

THE IMPACT OF TECHNOLOGY ON SMALL, MICRO AND MEDIUM SCALE ENTERPRISES IN GAUTENG SOUTH AFRICA

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Abstract

Small, Micro and Medium Enterprises play a key role in South Africa's economy especially in relation to Gross Domestic Product, unemployment as well as poverty eradication. In order to be able to compete globally and to effectively improve their productivity the SMMEs needs to utilize both existing and new technology in their Operations. This study investigates the impact of technological factors affecting productivity in SMMEs. The data used was collected by administering questionnaires to businesses within Gauteng Province selected through probability random sampling method. The data analysis was mainly through descriptive statistics where the results indicated that technological factors have significant impact on SMMEs especially during their early stages of establishment. Recommendation on better usage of Technology to improve productivity in Small, Micro and Medium Enterprises were suggested.

Keywords: SMMEs, Technology, Productivity, Entrepreneurs, South Africa.

Introduction

Small, Micro and Medium Enterprises (SMMEs) have always played a key role in the economies of major industrial societies especially in regard to both Gross Domestic Product and employment levels. Their survival and growth is therefore an issue, because of their flexibility and quick adaptability to change. SMMEs are viewed as instruments capable to responding to globalization. Whereas their flexibility and adaptability promise their success in global trade, SMMEs can only achieve this when they are productive in their operations, hence making them competitive in terms of price, quality of goods and ability to meet delivery requirements. Within this scope, SMMEs can utilise existing and new technology in order to improve productivity. Generally SMMEs use outdated technology impacting very negatively on their productivity. (Abeer and Abdullar, 2011). It is partly the recognition of

these challenges that has necessitated this study whose aim is to find out ways to improve the productivity in Small Micro and Medium enterprises in Gauteng Province using technology.

It is important to note that productivity measures the efficiency of production. It is therefore measured as an average of the total output divided by the total input. Essentially it measures output per unit of input and can be expressed as a fraction or as a percentage. The impact of improved productivity at the national level is the improvement of living standards since less people are required to produce more and can be paid more as a result and prices of goods and services can be reduced. At the company level, an organisation with improved productivity can become more competitive. The growth in productivity can be improved by use of the best available technologies and by benchmarking in all areas and spheres. High productivity industries, technologies and activities must be promoted. (Sink, 1985; Rantanen, 2001; Rogers, 1998; Wikipedia, 2012)

This study attempts to establish the specific technological factors affecting productivity in SMMEs so as to help design; develop and implement productivity improvement strategies for the Small Micro and Medium Enterprises (SMMEs) in Gauteng Province in South Africa.

The structure of this study is as follows; the section following the Introduction will focus on the literature review followed by a discussion on the research methodology. After the top three sections, section four will discuss the results and conclusions. Section five will focus on the recommendations and provide managerial implications on the research findings. The final section of the study will examine the limitations of the study and then suggest areas of further research.

Literature Review

Research on productivity improvement in Small Micro and Medium enterprises has been done in some countries such as Finland and with very interesting findings. For example, according to Rantanen, 2001 improving productivity is a means for increasing the profitability of a firm. In managing productivity of small enterprises, interventions can be made to improve productivity. These can be technological interventions and the challenge is to identify the most effective interventions (Sink, 1985).

Rantanen (2001) argues that a firm may have real intentions to improve productivity, but there are many things which will restrain their ability to achieve this which can be internal or external. Internal obstacles, which are basically factors inside the firm causing the decrease in productivity, may include poor training on the use of existing technology, poor and/or outdated technology, lack of knowledge concerning productivity technology and poor production methods. A general lack of resources in the firm can be a major challenge as well.

Benefits of improved productivity

According to Mammone, (1980), improving and increasing productivity may result in higher wages to labour, more jobs and incremental gains in standards of living; greater profits for management through greater output at reduced costs; and lower prices to consumers. At a firm level the increase in productivity means improvement of price competitiveness,

improvement in the ability to pay salaries, and money for the development of the firm and for environmental control (Bala, 2006). Improving technology can also result in reduced operating costs. Any reduction in operating costs is bound to increase the competitive edge of the industry (Gopalakrishnan et al, 2002). For example a focus on improved energy efficiency can increase productivity. However, an important contributor to energy efficiency improvement could be up-grading technology. Whereas inefficient technology is bound to be energy inefficient as well, but up-grading technology across all small enterprises would call for an enormous amount of investment at the macro level, and at the micro level. Financial constraints can prevent many of the small entrepreneurs from achieving energy efficiency by means of up-grading technology. Unfortunately, investing in new technologies requires substantial capital investments, which the SMME might not have.

In India, small enterprises account for 40% of manufacturing value added (MVA), 44% of manufacturing employment and 35% of total exports in the Indian economy (Ministry of SSI India, 2003). The fundamental role played by SMMEs in job creation, income generation and poverty eradication has been recognised worldwide. Berry et al, 2001 reported that micro and small enterprises in Indonesia employ 67% of the working population in the country in manufacturing establishments.

Definition of SMMEs

The most common definitions used for small, micro and medium scale enterprises relates to employment, but, there is a variation in defining the upper and lower size limit of an SMME (Ayyagari et al, 2003:4). In South Africa, a SMME is any business with fewer than 200 employees, an annual turnover of less than R5 million, capital assets of less than R2 million, and the owners are directly involved in the management of the business. (Cronje et al. 2001:495). Generally small enterprises employ between 5 and 9 employees, whilst medium enterprises employ between 20 and 90 employees (Quartey, 2001:5). In Zimbabwe, an SMME is described as a registered company with a maximum of 100 employees and an annual turnover in sales of a maximum of 830, 000 U.S. dollars (Machipisa, 2008).

There is a tendency to group small and medium enterprises together into homogeneous groups, even though these enterprises have different characteristics and unique requirements (Iskanius et al., 2009). Xiaoping and Jing, 2008 argue that small businesses are predominantly individualistic with highly centralized structures

In this study the definition of SMMEs use is adopted from the FinSope small business survey report of 2006(FinMark Trust 2006). where SMMEs were categorised into (07) seven Business Sophistication Measures (BSM). These seven categories were developed from a wide range of variables measured from the initial pilot Survey. The level of Sophistication of Business was gauged by the empirical variable which the Business has or did not have. Some of the examples of these variables included places where the Business is conducted, levels of employment the Business offers, the kind of Business records the Business keeps as well as the level of Education of the Ownership.

In many African countries, unemployment rates are increasing. (Ngwenya and Ndlovu 2003:6). Robertson (2007) There is therefore a need to improve SMME productivity.

Technology and productivity improvement

According to Kazuyuki (2008), information and communication technologies play a relatively important role in the productivity performance of enterprises. Firms can form networks and build alliances for information dissemination and sharing. For small and medium scale enterprises to succeed in the current economic environment, forming networks and building alliances is important. Building alliances and networks can give rise to an idea of ‘clusters’ of SMMEs which through networking reinforce each other and improve their productivity and international competitiveness. For example enterprise resource planning (ERP) can improve planning procedures and customer specific flexibility (Iskanius et al. 2009). This can improve SMME productivity, effectiveness, efficiency and global competitiveness (Abeer and Abdullah, 2011; Gore, 2008).

There is evidence that ERP systems, traditionally used in large enterprises, are working for and adapted for use by SMMEs as well (Deep et al., 2008). The main challenge is poor politics, bad economics and inadequate infrastructure (Huang and Palvia, 2001). Organisational and national key success factors for successful implementation of ERP have been identified (Hany and Reem, 2010). Low cost systems are needed (Seethamraju and Seethamraju, 2008). These can reduce implementation risks (Baker, 2006). A need for resurgence in evaluating information technology investment evaluation in general has been noted (Teltumbde, 2000; Chen, 2001; Ross and Beath, 2002).

Research Methodology and Design

The study focussed on identifying the main technological factors which hinder productivity in the informal, SMME and Cooperative sectors with a view to finding solutions, instruments and tools that can be used to overcome productivity barriers. The main methodologies that were planned for the study are as follows; desktop research and document review; 334 SMMEs in different sectors and locations were selected for questionnaire surveys to collect quantitative productivity data mostly; Quantitative statistical analyses were conducted

Similarly, the following activities were carried out i.e. development of a research design; development and piloting of questionnaires; conducting field survey; data collection, collation, uploading and analysis; reporting on findings, results and general discussions; recommendations and conclusions. A productivity survey was conducted on a sample of SMMEs and Cooperatives across sectors and in different municipalities. The aim of this survey was to determine the constraints faced and what needs to be done to address it.

The probability random sampling method was also used in this study where a study sample of 334 SMMEs of all types in the different parts of Gauteng was taken. These included Johannesburg, Ekurhuleni, Tshwane, Metsweding, Sedibeng and the West Rand. The following table illustrates the number of questionnaires that were completed in the specific regions.

Table 1

Questionnaires conducted per region

Regions	Total questionnaires to date 12 March 2012
Ekurhuleni	100
Johannesburg	81
Metsweding	5
Sedibeng	45
Tshwane	33
West Rand	70
Total	334

Table 2

Areas in Gauteng Province where the respondents operate businesses

Alberton	Irene	Olwese	Southgate
Attridgeville	Jabulani	Orange Farm	Soweto
Bagit	Johannesburg CBD	Orlando West	Trade Route Mall
Bara Mall	Katlehong	Orlando	Vaal
Boksburg	Kenilworth	Palm Ridge	Vereeniging
Brackenhurst	Lenasia	Palm Springs	Vosloorus
Centurion	Letsoho	Palmsprings Mall	Wadeville
Carletonville	Malvern	Pretoria CBD	West Gate
De-Deur	Maponya Mall	Rietfontein	Westgate Mall
Denneboom	Meredale	Rondebult	
East Rand Mall	Mntanami	Roodepoort Royal Place	
Evaton	Mofolo	Sebokeng	
Grasmere	Mzimihlophe	Sedibeng	
	Naturena		

Table 3

The towns and Cities in Gauteng where respondent enterprises of the 334 respondents are located

Alberton	Everton	Palmsprings	Vaal
Boksburg	Germiston	Tshwane	Vanderbilpark
Centurion	Grasmere	(Pretoria)Roodepoort	VereenigingVosloorus
Crystal Park	IreneJohannesburg	Sedibeng	VosloorusBusiness,
Daveyton	Katlehong	South of Johannesburg	GEP Tshwane
De Deur	Lenasia	Soweto	
Dobsonville	Orange Farm	Springs	

Results and Conclusions

Data analysis was done using Statistical Package for social Sciences (SPSS). Overall the analysis is descriptive and frequency tables were used.

The impact of technology on SMME productivity

Technology is the application of equipment, substance, methods, process or procedure in order to solve a problem or achieve a goal by performing a specific function. In businesses technological impact is divided into three main areas namely;

The improvement of professional productivity which would examine everything from administrative software packages which keeps financial records to detail payroll and inventory controls.

The second consideration of technological impact would be the improvement of communication involving the activities such as the generation of Management reports, e-mails and word processing software.

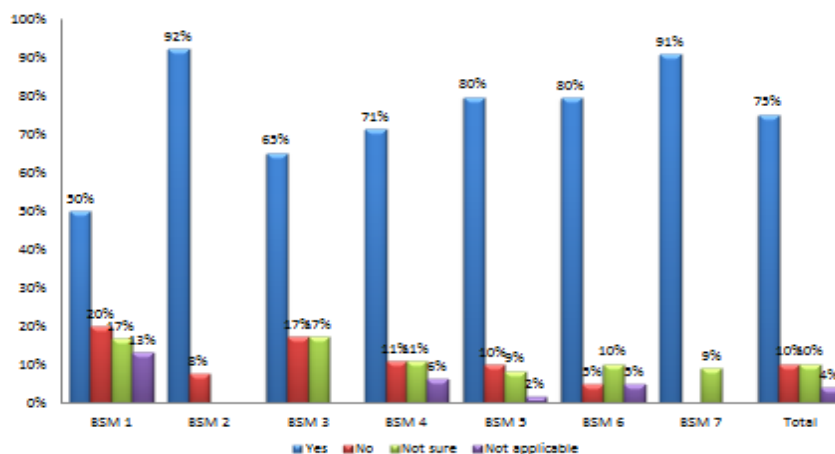
The final area of consideration looked at the use of technology as a tool for automation of routine activities making these more efficient and less costly.

To clearly understand how productivity improvement is closely linked to technology the following areas were investigated:

- i. Technological link to higher productivity
- ii. Productivity improvement technology that has been acquired in the last five years
- iii. Organisation far behind in its use of productivity improving technology when compared with other competitors
- iv. Organisations ignorant on the use of existing productivity improving technology
- v. Productivity improvement is one of the main factors considered when investing in any new technology.
- vi. Management is aware of the current and future productivity improving technology in the market
- vii. The organisation has a culture of improving productivity learning curve.

Technology has always been the Corner-stone for productivity improvement. Figure 1 closely relates to this belief. BSM 2 is somewhat over claimed but generally technological improvement is shown to be rising steadily as the level of sophistication of Businesses increases. Technology usage starts of at 50% in BSM 1 and increases up to 92% at BSM 7 at 92%.where the number of computers could be more than five. In general, technological support has been rated very highly by all businesses world over.

Figure 1

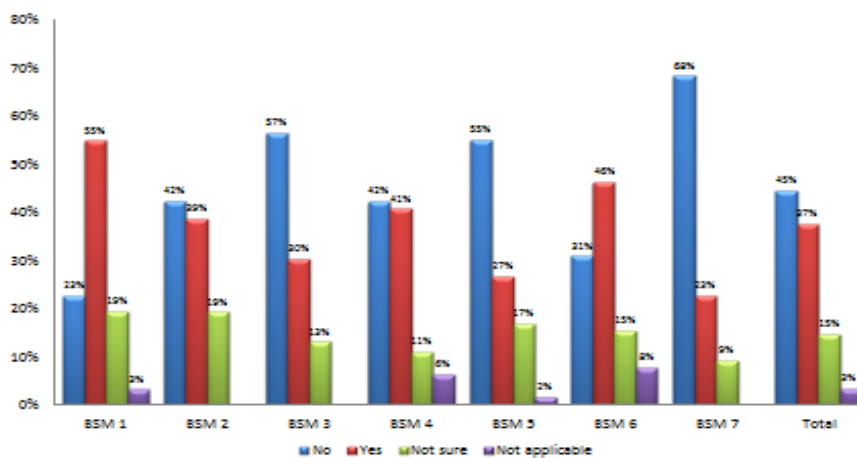


Technology assists in achieving higher productivity

In Figure 2 below the utilization and or replacement of new technology is assessed. The general indication is that most businesses have not acquired technology during the last few weeks. The only unique case has been from BSM 3, BSM 5 and BSM 7 where there has been a response of up to 50% and more.

This may be explained by the expenses associated with technological investments which tend to be very expensive and may not be afforded by very small and micro Businesses.

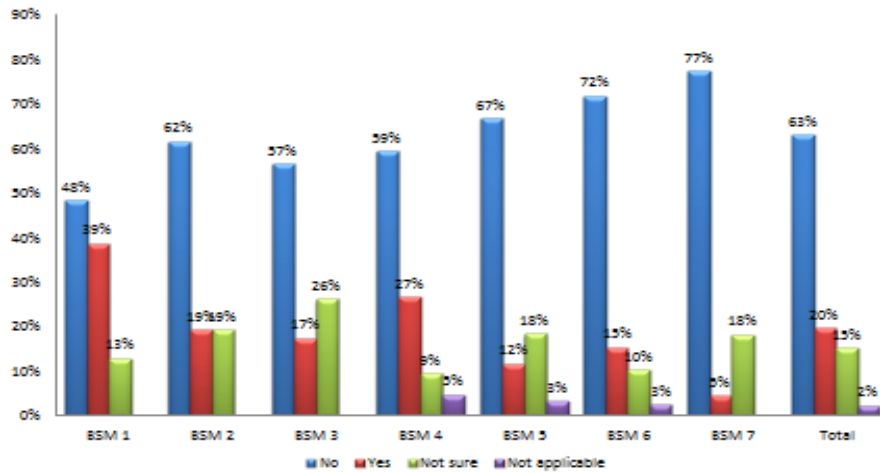
Figure 2



Productivity improvement technology has not been acquired in the last five year

The highest response in this benchmark result is centered at BSM 7 and the lack of utilization of technology is noted to have arisen from BSM 1 steadily to BSM 7. This may be interpreted as the risk and level of sophistication of business which tends to limit the use of technology as the business grows and becomes more complex. The number of businesses utilizing technology mirrored the exact opposite of what was explained earlier. The business who are not sure remained steady on average throughout the all the levels

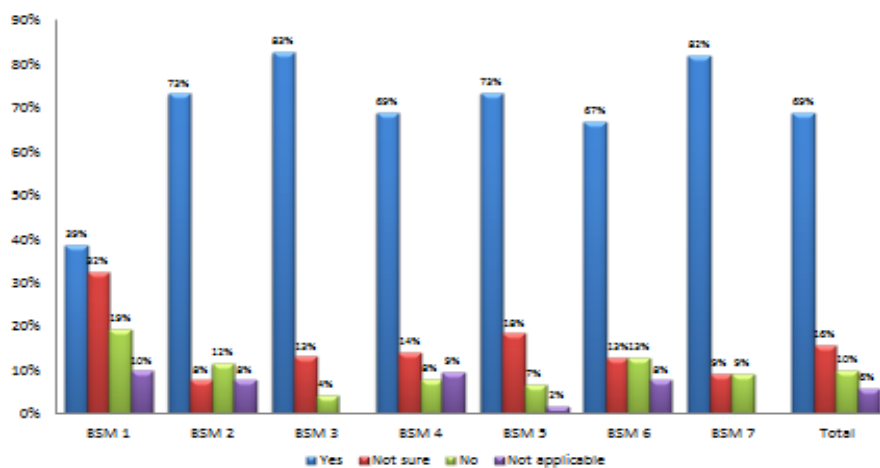
Figure 3



Organization so far behind in the use of productivity improvement technology

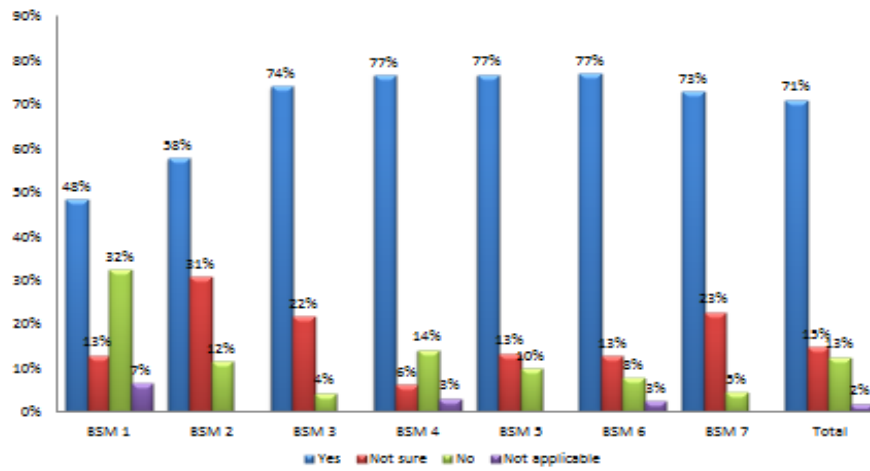
Figure 3 is an expansion of the previous report. The effect of the new technology in production improvement is reflected by the highest data being recorded by BSM 7. The explanation could be that there is some delay in the acquisition of new technology that by the time they buy or the business imports the technology it could be somewhat obsolete due to delays. The next three analysis are similar to the previous business response. The highest reflection in still BSM 1, BSM 3, BMS 6 and BSM 7 raising up to 76%. The level of understanding by management technological key elements still remains a problem but is likely to be resolved through exposure and training. (Figure 4)

Figure 4:



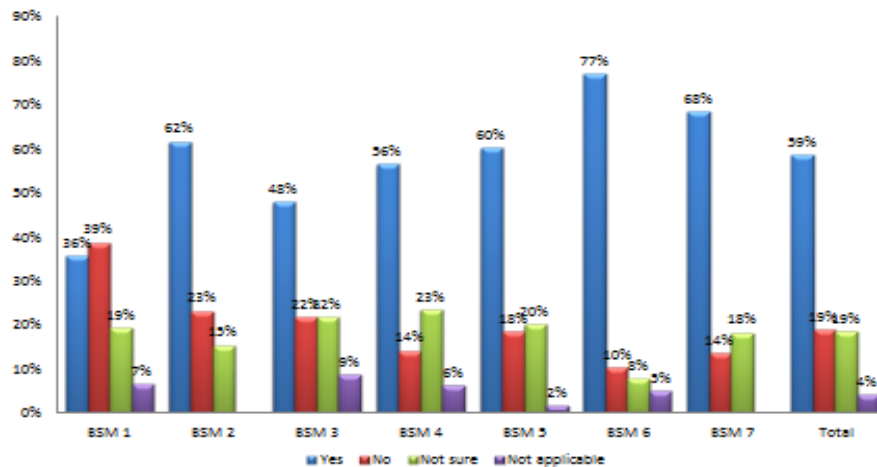
Productivity improvement is one of the main factors considered when investing

Figure 5:



Management is aware of current and future productivity improving technology.

Figure 6:



The organization has a culture of improving productivity learning curve

The interpretation in this case is centered on the culture of the business which is normally intertwined with the mission and vision of the business. Again there is a steady raise from 36% beginning from BSM 1 to 77% in BSM 6 before dropping at BSM 7 to 62%.

Conclusions

Results from this study show that technology can be used as a tool to improve productivity and that most actors in SMMEs are aware of this fact. However many enterprises acknowledge the fact that they do not have the capital or financial capacity to invest in the needed or required technologies. There is therefore need for policies that can assist to bridge

this gap through financial mechanisms and enterprise support systems. The enterprises generally operate at the same technological level suggesting that mediocrity has set in reducing the ability of the sector to compete globally. Enterprises that manage to differentiate themselves on better technology have the potential to be most competitive than other. Most enterprises plan to prioritise investment in productivity-improving technology in future or whenever they get enough resources. They are generally aware of new developments and new technologies in their business sectors.

It is clear that the Gauteng provincial government can have a positive impact in promoting productivity-improving technology in SMMEs in the region. Existing policies can be fine-tuned based on these findings in order to promote more sustainable SMMEs. There is need for cross-departmental synergies and Gauteng level institutional arrangements that support SMME technology-led growth and productivity. Current efforts are disjointed and follow a silo mentality resulting in reduced impact. There is a need to focus on policy and strategy fine-tuning, implementation, action, effectiveness and efficiency. There is a need to move beyond endless policy and strategy making to implementation and actions.

Recommendations

It was also noted that the world is dynamic and technological changes occur at a very first speed. It is therefore recommended that enterprises need to keep abreast of the changes by attending and participating in technological trainings, workshops and seminars. Most SMMEs are very similar in their operations and in some cases similar issues and solutions exist across the developed seven distinct BSMs. Success stories should therefore be shared by the SMMEs through networking, magazines and newsletters.

Business technology management centres should be offered to most of the SMMEs as these can provide a group of services intended to help SMMEs that might not have their own information technology departments. The centres would help to bridge the gap where there is lack of skills and awareness. It was noted that most SMMEs centre their application on the tangible technological changes such as blueprints, models, operating manuals and prototypes. Opportunities are also available for the intangible technologies like: the high entirely automated and intelligent technology; the semi-automated partially intelligent technology; and the low labour-intensive technology.

Policy implications

The results have the following policy implications:

- i. There is need to arrange training of SMMEs on existing and new productivity-enhancing technology likes information and communication technology.
- ii. One-stop centres can be created for SMME productivity improving technologies. In the long-term a Gauteng Technology Research Institute can be considered for this initiative
- iii. Promote better production and operations technologies and management to improve management, stock turns, quality systems and business practices
- iv. Promote and support energy efficiency programmes and activities targeted at SMMEs

- v. Promote business incubation and support new businesses so that SMMEs are capacitated and empowered to venture into productive ventures and technologies
- vi. Promote innovation and ICT and other productivity enhancing technologies
- vii. Support research- master and doctoral level in the Province to look at technology dissemination and productivity improvement for SMMEs

Limitation of the Study

This study as is always with other studies had some limitations. The most significant limitation to this study was access to information from the respondents as some of the entrepreneurs were not willing to cooperate with the enumerators.

Secondly most white businesses kept complaining and referring to the BEE (Black Economic Empowerment) requirement which excludes most of these businesses from the Government tendering process.

The duration of the interview process was between thirty to forty-five minutes and some business found this time period too long and too demanding and therefore requested the enumerators to collect the questionnaires the following day. In a number of cases this was not possible as the business were located far from the University and making it impossible to make a second visit.

In some cases data was collected from employees and not owners of the business and as such in some cases the data was incomplete. Furthermore, some of the businesses did not have information on vital questions in the questionnaires as they did not keep some of the records of their activities which included sales figures or even staff turnover.

In a few instances owners of some the businesses could not effectively communicate to the enumerators as a result of language barrier.

Based on the aforementioned limitations, we recommend that further areas of research to include the involvement of SMMEs in cross boarder trades, the level of education of business owners and the kinds of strategies these owners use in running their businesses. Similarly, there is need for further research to be carried out to try and establish the professional bodies or societies that these businesses mainly associate with and the kind of benefits that they derive from such association and or membership.

Acknowledgements

The authors would like to thank the Gauteng Department of Economic Development, The Faculty of Management at the University of Johannesburg and Professor Edwin Bbenkele for the kind financial, moral and management support given to this research.

References

1. Abeer N. and Abdullar S., (2011). The impact of change in ERP system: A case study of Madar. *Journal of Theoretical and Applied Information Technology*.
2. Ayyagari, M., Beck T. and Demircug-Kunt (2003). Small and Medium Enterprises across the Globe: A New Database. [On-line]; Available: <http://siteresources.worldbank.org/DEC/Resources/847971114437274304/SMMEglobe.pdf> [Accessed 21 March 2012].
3. Baker, V., (2006), Understanding the ERP Investment Decision. *Proceedings of Management of Innovation and Technology*, 2006 Conference, Singapore, China, June 21st -23rd 2006, IEEE December 26th 2006.
4. Berry, A., Rodriguez, E. and Sandee, H. (2001). Small and Medium Enterprise Dynamics in Indonesia' *Bulletin of Indonesian Economic Studies*. 37(3), 363-84.
5. Chen, I.J., (2001). Planning for ERP systems: analysis and future trend, *Business Process management Journal*, 7(5), 2001, pp 7 – 14.
6. Cronje, G.J., Du Toit, G.S. and Motlana, M.D.C. (2004). *Introduction to Business Management*, Cape Town: Oxford University Press, Southern Africa.
7. Deep, A., Guttridge, P., Dani, S. and Burns, N. (2008). Investigating factors affecting ERP selection in made-to-order SMME sector, *Journal of Manufacturing Technology Management*, 19, 430-446.
8. FinScope Small Business Survey Report Gauteng (2006) The African Response Small Business Survey
9. Gopalakrishnan B, Plummer RW, Alkadi NM. Comparison of glass-manufacturing facilities based on energy consumption and plant characteristics. *Journal Energy Dev* 2002;27(1):101–15.
10. Gore, A. (2008). Exploring the competitive advantage through ERP systems: From implementation to agile applications in agile networks. University of Oulo, Finland.
11. Hany A., Reem. A.A., (2010). Significant factors influencing ERP implementation in large organizations: Evidence from Egypt. *In proc. European, Mediterranean and Middle Eastern Conference on Information Systems 2010*.
12. Huang, Z., and Palavia, P. (2001). ERP implementation issues in advanced and developing countries. *Business Process Management Journal*, 7(3): 276-284.
13. Iskanius, P., Halonen, R. and Mottonen, M. (2009). Experiences of ERP use in small enterprises, ICEIS 2009 – *In proc. 11th International Conference on Enterprise Information Systems. Milan, Italy*
14. Kazuyuki M., (2008). IT, enterprise reform, and productivity in Chinese manufacturing firms, *Journal of Asian Economics*.
15. Machipisa, L. (1998). Developing the Focused Entrepreneur, [On-line] Available: <http://72.14.207.104/search?q=cache:UiMJ1N2HYJ.www.ipsnews.net/domainlogin> [Accessed 20 March 2012].
16. Ministry of SSI (small scale industries). Annual report 2002/2003, Government of India, New Delhi, 2003.
17. Ngwenya, T., and Ndlovu, N. (2003). Linking SMMEs to sources of Credit: The performance of microfinance institutions in Gauteng, South Africa, [On-line] Available: <http://www.ilo.org/public/english/employment/finance/download/wp8.pdf> [Accessed: 20 March 2012].
18. Quartey, P. (2001). The Impact of Regulation and Competition on SMME Development. [On-line]. Available: <http://66.102.9.104/search?q=cache:r0D7Kr7GPZ0J:www.devstud.org.uk/publications/papers/conf01/conf01quartey.doc+Quartey+2001+description+of+an+SMMEandhl=enandct=clnkanddcd=2andgl=za> [Accessed: 19 March 2012].

19. Rantanen H., (1995). The effects of productivity on profitability - A case study at firm level using an activity-based costing approach, *In Proc. Research papers 45, Lappeenranta University of Technology, Lappeenranta.*
20. Rantanen H., (2001). Internal obstacles restraining productivity improvement in small Finnish industrial enterprises, *International journal of production economics 69* (2001) 85-91.
21. Seethamraju R. and Seethamraju, J. (2008). Adoption of ERPs in a Medium-sized Enterprise – A case study, *In Proc. The 19th Australian Conference on Information Systems.*
22. Roberts-Lombard, M. 2006. Marketing Research (BEC 506), Alice: UFH. 126p. (Study guide).
23. Rogers M., (1998). The definition and measurement of productivity, The University of Melbourne of productivity. The University of Melbourne, Australia, Melbourne Institute of applied economics and social research.
24. Ross, D., Ross J., and Boudreau, M. (2002). Beyond the Business case: New Approaches to IT Investment, *MIT Sloan Management Review*, vol. 43, No. 2, 2002.
25. Sink D.S., (1985), *Productivity Management: Planning, Measurement and Evaluation, Control and Improvement*, Wiley, New York.
26. Teltumbde Anand, (2000). A framework for evaluating ERP projects, *International Journal of Production Research*, 2000, vol 38 No. 17 pp. 4507 – 4520.
27. Wikipedia, 2012, Productivity, <http://en.wikipedia.org/wiki/Productivity>., Last accessed on 12th January 2012
28. Xiapong, Y. and Jing, F. (2008). Review of IT/IS Adoption and Decision-Making Behaviour in Small Businesses. *Tsinghua Science and Technology*, 13, 323-328.