

Assessing the Impact of Information and Communications Technologies on the Performance of Small-Scale Enterprises: Case of Kitwe (Zambia)

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ABSTRACT

Micro Small and Medium-sized Enterprises (MSMEs) are the engine of most economies worldwide. Small-scale enterprises, including those in Zambia, face many challenges. ICT is one lever that small-scale enterprises can use to increase their productivity, competitiveness and efficiency thus overcoming some of the challenges faced.

This empirical research explored the impact of ICTs on the performance of small-scale enterprises. ICTs were divided into mobile phone, computer, Internet, email and website/Facebook page. While the Internet is needed to access email, websites and Facebook, the use of Internet in this research alluded to the use of the Internet for searching information, making online payments and accessing other Internet-based services (apart from email and Facebook) such as online storage. Porter's value chain model was used to classify small-scale enterprise business activities into supplier-related, internal operations-related and customer-related value-chain activities. Data was collected from 88 Kitwe-based small-scale enterprises and then analysed using Microsoft Excel.

The study results showed that ICTs have the most impact on costs/time reduction compared to sales/revenue increase, the mobile phone is the most used ICT and ICTs have the most impact on supplier-related activities.

Keywords: ICTs, Small-Scale Enterprises, SMEs, MSMEs, Performance, and Value Chain

1.0 INTRODUCTION

Information and Communications Technologies (ICTs) play a critical role in almost all aspects of modern life. ICTs are used by individuals, communities in society, enterprises in various industries and in some cases ICTs are the core business of some enterprises.

A business enterprise or firm - large or small - is a collection of activities that are performed to design, produce, market, deliver, and support products or services and these activities can be represented by a value chain [1]. ICTs used by business enterprises across the value chain include the Internet, websites, Facebook pages, emails, voice calls, instant messaging, SMS and enterprise software. For example, the Internet is used to search for the cheapest suppliers. Websites and Facebook pages are used for marketing the firm's products and services, and in some cases used for obtaining customer feedback. Emails, voice calls, instant messaging, and SMS are used to communicate with suppliers, for communication among employees and also for communicating with the customers. Various software is used for managing the functional activities within an enterprise, for designing products and for managing customers.

The ICT sector in Zambia is regulated by Zambia Information and Communications Technology Authority (ZICTA) which is in the Ministry of Transport and Communications of the

Government of the Republic of Zambia (GRZ). Unfortunately, SMEs are largely unaware of existing policy instruments designed to help them in their adoption and use of ICTs [2].

Globally, it is acknowledged that MSMEs play a vital role in the economic development of many countries. So much so for Zambia which is economically heavily dependent on mining. MSME business activities in Zambia are largely in simple manufacturing, service provision and trading [3]. In 2006, the Ministry of Commerce, Trade and Industry (MCTI) defined micro, small and medium enterprises as shown in Table 1.1.

Table 1.1: Recommended Definitions for Micro, Small and Medium Enterprises for 2006

Business Enterprise Category	Upper Limit Values		Number of Workers 2006
	Investment Value in ZMW (2006)	Turnover Value in ZMW (2006)	
Micro	70,000	140,000	10
Small (Manufacturing)	500,000	800,000	45
Small (Trading / Services)	100,000	800,000	45
Medium (Manufacturing)	1,800,000	5,000,000	100
Medium (Trading / Services)	600,000	5,000,000	100

Source: MCTI (2008)

According to MCTI [4], some of the challenges and constraints experienced by MSMEs include limited access to markets, appropriate technology, suitable business financing solutions and telecommunication facilities. The large enterprises have successfully and traditionally used ICTs to overcome the aforementioned challenges and constraints faced by the MSMEs. Small and Medium-sized Enterprise (SME) owners and managers perceive ICTs to be costly and complex and are also wary of consultants and vendor organisations [2]. Furthermore, only a small number of SMEs are aware of the benefits of ICT adoption [5]. Since the digital flows of data and information now generate more economic value than the global goods trade [6], SMEs can also use ICTs to exploit opportunities particularly those beyond Zambia's borders.

This research focused on the following two questions:

1. Which ICTs are mostly used by the small-scale enterprises in their operations?
2. In which small-scale enterprises' operations, within the value-chain, does the use of ICTs have the most impact?

The two specific objectives of the research were:

1. To identify the ICTs most used by small-scale enterprises in their operations.
2. To establish the small-scale enterprises value-chain activities (among supplier-related, internal operations-related and customer-related activities) in which ICTs have the most impact.

The proposed hypotheses of this study were as follows:

- H1:** The use of ICTs by small-scale enterprises has a positive influence on sales or revenue increase.
H2: The use of ICTs by small-scale enterprises has a positive influence on costs or time reduction in performing some business operations.

This research outlines the ICTs which significantly contribute to the performance of small-scale enterprises. Furthermore, the research shows at which levels of the small-scale enterprise value chains the various ICTs have the most impact.

2.0 LITERATURE REVIEW

While some sizeable research has been done on the impact of ICTs on the performance of enterprises in general, in Zambia there has not been much research done specifically on the impact of ICTs on the performance of small-scale enterprises. For instance, Research ICT Africa (RIA) Network did a survey on ICT usage and its impact on the profitability of SMEs in 14 African countries which included Botswana, Cameroon, Ethiopia, Ghana, Kenya, Mozambique, Namibia, Nigeria, Rwanda, South Africa, Tanzania, Uganda, Zambia and Zimbabwe [7]. However, the data for Zambia was not processed on time to be included in RIA's final report.

Some studies have been done in developed countries that highlight the impact of the use of Internet and e-business on SMEs [8,9,10,11]. In contrast, a few studies have been done in developing countries and these studies primarily focused on the adoption of ICTs and not the impact of ICTs [12,13,7,14].

The empirical evidence of the effects of ICTs on small enterprises is very limited partly due to data problems [15]. Alam and Noor (2009) noted that the majority of the empirical research is based on large companies and usually SMEs are characterised as lacking knowledge about the possible actual advantages of ICTs [16]. However, Alberto and Fernando (2007) argued that the use of ICTs can improve business competitiveness with Internet providing numerous opportunities for SMEs to compete equally with large corporations [17]. Through the effective use of ICTs, SMEs can capture global markets, sell to international customers, and compete favourably with large corporations [18]. Matthews (2007) supported this approach and stated that there is some empirical evidence that small firms employing ICTs enjoy enhanced profitability and outreach and thus can better position themselves for more wholesale expansion [19]. The use of ICTs has an impact on the financial performance, the cost reduction, the use of technology and the competitiveness of SMEs [20].

Kreitner (2009) defines a small-scale enterprise as an independently owned and managed profit-seeking enterprise employing fewer than 100 people [21]. The definitions of a small business varies from country to country and are ideally defined specifically according to sector [7,22]. The definition of an enterprise as micro, small, and medium takes into account the number of employees, investment and turnover [3,23,24]. Small-scale enterprises have been called the engine of most of the countries' economies [20,21,23]. The SME sector largely exceeds the average economic growth of national economies in many countries and contributes significantly to employment creation. As a result, the SME sector has an important role to play in economic development, poverty reduction and employment creation in developing economies [7,25,20]. The contribution of ICT investment to economic growth in the US from 1960 to 1990 was analysed and it was revealed that half of the US's economic growth was due to ICT investment [26,27].

The definition of ICT in a universal sense is a challenge because of the diverse applications of the term ICT within several contexts which include economic development, education, IT, business and personal usage [28]. ICT captures both telecommunications technology and Information Technology (IT) which until recently were treated as distinct and separate technologies. This is now necessary because the two technologies - telecommunications and IT - can not be used in isolation if realistic value is to be captured from either technology. The International Telecommunication Union (ITU) defines telecommunications as any transmission, emission or reception of signs, signals, writings, images and sounds or intelligence of any nature by wire, radio, optical or other

electromagnetic systems [29]. The term Information Technology was first used by Leavitt and Whisler in 1958 [55]. Porter (1985) used the term Informations Systems Technology to refer to IT and went on to argue that information systems have a profound impact on competition and competitive advantage because of the pervasive role of information in the value chain [1]. A research done in 2009 in Gauteng in South Africa to determine how SMEs can use ICTs to become more competitive concluded that when ICTs are implemented as part of the business strategy to support the business processes, ICTs can lead to a competitive advantage [30]. However, the adoption and use of ICTs among SMEs is mainly focused on operational matters with few extensions into the potential strategic use of such technologies [2].

The ICT hardware, such as telephones and computers, are the physical tools through which ICT services and software are used. The bellwether ICT device is the telephone, particularly the mobile cellular telephone. Since the invention of the telephone by Alexander Graham Bell in 1876 [31], the telephone has evolved dramatically. In Zambia, the current number of mobile cellular telephones and fixed telephones (landlines) is 10,114,867 and 114,420, respectively [56]. According to Chiware and Dick (2008), service providers should now use more mobile phone-based technology services to reach out to more SMEs [32]. Mobile Network Operators (MNOs) can be used as a platform to effectively provide credit to SMEs [7]. According to the latest ZICTA survey, there has been a marked improvement in the proportion of Zambian households that have access to a computer, determined by at least one member of the household owning a computer, from 4.9% recorded in 2013 to 7.1% in 2015 [33].

Some ICT services accessed via the aforementioned devices include voice, video, Short Message Service (SMS), Unstructured Supplementary Service Data, instant messaging, Internet, email, websites, social media, data processing, data storage, and cloud computing. SMS-based applications can have a positive impact on SMEs' profitability [7].

The Internet, with its associated services of email and websites, is the most fundamental ICT service in the modern digital era. The World Wide Web (the Web) which was initially only a platform for retrieving published information is now being transformed into a more creative and interactive platform for the masses to share content and opinions. This transformation process has been dubbed Web 2.0 [34]. Some SMEs and startups are using Web 2.0 tools for innovation [35]. Web 2.0 has also led to the development of social networking sites such as Facebook, Youtube, LinkedIn and Twitter. The Internet is also the enabler of e-business, which is the use of the Internet for greater efficiency in business operations [21,36].

Facebook is the most popular and largest social networking site used for both personal and business activities. This is because whilst both a Facebook page and a web page have nearly the same efficacy, a Facebook page is free of charge and easy to set up via a click-through process whilst a web page is a bit costly and its setting up is a relatively tedious process. The number of SMEs on Facebook has doubled from 25 million in 2013 to over 50 million as of 2016 and 30 percent of these SMEs' Facebook fans are cross-border [6]. In 2010, the World Bank's database for 132 countries had 125 million MSMEs [22].

ICT devices need software to make the above ICT services possible. Software is generally divided into system software (operation system), programming software [37] and application software [38]. The most popular operating system for computers is Microsoft's Windows while for mobile cellular phones it is Apple's iOS and Google's Android. On top of these operating systems runs a plethora of programming software and application software. The recent advances in electronics have resulted in high computing power and affordable data storage [39]. SMEs are now looking to cloud-based services for computing, storage, big data and business applications [40].

The clear distinction between ICT devices, service and software has begun to blur as a result of convergence between telephone networks and data networks. ICT customers seek the same functionality from all their telecommunication services and also wish to access all their services from whatever hardware they happen to be using [41]. Technology is also embodied in every value activity in an enterprise and Porter illustrated the range of technologies typically represented in a firm's value chain activities [1]. Porter showed that Information Systems Technology is the most pervasive of all technologies followed by Communication Systems Technology. In fact, Information Systems Technology is used in all the enterprise activities. These two technologies that Porter separately referred to as Information Systems Technology and Communication Systems Technology in 1985 are now collectively referred to as ICTs.

The most common performance evaluation criteria of a firm is on the basis of accounting measures of performance such as profit margin, return on equity market share, and cost reduction [42,43]. Return on investment has been used by some researchers to assess the impact of ICT investment on firm performance [14,44,27].

3.0 THEORETICAL AND CONCEPTUAL FRAMEWORK

ICT was divided into five components namely Mobile Phone, Computer, Internet, Email and Website/Facebook page. While the Internet is needed to access email, websites and Facebook, the use of Internet in this research alluded to the use of the Internet for searching information (e.g. using Google), making online payments (Internet banking) and accessing other Internet-based services (apart from email and Facebook) such as online storage. The measurement of the use of the five ICTs was based on the the frequency of use and the duration of use.

The research survey participants were initially asked quantitative questions on whether they used the five ICTs, and if yes, for how long and how frequently based on the level of agreement with some statements using the 3-point scale (Not At All, Sometimes and Always). Further quantitative questions, using the same 3-point scale were used to measure the use of ICT in customer-related activities, internal operations-related activities and supplier-related activities.

Small-scale enterprise performance was measured using two criteria:

1. Increased sales transactions or increased revenue volume
2. Reduction in costs or time in performing a company's activities.

The measurement was based on the level of agreement with some statements using a different 3-point scale (Not At All, Moderately and Significantly).

4.0 RESEARCH METHODOLOGY

The targeted population for this research was the small-scale enterprises based in Kitwe, the most centrally located town on the Copperbelt Province of Zambia. Zambia's economy is largely dependent on mining, mostly of copper, which accounts for almost 70% of the country's foreign exchange earnings. Six of the nine large-scale copper mines are in the Copperbelt Province, which comprises of eight towns each bustling with economic activity backed by both mining and mining-related activities. The sampling frame was the 528 Kitwe-based entities (companies) listed with the Patents & Companies Registration Agency (PACRA) from 1st January 2010 to 13th January 2016. The sample size was 30% of the sampling frame and simple random sampling was used to select the 158 (30% of 528) small-scale enterprises for this study.

A researcher can gather secondary data, primary data, or both. Secondary data are data that were collected for another purpose and already exist somewhere. Primary data are data freshly gathered for a specific purpose or research project [36]. A

questionnaire was developed to gather primary data from small-scale enterprises in January and February 2016. The questionnaire comprised of four (4) sections. Section-I assessed the profiles of the respondents and the characteristics of the small-scale enterprises. Section-II explored how frequently the small-scale enterprises used each ICT (mobile phone, computer, Internet, Email and website or Facebook page) based on a 3-point scale (Not At All, Sometimes and Always). Section-III examined the use of ICTs by small-scale enterprises in the value-chain activities relating to suppliers, internal operations and customers. Section-IV enquired into the performance of small-scale enterprises, particularly the increase in sales transactions or revenue and the reduction in costs or time in performing some business activities. Out of the randomly selected 158 small-scale enterprises from the sampling frame, the research only managed to locate and administer questionnaires to 137 small-scale enterprises. Out of the 137 questionnaires distributed, only 116 questionnaires were answered and subsequently collected yielding a response rate of 84.7% .

Secondary data - in the form of articles and Zambian policy on ICTs and SMEs - were collected and analysed. Zambian policy on SMEs was obtained from MCTI, Zambia Development Agency and Central Statistical Office (CSO) websites whilst the policy on ICT was acquired from the ZICTA website. Further secondary data sources included research journals, business and management magazines, publications by professional bodies, academic books and research on the Internet.

5. FINDINGS AND ANALYSIS

Following the evaluation for incomplete data, 17 of the 116 collected questionnaires had missing data which was requisite to the study thus leaving only 99 questionnaires for further research purposes.

The last official sizing of enterprises in 2006 as tabulated in Table 1.1 was adjusted using the Consumer Price Index factor between December 2006 and December 2015, and the growth of the economically active population from 5,003,871 in 2008 to 6,329,076 in 2014 [57]. Of the 99 survey participants who had fully answered the research questionnaire, 11 had a total investment over the recommended investment limit. Therefore, only the data from 88 small-scale enterprise met both the small-scale enterprise criterion and the research framework. The data obtained was analysed using Microsoft Excel with particular reference to the research questions using the descriptive statistical tools of tables and charts.

Table 5.1 and Table 5.2 show the professional profiles of the respondents and characteristics of the 88 small-scale enterprises that fully met the criteria for this study, respectively.

Table 5.1: Professional Profile of Respondents

Characteristic	Respondents (n)	%
Current Position:		
Owner	43	48.9%
General Manager	17	19.3%
Finance Manager	8	9.1%
Other	20	22.7%
Total	88	100.0%
Years in Current Position:		
Less than 1	0	0.0%
1-2	9	10.2%
2-3	7	8.0%
3-4	23	26.1%
More than 4	49	55.7%
Total	88	100.0%

Source: Author

Except for the websites/Facebook page, it was evident from the survey results that it is statistically difficult to find small-scale enterprises that do not use ICTs so as to compare the

performance of the small-scale enterprises that use ICTs and the performance of the small-scale enterprises that do not use ICTs. This is in line with Carr’s findings which show that ICTs are an infrastructural technology - such as electricity - which a business can not do without [45].

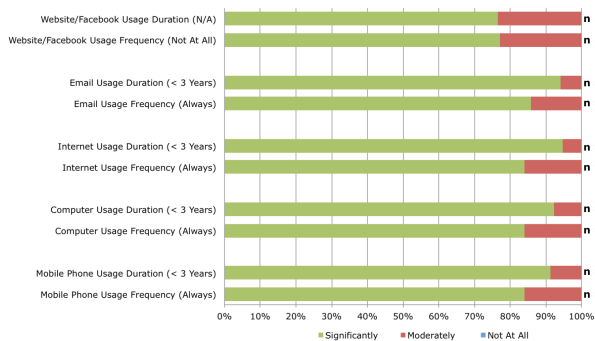
According to the central limit theorem, the distribution of the mean of a sufficiently large number of different samples can be approximated using a normal distribution irrespective of the underlying distribution [46]. The minimum sample size, for use in parametric statistical tests, varies [47]. However, to be reasonably valid, at least a sample size of 30 is needed for a normal distribution-based analysis [48]. The data analysis for ICT usage categories with samples of more than 30 small-scale enterprises ($n > 30$) are summarised in the four figures below.

Table 5.2: Characteristics of Small-Scale Enterprises

Characteristic	Respondents (n)	%
Nature of Business:		
Service	28	31.8%
Trading	25	28.4%
Manufacturing/Construction	18	20.5%
Service & Trading	2	2.3%
Service & Manufacturing/Construction	1	1.1%
Trading & Manufacturing/Construction	11	12.5%
Other	3	3.4%
Total	88	100.0%
More than one Branch/Office:		
Yes	25	28.4%
No	63	71.6%
Total	88	100.0%
Number of Employees:		
Less than 11	30	34.1%
11 - 50	42	47.7%
51 - 100	16	18.2%
Total	88	100.0%
Investment (ZMW):		
Less than 165000	34	38.6%
166,000 - 235,000	45	51.1%
236,000 - 1,200,000	9	10.2%
Total	88	100.0%
Turnover (ZMW)		
Less than 300,000	49	55.7%
300,000 - 2,000,000	38	43.2%
More than 2,000,000	1	1.1%
Total	88	100.0%

Source: Author

Figure 5.1 : Impact of ICT Usage on Costs/Time Reduction

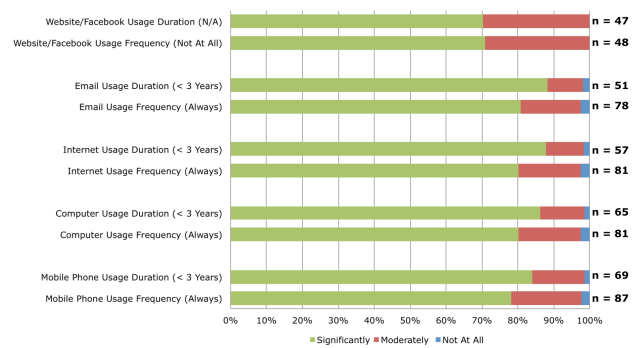


Source: Author

As shown in Figure 5.1, the use (always) of a mobile phone, computer, the Internet, and email in the business operations of small-scale enterprises has an impact on costs/time reduction, by at least 84% significantly. Thus H_2 is not rejected with regard to the frequent use of a mobile phone, computer, the Internet, and email by small-scale enterprises. The use of a mobile phone, computer, the Internet, and email for more than 3 years in the business operations of small-scale enterprises also

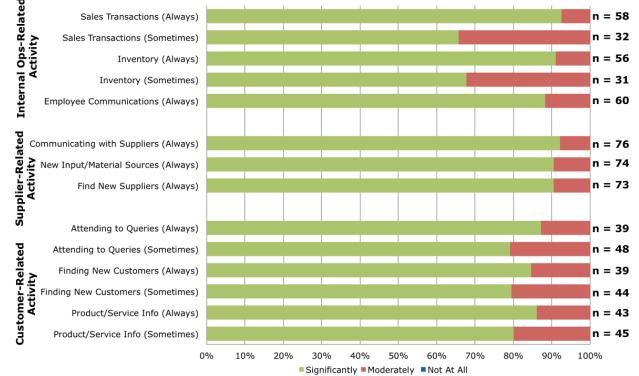
has an impact on costs/time reduction, by at least 92% significantly, thus H_2 is not rejected in this regard. The use of a website or Facebook page has no impact on costs/time reduction, by at least 72% significantly, thus H_2 is rejected with regard to the use of a website or Facebook page.

Figure 5.2: Impact of ICT Usage on Sales/Revenue Increase



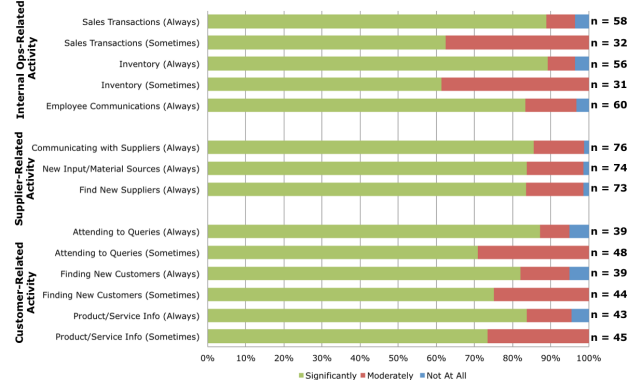
Source: Author

Figure 5.3: Impact of ICT Usage in Value-Chain Activities on Costs/Time Reduction



Source: Author

Figure 5.4: Impact of ICT Usage in Value-Chain Activities on Sales/Revenue Increase



Source: Author

Figure 5.2 shows that the use (always) of a mobile phone, computer, the Internet, and email in the business operations of small-scale enterprises has an impact on sales/revenue increase, by at least 78% significantly. Thus H_1 is not rejected with regard to the frequent use of a mobile phone, computer, the Internet, and email by small-scale enterprise. The use of a mobile phone, computer, the Internet, and email for more than 3 years in the business operations of small-scale enterprises also has an impact on sales/revenue increase, by at least 84% significantly, thus H_1 is not rejected. The use of a website or Facebook page has no impact on sales/revenue increase, by at

least 71% significantly, thus H_1 is rejected with regard to the use of a website or Facebook page.

As shown in Figure 5.3, the use of ICTs (*always and sometimes*) in the small-scale enterprise value-chain activities (customer-related, supplier-related and internal operations-related) has an impact on costs/time reduction, by at least 66% significantly, thus H_2 is not rejected.

Figure 5.4 shows that the use of ICTs (*always and sometimes*) in the small-scale enterprise value-chain activities (customer-related, supplier-related and internal operations-related) also has an impact on costs/time reduction, by at least 66% significantly, thus H_1 is not rejected.

6.0 DISCUSSION AND INTERPRETATION OF RESULTS

The mobile phone was used by all the small-scale enterprises surveyed with 98.7% of them *always* using a mobile phone in their operations. The mobile phone was also the ICT used for the longest duration with 78.4% of the surveyed small-scale enterprises having used it for more than 3 years. This is in agreement with a study in Namibia which showed that the most used communication tool by SMEs is the cell-phone [32].

The computer was used by 96.5% of the surveyed 88 small-scale enterprises, with 92% *always* using it. Then 73.9% of the surveyed small-scale enterprises had used a computer for more than 3 years. This high computer usage can be attributed to the computer being a platform for using other ICTs such as the Internet, email and Facebook. ICT-based inventory tasks are also mostly done on a computer [7].

The Internet was used by 98.9% of the surveyed small-scale enterprises and 92.0% *always* used the Internet. The use of the Internet was higher than that of a computer because the Internet is accessible from both a mobile phone and a computer. Furthermore, even if a small-scale enterprise does not have a mobile phone or a computer, Internet can still be accessed at a business centre [7]. However, only 64.8% of the small-scale enterprises had used the Internet for more than 3 years and this is lower than that for the computer because of the initial exorbitant Internet prices in Zambia.

Email was used by 98.8% of the surveyed small-scale enterprises with 88.6% *always* using email. The email usage is almost similar to Internet usage because the email service depends on the Internet. 58.0% of the small-scale enterprises had used email for more than 3 years and this is lower than that for the Internet because Internet access precedes email usage.

A website or a Facebook page was the least used with only a 45.5% usage with 25% of the small-scale enterprises *always* using a website or a Facebook page. This could be due to the technical difficulty and set up costs of a website and this is compounded by lack of skilled ICT personnel within small-scale enterprises [13,49,50]. The impediment to the use of Facebook could be as a result of lack of knowledge among small-scale enterprises on how Facebook can be used for business purposes. Only 6% of the small-scale enterprise had used a website or a Facebook page for more than 3 years.

ICTs were used by at least 94% of the surveyed small-scale enterprises in all the three customer-related activities. These small-scale enterprises also used recorded reduced costs in performing business operation and increased sales. This is supported by the research findings in 13 African countries which showed that, within the SME sector, ICTs play a role in reducing transaction costs and increasing market access [7].

All the surveyed small-scale enterprises used ICTs in all the three supplier-related activities and also achieved cost reduction in doing business and equally had increased sales and revenue. This is consistent with Shemi and Magembe's findings which showed that the use of ICTs can help MSMEs reduce costs and

improve the flow of goods through the supply chain [50].

At least 97% of all the surveyed small-scale enterprises used ICTs in the three internal operations-related activities and also recorded improved performance in terms of reduced costs and increased sales. This corroborates with the results of a study in Mexico which showed that to become more productive and competitive, SMEs need to modernise their management and production through the use of technology and the inclusion of systems to streamline their functions [51]. This research's findings also reaffirm the findings of a study in the US, from 1987 to 1993, which showed that the greater use of computers by non-management workers leads to greater productivity [52].

7.0 CONCLUSION

From the research findings, it is observed that small-scale enterprises have used mobile phones, computers, Internet and emails for more than 3 years and that the small-scale enterprises also use the aforementioned ICTs frequently. This means that ICTs have a major role to play in improving the competitiveness, productivity and efficiency of the small-scale enterprises. This in turn has a significant impact on the overall performance of the small-scale enterprises.

The other finding of this research is that ICTs have more impact on costs reduction than sales increase. This impact of ICTs on cost reduction is most pronounced in supplier-related activities compared to internal operations-related activities and customer-related activities. ICTs have more impact on cost reduction than sales increase because the small-scale enterprises have not fully embraced ICTs with regard to marketing as evidenced by the low usage of Facebook which is a great marketing tool and a zero-level marketing channel [36]. The biggest cost reduction was recorded in supplier-related activities, in which ICTs were also used the most, because suppliers are most likely to be companies which have also adopted similar ICTs.

It is therefore imperative for GRZ to formulate and implement policies that will ease the access to ICTs for SMEs by creating an environment which allows telcos and ISPs to provide ICTs at a lower cost compared to the large corporations. ZICTA should also drive initiatives meant to promote the use of ICTs by SMEs in addition to its current initiatives such as the universal access and provision of ICTs in schools [53]. Furthermore, Zambian ICTs providers should also harness the flexibility provided by modern ICT and develop products specifically meant for SMEs [54]. Whilst large corporations have the requisite financial capability and dedicated IT staff to manage ICTs [5], SMEs have limited capital and usually have to depend on the ICT service providers to also provide technical support [2].

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