

ICTs and Supply Chain: The Competitiveness of Small and Medium Scale Enterprises (SMEs)

Gabriel Nyame, Francis Ohene Boateng, Nana Kwame Gyamfi, and Nana Yaw Asabere

Abstract— *The number of Small and Medium Enterprises (SMEs) operating in the Adum Central Business District (CBD) of Kumasi, Ghana continues to grow at an increasing rate, but still they do not conform to the right standards and appropriate parameters. No matter what business activities they embark on some Information and Communication Technologies (ICTs) can be effectively used to enhance their operations. This paper finds out the adequacy of dissemination of ICTs and its level of deployment in the operations of SMEs of trade businesses in the Adum CBD and establishes the level of awareness of computers and their related technologies among owner-managers. In order to do an in-depth assessment of the situation, the CBD was put into zones A, B, and C and enterprises were selected at random. Interview procedures and administered questionnaires were used to obtain data for analysis. In effect, the study established that though the level of awareness is high, only 23% of these SMEs use computers whilst 49% use mobile phones to support their businesses. Also, 54% of these enterprises do not have access to the Internet. Thus, the exploitation and deployment of ICTs remain a greater challenge to these enterprises. It is recommended that the Ministry of Trade and Industry and other stakeholders organize programmes to enlighten owner-managers on the prospects of using ICTs to gain competitive advantage. In addition, the ICT industry must be revamped and freed from bottlenecks surrounding access to hardware and software.*

Index Terms— Awareness, Competitiveness, Digital Enterprise ICTs, Owner-Managers, SMEs, Supply Chain.

I. INTRODUCTION

Small and Medium Enterprises (SMEs) are enterprises that employ relatively small financial and human capital to do businesses of all kinds. In Ghana, owner-managers find it easier to engage in trade businesses than the other forms of businesses. Tang [1] explained that the entrepreneurial economy is as a result of vibrant SMEs through persistent innovations in national economies. It must be pointed out that the definitions of SMEs differ from country to country, but usually fall within the context of financial capital and level of employment. Stokes and Wilson [2] however defined SMEs in relation to social structures and relationships as there are differences in the levels of resources. Kotelnikov [3] defines SMEs as enterprises that employ not more than 250 employees. Variations in the definitions of SMEs are as a result of differences in business processes, structures,

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economic situations, culture, demography, market layouts, government regulations and policies, institutionalizations, social and ethic dimensions.

ICTs are all those electronic technologies that are capable of accepting data in forms such as texts, voice, graphics, or videos for processing to produce information for decision making. Kushwaha [4] also defines ICTs as technologies and tools that people use to share, distribute, and gather information to communicate with one another, one on one, or in groups, through the use of computers and interconnected networks. In a 1992 report of DFID [5], ICTs are defined as technologies that are used for collecting, storing, processing and communicating information by electronic means.

The Ghana ICT for Accelerated Development (ICT4AD) Policy (2003) emphasized the need to disseminate ICTs to all aspects of Ghanaian communities, which includes SMEs as one of the targets to champion real deployment of ICTs for a more vibrant technologically based business environment. Entrepreneurs are decision makers of their own businesses and that it is necessary for them to become computer and web literates so that they can use more computerized tools to support their work. According to Kuppusamy *et al.* [6], this leads to a positive correlation between managerial decision making and its computerized support. In a similar context, Kushwaha [4] explained that these technologies really impact on business strategies, performance, and competitiveness. Stokes and Wilson [2] stressed that SMEs form a greater part of the informal sector, and hence contributes significantly to Gross Domestic Product (GDP) whenever assessing the overall productivity of an economy. According to Abor and Quartey [7] SMEs represent 92% of Ghanaian businesses and contribute about 70% to Ghana's GDP and over 80% to employment for the year 2010. Laudon and Laudon [8] emphasized that SMEs are expected to be digital enterprises so that their business relationships with customers, suppliers, and employees are digitally enabled and mediated.

As pointed out by Popoola [9], the capabilities of computers extend to monitoring and controlling work practices in real time. Thus, the core business processes are accomplished through digital networks spanning the entire business entity or linking multiple businesses. Papastathopoulos [10] argued that the adoption of ICTs into the operations of SMEs increases interoperability and transparency among businesses so as to improve effectiveness, quality and security in all business transactions. Today, SMEs appreciate computers and their related technologies yet they fail to exploit and deploy the appropriate ICTs necessary for enhancing business practices along the supply

chain. Computers aid market survey and analysis as more data are gathered about prices, products, services, competitors, consumption patterns of consumers, and trading policies and regulations.

It must be emphasized that the strategic use of ICTs (especially computers, the Internet and Web tools) in the operations of SMEs can position a business entity competitively in the industry it operates. With the use of computerized decision support systems, it is very easy to select appropriately among various variables and performing analysis on them. This is one modest way to speed up the decision making process for quality delivery of service for both customers and suppliers belonging to the supply chain. Thus, the ability of SMEs to access ICTs creates an enabling platform for enhancing their operations, and hence performance.

Though it is generally expensive to invest in ICTs [11], owner-managers can still evaluate the entire business operations and come out with those functional areas that seriously require some level of ICT deployment. Marker *et al.* [12] accentuated that ICTs must be strategically utilized to address specific business needs and not to invest in them as something for the order of the day. It is evident that ICTs foster the operations of SMEs both internally and internationally as they are able to monitor activities in both domestic and international markets. Hence, the adoption of ICTs in the operations of SMEs is one of the most important aspects of supply chain management practices in recent times.

This further strengthens the fact that SMEs that fail to integrate ICTs as instruments of business processes find it difficult to overcome challenges in the domestic market in particular and the global market in general [13]. It is against this background that Shiels *et al.*, [14] pointed out that the internet has forced businesses especially SMEs to critically examine their own business practices and how best they can adopt new ways of working to achieve significant market shares. Davenport and Harris [15] were of similar view that it is still a requirement for owner-managers of SMEs to at least invest in ICTs especially the internet in order to become part of the global village. According to Sevrani and Bahiti [16], ICT investment is considered insufficient in many developing countries due to the slow pace of development in the ICT industry.

Due to the importance of ICTs in the supply chain of SMEs, the main objective of this paper is to analyze and evaluate the adequacy of ICT dissemination and its level of deployment in the SME operations of trade businesses in the Adum CBD. Furthermore, we establish the level of awareness of computers and their related technologies among owner-managers pertaining to the case study zones.

The paper is presented in four sections. After the Introduction in Section I, Section II presents the Research Methodology and Data Collection Instruments and Section II presents the Results and Discussions. The paper is finally concluded with a recommendation in Section IV.

II. RESEARCH METHODOLOGY AND DATA COLLECTION INSTRUMENTS

The study focused on the Adum Central Business District (CBD) of Kumasi (a popular city in Ghana). The focus of the study did not include Central Market and Kejetia Lorry Park because the trade enterprises at these places are more structured and their products, services, and operations exhibit common characteristics in terms of operational capacity, physical size and location, business and marketing strategies, goods sold or services rendered, and small market share. The study was not sensitive to a particular type of commodity or service an enterprise deals with because any business dealing in whatever goods or services of any kind can still utilize some ICTs for effective operations and hence speed up decisions and improve performance.

Exploratory and descriptive approach was used to determine what actually exists in terms of computers and their related technologies and the degree of their exploitation and deployment for business practices. Bryman and Bell [17] were of the view that such a design gives a thorough understanding of the phenomenon under study. A case study strategy was adopted to help the researchers/authors conduct a reliable assessment on the awareness and use of ICTs for business operations. It is for this reason that Yin [18] emphasized the relevance of the case study approach as a good strategy for better empirical investigation into states of phenomena.

We however emphasize that a reconnaissance survey was initially carried out to determine the principal streets that would be considered in zoning out the Adum CBD into zones A, B, and C. These zonal markings helped us to assess and describe the current situation thoroughly on the dissemination, exploitation and deployment of specific computer technologies including access to the internet for commercial activities. A simple random sampling technique was used to select samples from each of the zones. Thus, questionnaires were administered in all the three Zones. In this case, an interviewer-administered questionnaire procedure was used to ensure a high response rate [19], that is, on the part of owner-managers. This was complemented by other sources of secondary data.

A total of 2,816 trade enterprises were obtained after a headcount as against 2,472 obtained by Skymount Consult Limited in 2010 indicating a 13% rise in the population. The number is however expected to increase further as the CBD goes through a gradual transition of modern business operations and marketing strategies in terms of physical structures and modern technologies. Techniques and tools of exploratory data analysis involving Microsoft Excel Charts were deployed to establish relationships among variables, and this helped to establish the extent of deployment of ICTs in the Adum CBD of Kumasi, Ghana.

III. RESULTS AND DISCUSSION

On the basis of ICT awareness among owner-managers of trade enterprises in the Adum CBD, 98% are

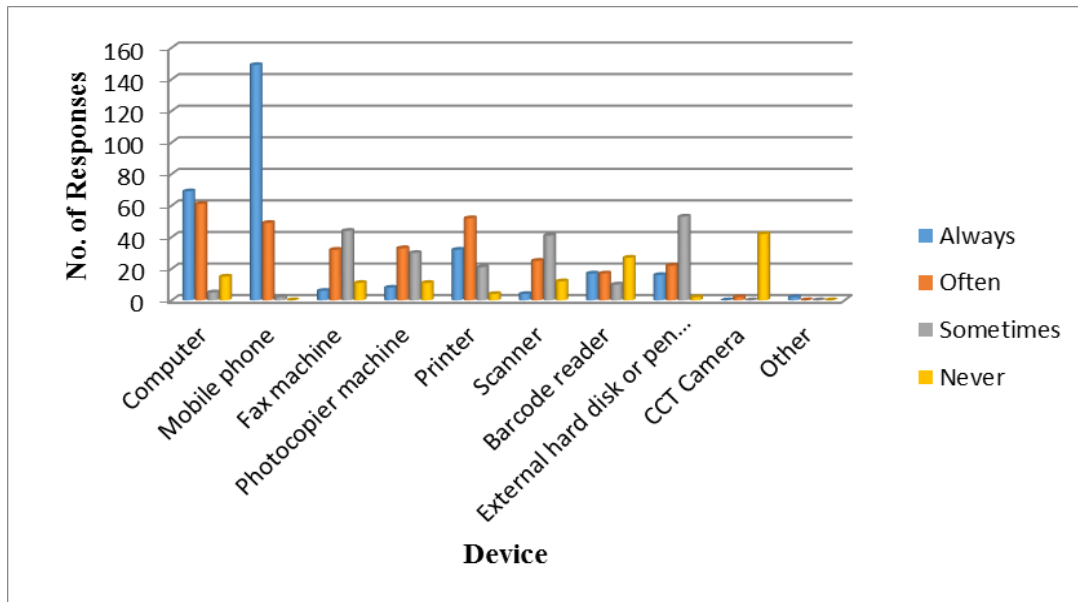


Fig.1. Extent of use of hardware technology

consciously aware of ICTs, particularly computers and their related technologies such as mobile phones, internet and web tools. It was however clear from the study that 76% of these owner-managers did not see the need for using computers for their businesses though they could afford them. This indicates that these owner managers do not really know what they can use computers to do as far as their business operations are concerned.

A. Adoption of ICTs in Trade Enterprises

On the basis of the adoption of ICTs by SMEs in the Adum CBD, it was evident that a greater number of owner-managers use mobile phones to transact businesses. The study revealed that 149 of owner-managers always use mobile phones to do their businesses, representing 49% whilst 69 of them use computers, representing 23%. These mobile phones were mostly used for voice communications about their businesses and not for equally accessing the internet for online transactions. Also, only few enterprises always use fax machines, photocopier machines, printers, and scanners representing 2%, 3%, 11%, and 1% respectively. These are shown above, in Figure 1. It must be noted that 17 of these enterprises representing 6% always use barcode readers to identify prices of products being sold. These enterprises were mostly those into groceries and supermarkets businesses.

B. Computer Application Software for Business Support

With the development of intelligent Commercial-Off-The-Shelf (COTS) and customized enterprise software, trade enterprises are gradually becoming oriented in the applicability of real time computer software technologies. The study revealed that 62% of these trade enterprises had branches of their businesses in other market centers such as Kejetia Lorry Park, Central Market, Bompata Area, and Bantama Market all in Kumsai, Ghana. These branches sometimes include their remote warehouses. The study further established that trade enterprises lack integrative and collaborative enterprise applications that can

help monitor effectively and cohesively the overall activities of the business, usually in real time.

In the context of use of some computer applications, the study showed that a total of 86 enterprises used custom-made software as against 35 in the case of COTS. Though a significant number of the enterprises used custom-made software, they were primarily Point-of-Sales (POS) software and Inventory software with very little or no analytical capabilities. This is however an indication that owner-managers at least understand the essence of deploying computer-based software systems for routine tasks. It is still inadequate as they strive to remain competitive along the supply chain with the objective of having good market share. This significantly affects their operational capacities, computer technological skills development and profit margins. A total of 29 of these enterprises had never used either custom-made or COTs software or both. Figure 2 below shows the extent of use of these applications among the trade enterprises.

In the use of custom-made application software, a greater number of these enterprises use POS software all the time for routine tasks representing 48% whilst cash register represents 27%. Inventory and TPS were 14% and 3% respectively indicating lower rate of inventory practices among these enterprises. The study revealed that a total of 26 enterprises do not use any of the custom-made software for their business activities. Inevitably, this contributes to the low number of owner-managers who use computers for their businesses.

It was however clear from the study that owner-managers fail to consider using management and decision support application systems, which provide enterprise-wide application with good analytical tools for monitoring and evaluating the progress of work and hence enables quality decisions to be made in less time.

C. Computer-Based Technologies and Decision Making

Owner-managers commit resources to ICTs with the hope to not only speed up their decision making processes but

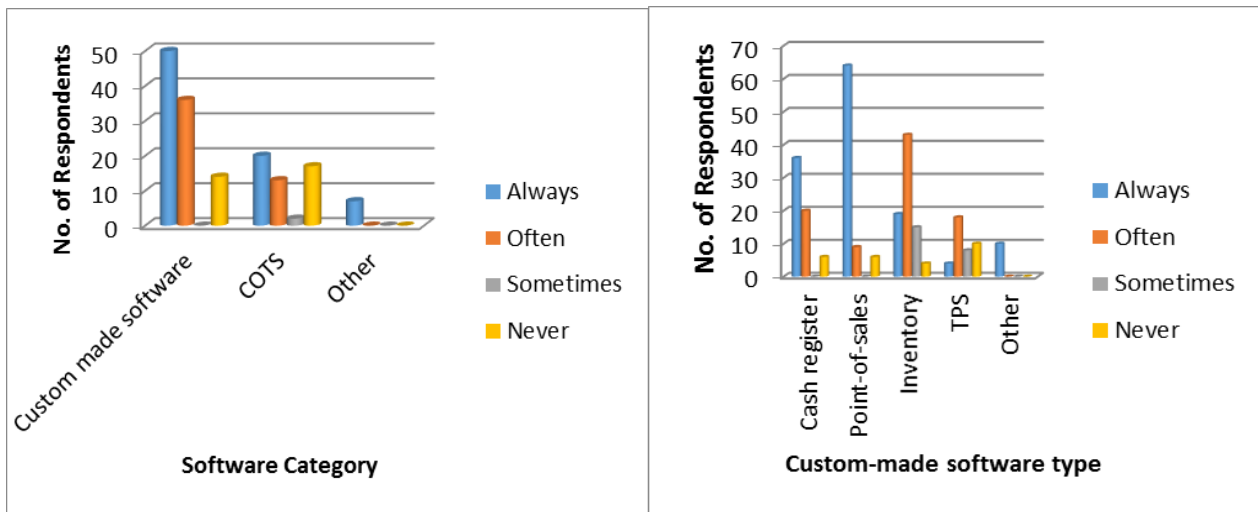


Fig. 2. Trade software and the extent of use

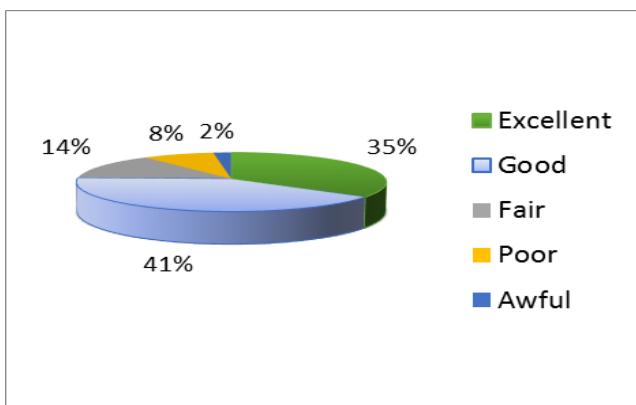


Fig. 3. Support of computer technologies in business activities

also to see some considerable improvements in their businesses. If such ICT integration largely impacts business performance, owner-managers easily commit more resources to the business. Thus, the study revealed that 35% and 41% of owner-managers rated the deployment of computer

not realize any significant support in using ICTs for their business operations as shown above, in Figure 3. This may be possibly due to wrong choice of appropriate technologies ignorance and lack of skills.

Furthermore, the study established that a total of 73% of owner-managers are able to speed up their decision-making processes through the use of computers and communications technologies in the context of quality product or service delivery in a timely manner. However, 21% of owner-managers claimed that the use of computer technologies cannot in any way improve their decision making processes. These are shown above, in Figure 4. In spite of this, it is still clear that ICTs contribute significantly to the decision making process of trade enterprises in the Adum CBD irrespective of the types of businesses being engaged in.

E. Contribution to Profit Margin

A total of 51% of owner-managers claimed a significant increase in profit margins resulting from commitment to ICT investments in their businesses whilst 7% see no considerable change in profit margins. 14% are indifferent about any significant increase and this according to Hall [20], is probably as a result of inappropriate technologies or

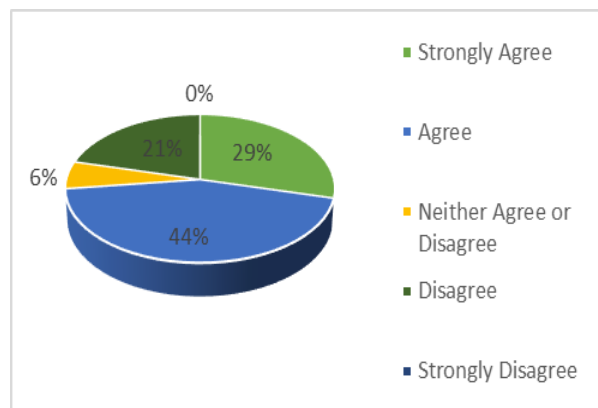


Fig. 4. Computer technologies and the decision making process

technologies to businesses as excellent and good respectively. This explains the significant value that can be obtained from the deployment of computer technologies in the operations of trade enterprises. On the contrary, only a total of 10% did

failure to measure ICTs' contribution correctly on the business operations. Moreover, such owner-managers are simply incapable of using any reliable index or scheme to measure such benefits obtained from using ICTs.

F. Inter and Intra Communications of Trade Enterprises

Effective communication and collaborative tools are mostly used in the operations of SMEs in trade businesses in order to strengthen the information flow for quick decision making at all levels within the enterprise. The study thus revealed that 129 (69%) of the enterprises in the Adum CBD at all times communicate with individuals, groups, stakeholders, partners, and other businesses all through face-to-face interactions. A total of 85 enterprises used computer networks for communication purposes and 36 had no network facility.

However, in relation to the extent of using computer networks, 35 (29%) use it from time to time but not much is seen on their tenacious usage. Also, 38 (33%) and 41 (36%) claimed that they had not used Intercom and Memos for communication purposes before. These are illustrated below, in Figure 5. The high degree of face-to-face form of communication greatly affects business practices and hence slows down

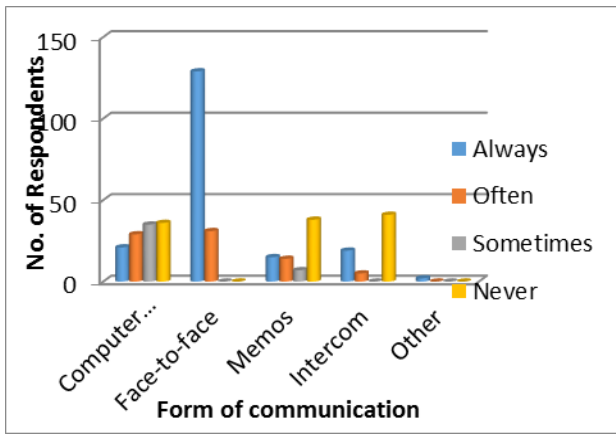


Fig. 5. Mode of communication within and outside the enterprise

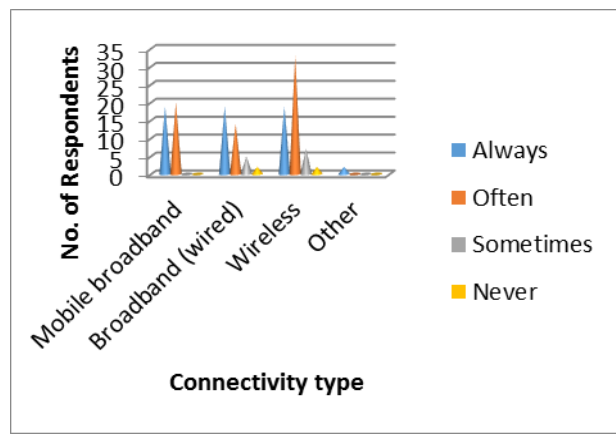


Fig. 6. Form of internet connectivity

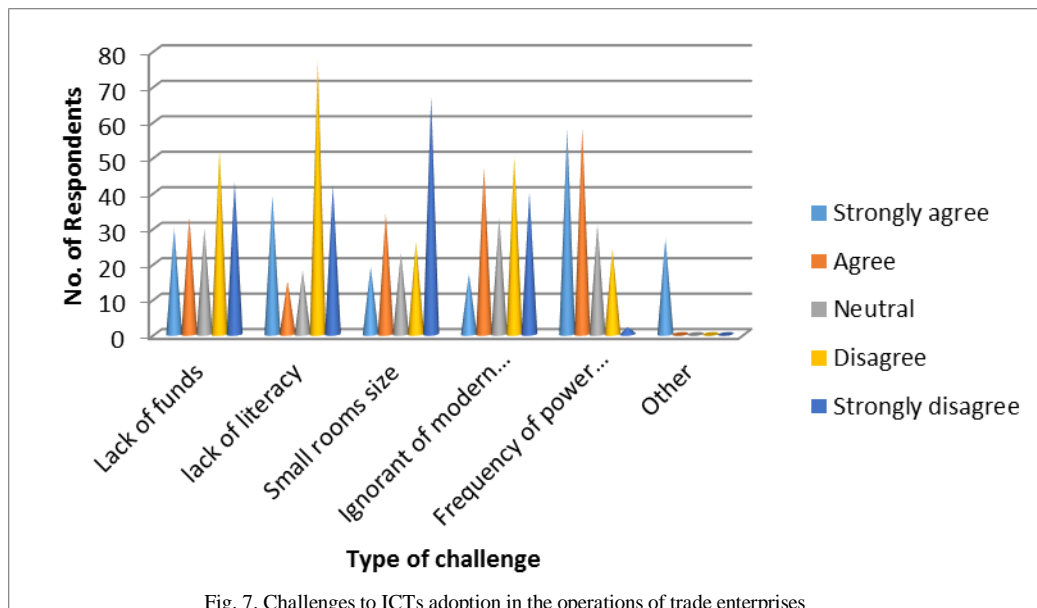


Fig. 7. Challenges to ICTs adoption in the operations of trade enterprises

effective decision making. This is a possible deprivation of owner-managers in accessing relevant information that affects their businesses.

G. Internet Connectivity

In the supply chain process, businesses rely on timely and accurate information for making better decisions that affect their business operations either for now or future purposes. As pointed out by Hoffer *et al.* [21], the internet and its derivatives such as intranets and extranets are the infrastructures upon which communications for collaboration either within or outside an enterprise occurs.

One common use of the web is that it supports collaborative decision making through collaborative tools and access to data, information, and knowledge from outside and inside an enterprise. The study established that 46% of trade enterprises had internet access on site as against 54% that did not have. Owner-managers are connected to the internet through wireless, wired and mobile broadband connection representing 43%, 28%, and 27% respectively. This indicates that only 1% possibly use their mobile phones to access the internet. Out of 59 enterprises that used wireless connectivity, 33 often connect to the internet to access

information in order to enhance their businesses whilst 19 always connect to the internet and 7 from time to time through the same means.

On the contrary, a total of 26 had never used the internet. These are shown above, in Figure 6. This implies that the capabilities of the internet are still not exposed to some trade enterprises and this affects their competitiveness along the supply chain.

The study revealed that use of the internet at all times for the purpose of business transactions represents 43% as against frequent and occasional use of it representing, 25% and 22% respectively. We also noticed that the irregular use of the internet for business transactions is possibly due to inadequate skills and lack of knowledge on internet-based tools and systems for supporting business operations.

H. Challenges of Adopting ICTs in Business Practices

The adoption of ICTs to business operations of SMEs in trade business operations continue to face challenges in terms of funds, skills and competences, ignorance, technological know-how, and operational capacity. It is apparent that a greater number of owner-managers face the challenge of adopting

ICTs in their business activities mainly in terms of lack of funds, lack of literacy skills, ignorant of modern technologies, small room size and frequent power fluctuations. However, a total of 135 were indifferent in considering these factors as any challenge to the adoption of ICTs in business activities.

From Figure 7, the study revealed that a total of 66 believed that they lacked the needed funds to be able to

Despite these barriers of ICT adoption, owner-managers of enterprises in the Adum CBD understand that exploitation and deployment of ICTs offers the following benefits:

1. Eases business transactions.
2. Enhances faster communications.
3. Facilitates record keeping and stock control.
4. Helps obtain relevant information on time for business decisions.
5. Improves quality service delivery for customers.
6. Helps monitor sales activities.
7. Makes work easy and speeds up decision making processes.
8. Helps in solving problems without much difficulty.

IV. CONCLUSION AND RECOMMENDATIONS

With a reflection on the SME case studies used in this paper, it is evident that not much has been done in the creation of level of awareness in terms of the capabilities of computers and their related technologies in the context of proper and efficient utilization of trade enterprise applications. Some owner-managers of SMEs are not effectively utilizing ICTs, such as the internet and the related web tools, as well as mobile phones not only for voice communications but for accessing relevant information from the internet and this has exposed the decreasing rate of global ICT opportunities along the supply chain. Therefore, the integration of ICTs to the operations of SMEs in trade business operations has become a key success factor in determining the operational capacity and competitiveness in the markets and industries they operate.

SMEs, which conduct profitable trade business operations can in a small way put in place computer network infrastructures that provides a common platform for information sharing, delivery, and processing irrespective of location. Owner-managers must connect to the internet either through the use of fixed telephone lines or through their mobile phones. This enables them to become active members of the supply chain because at any point in time they can liaise with their suppliers, customers, and partners or collaborators when the need arises.

The study however recommends that Government, Ministries, Departments, Agencies, Non-Governmental Organisations (NGOs), individuals, groups and all stakeholders must contribute to the development of the ICT industry because it provides a formidable platform for vibrant business practices and hence a better dissemination of ICTs to all communities as enshrined in the Ghana National ICT for Accelerated Development (ICT4AD) Policy. Such innovative procedure will strengthen the competitiveness of owner-managers in both local and international markets for overall vivacious business environments. As market demands continue to change, advanced tools must be used to monitor the behaviour of the market and to determine the

effectively deploy ICTs and this represents 34% whilst 95 did not see that as any challenge. This is an indication that majority of these owner managers can afford to commit resources to some relevant deployment of ICTs but possibly lack the required understanding and direction of their investments.

strategies to adapt for better performance. Thus, the use of such strategic decision support systems enhances decision making, collaboration and performance.

It is an established fact that SMEs operate with relatively small amount of investment capital, and also on smaller scale of operation and do not enjoy some economies of scale. However, an ICT policy framework must be put in place to guide the rate of their adoption to the business. In terms of ICT literacy skills, owner-managers need to acquire knowledge and skills in the use of some specific ICTs they can relatively deploy to support their businesses. This can be achieved through workshops, seminars and education on the electronic media. In this way, owner-managers can decide for themselves the kind of technologies that can best support their businesses.

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