The implications of Artificial Intelligence on Soweto Furniture Manufacturing SMEs

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Abstract

Artificial Intelligence (AI) and mobile robotics are threatening to take over the office work (White-collar jobs). This concept of AI is not the first to replace the human work force. The first concept that took over the human workforce was automated machinery that took over the blue-collar jobs (production and general employees). It is important to understand that Artificial Intelligence first took off in the 1980s and 1990s and it discussed that it can add the competitiveness of the furniture manufacturing SMEs. The aim of this study is to find out if furniture manufacturing SMEs are ready for Artificial Intelligence in their enterprises. This study is qualitative, where a case study about furniture-manufacturing SMEs was developed. This study discovered that these SMEs are not ready because they do not have the necessary resources to can operate AI. Consequently, the implementation of AI will mean that most people will lose their jobs due to their jobs being replaced by a computer system. However, AI and computerisation automation could improve the quality of products and the services. A replication study must be done on other sectors so that a generalisation can be made about the overall readiness of AI in SA's SMEs.

Keywords
SMEs, Quality Management, Business Improvement Strategies, Artificial Intelligence (AI), Total Quality Management

1. INTRODUCTION AND BACKGROUND

Artificial Intelligence first took off in 1980s and 1990s. The whole idea of AI is to have computers that can perform tasks that can be perfomed by human beings using their their intelligence, but tasks that would require human beings to have more time to perform them. This AI is made to perfom those tasks by an eye of a blink. Entities use AI to allow them to order products, make appointments and other activities in the enterprise (Fernandez, 2016). Therefor, entities are supposed to consider this sudden rise of Artificial Intelligence and robotics. This Artificial Intelligence can work in favour of entities and work against employees as blue collar jobs are replaced by computer automation. Currently, white collar jobs will be replaced by this Artificial Intelligence and robotics. For example, Human Resource administrators are replaced by softwares that perform payroll services. Another exaple can be a software that does bookkeeping services. This can minimize costs for SMEs, this includes furniture manufacturing entities. However, Artificial Intelligence and robotics will require entities to have sufficient capital to buy, install it and train the manpower to perform the high value jobs. Consequently, those who used to do the jobs that will be replaced by Artificial Intelligence and robotics will either be fired or be upskilled so that they can perform high value jobs and this means more money for that (Chelliah, 2017). On the bright side of things, this Artificial Intelligence and robotics can ensure consistency in the quality of products and services. But the question is, are the Soweto based furniture manufacturing SMEs ready for artifial intelligence? The purpose of this study is to examine if funiture manufacturing SMEs that are based in Soweto are using Artificial Intelligence in their businesses. If not then the study will seek to find out if they are ready for Artificial Intelligence in their businesses.

Soweto is a region found in the City of Johannesburg municipality, which is one of the top four metropolitan municipalities in the country. This region is in the south of Johannesburg. This place is one of the regions that are very small but are too much population. The area is facing many challenges such as high unemployment rate, a high number of uneducated people (only 9.3% have higher education), crime rate that is sky rocketing etc. Ninety eight percent of its population is made-up of Africans, with the remaining that is other races (Afrikaners, Whites, Indians, and Coloureds), with most people speaking isiZulu, Sesotho, Xitsonga and isiXhosa and fewer people speaking sign

language, Afrikaans and other languages. Over 60% of their people have never been married before. Concerning the gender, the difference is minimal, 49.6% are male and 50.4% are female. Concerning the region's economies, 18.7% of the people there do not have income at all; this percentage is then followed by an 18.4% that receives between R18 601 to R30 200 per annum (Stats SA, 2017). However, every coner at Soweto there is a basic survivalist. This clearly shows that most of the people there depend on these basic survivalists for income. This is justified by having people with little income in their house holds.

Moreover, some of these enterprises that are dominat at Soweto are furniture maufacturing SMEs that are either reparing furniture or manufacturing it from scratch. These furniture manufacturing SMEs are the main sorces of income in the families of the owners (entrepreneurs). Majority of these businesses have never implemented quality in their lives. The most common reson to non-implementation of quality in furniture manufacturing SMEs is that the business improvement strategies are not known to the people in the enterprise. Therefore it would never be possible to implement something they have never heard of? However, not implementing quality in their enterprises is costing them to rework on the products, to deal with angry customers and instilling confidence to their disappointed customers. It was discovered that business improvement strategies was invented by large entities such as Motorola, Toyota and other entities. These entities were implemented in those entities and they were a success. It is unfortunate that SMEs have limited resources therefor they differ greately with large entities. This means if SMEs want to implement these business improvement strategies they have to refine the model so that it may suit the needs of the business improvement strategies (Seseni & Mbohwa, 2016).

Research problem
Office employees are threatened by the introduction of Artificial Intelligence and robotics are threatening to take over the white-collar jobs. It is a known fact that blue collar jobs will was replaced and is still continuing to be replaced by automated computers in manufacturing industries (Chelliah, 2017). Introducing Artificial Itelligence (AI) in furniture manufacturing SMEs and mobile robotis will mean that executive members will lose jobs and add to the existing unemployment rate that is alarming.

Research question
- Are the Soweto based furniture manufacturing SMEs ready for Artificial Intelligence and robotics?

This study has the following sub-questions:
- Does furniture manufacturing SMEs have sufficient capital to finance Artificial Intelligence and robotics?
- Does furniture manufacturing SMEs have skilled employees who will be able to use this Artificial Intelligence and robotics?

Research objectives
This study have the following objectives:
- This study aims to examine if furniture manufacturing SME have sufficient capital to can employ Artificial Intelligence and robotics.
- The educational level of the employees will be examined to check if they are skilled enough.

Current similar studies
An American researcher by the name of Chelliah John conducted a research the previous year (2017). The researcher wanted to find out if the Artificial Intelligence and robotics would usurp white-collar jobs. It is discovered that over forty-seven percent (47%) of the United States of America would be replaced by computerization in the next twenty years (20%). These jobs incudes: Paralegal, Marketing, Human Resource Assistants, Clerical jobs, Insurance Underwriters, Credit Analysts, Cashiers, Electrical Engineers etc.

This research will examine furniture manufacturing SMEs to check if they are using Artificial Intelligence in their enterprises if not the study will examine if the enterprise is ready for this new concept.

2. LITERATURE REVIEW
2.1. Furniture manufacturing SMEs
Furniture manufacturing SMEs play a pivotal role in the economic growth of this country (South Africa). They contribute 1.1% to the total 15.2% of the total manufacturing contribution. This sector employs 26 000 from the the total workforce, this is according to 2014 statistics, which is a decrease from 38 267 employees in 2009. This is caused by the cheap imports from other parts of the world. Consumers prefer to buy cheap furniture than locally manufactured furniture. In solving this problem of cheap imports from other countries, the governement has vowed to buy most of their furniture that is produced locally. This will increase productivity that will require more manpower in furniture manufacturing SMEs. This move will automatically mean that people will be employed in this sector so that they may meet the demand required (Seseni & Mbohwa, 2017). In addition, SMEs account to 99% of the overall businesses and they employ many people as compared to large companies (Gordon Institute of Business Science Enterprise Development Academy, 2017). It is worth noting that SMEs play a pivotal role in the development of innovation and technological advancement as compared to big entities. However, SMEs are not immune to business failure, their failure rate is between seventy to eighty percent. Consequently, businesses that fail contribute to poor economic performance of the country, increase unemployment rate as people will be retreanched and loss of wealth to all its stakeholders (Asah, et al., 2015). With all of the above that has been said, the question rmains, is furniture manufacturing ready for Artificial Intelligence?

2.2. The global viewpoint of Artificial Intelligence in businesses

In her linked in post, Unerman a Chief Transformation Office states that 84% of the businesses believe Artificial Intelligence will improve competitive advantage in their businesses. While 23% claims that they are already using it in their services or processes. The author goes on to say that most businesses are considering to incorporate Artificial Intelligence in their businesses. It was discovered that Artificial Intelligence has a competitive advantage over people on the following things: gaming, emotional intelligence, health diagnosis, facial recognition, language skills and predicting behaviour (Unerman, 2017). In the United States of America, 47% of their current jobs are at a risk of being computerised. This clearly means that 47% of their workforce may be without jobs very soon due to Artificial Intelligence (Chelliah, 2017).

2.3. What is Artificial Intelligence?

Artificial Intelligence is defined as the human intelligence being used by a computer system. This can be as a form of speech recognition, language translation, decision making, reasoning, proving, understanding etc. (Deyi & Yi, 2007). Artificial Intelligence uses broad and complicated mathematics, computer science and other broad computer sciences. As everything has its own pros and cons, Artificial Intelligence is not immune to pros and cons. The pros of AI are as follows: error reduction, difficult exploration, daily application, digital assistance, repetitive jobs, medical applications and no breaks. While the cons are as follows: high costs, no replicating humans, no improvement with experience, no original creativity and unemployment (Wisestep, 2018).

2.4. The impact of Artificial Intelligence in South Africa

Technological advances are known for bringing social and economic opportunities, they also carry a pivotal risk in developing countries. Professor Ralph Hamann from the Graduate School of Business at the University of Cape Town asserts that Artificial Intelligence may hit South Africa and other developing countries harder as compared to developed countries. The risks that are associated with Artificial Intelligence are summarised in three categories and they are as follows: 1. Artificial Intelligence may increase unemployment even more, 2. Artificial Intelligence may increase where wealth is concentrated & 3. Artificial Intelligence may be biased to those that have created it (BusinessTech, 2018).

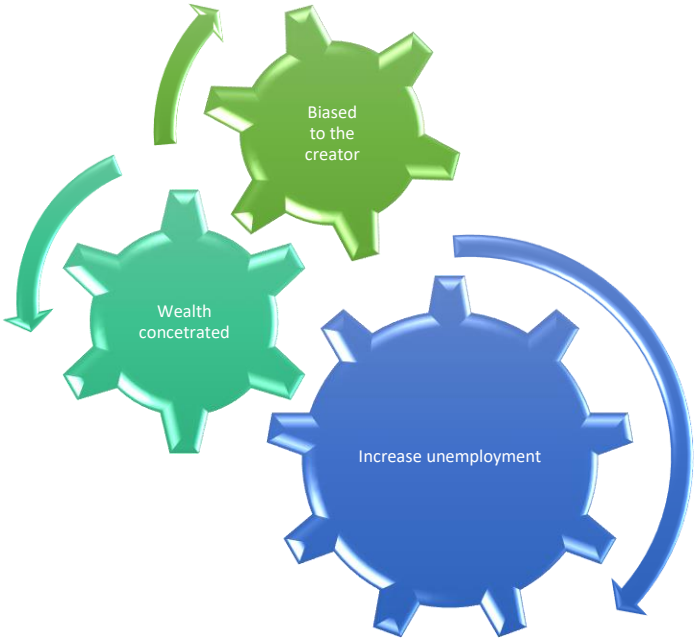

Figure 1 Three types of risk posed by Artificial Intelligence

2.3.1 Increase unemployment rate

South Africa is one of the countries that have the highest unemployment rate in the whole world. The country is ranked in the top 10 worldwide as one of the countries without jobs**.** Sadly, the South African youth is not immune to this problem of unemployment. They (South African youth) are the ones who are affected the most as the rate of youth unemployment is sky rocketing. The unemployment rate of overall South Africans was 27% in 2016 but it decreased to 26.7% in 2017 with 73% which is youth unemployment from the total unemployment (Trading Economics, 2018)**.** In addition, the educational background of the South African population is not too high. Majority of the people do not have tertiary education. The country has fewer higher learning institutions. The number of the grade 12 output is way too higher than the capacity that can be provided by the tertiary education. A large number of people who have completed matric/grade

12 are forced to stay at home or start looking for jobs as they are not accommodated at institutions of higher learning. Furthermore, institutions of higher learning accommodates top students and leave those who have passed averagely. This may contribute to unskilled people in the country (Seseni & Mbohwa, 2017)**.**

2.3.2 Wealth concentrated

Concentrated wealth means that wealth is at the disposal of certain individuals or entities while other people have a little or nothing. Wealth concentrated is not good as it increases the levels of inequality of the people of the country and this is not good for the growth of the economy and its prosperity. This is so because people who have a lot of money do not spend a lot, which is not good for the economy (Roth, 2018).

2.3.3 Biased to the creator

Oxford online dictionary define bias as "Inclination or prejudice for or against one person or group, especially in a way considered to be unfair". With that definition in mind, bias to the creator simply means that Artificial Intelligence can favour those who created it and not favour those who did not create it.

Labour/Human Resource

Labour/Human Resource is a critical resource enterprises need in order for them to succeed or reach their maximum potential. It is believed that the quality of staff plays a pivotal role in the success of the business. Therefore, entrepreneurs need to recruit the cream of the crop in the market and retain them. Their employees must constantly be trained so that they may know their work and that they keep up with the latest processes or techniques of the business and be able to use the latest technology (Ho, et al., 2011)**.**

The next table will review the quality of the enterprise's human resource looking at it from the skills of the skills perspective (their technical knowhow), their adaptability, their reliability and lastly, their educational background.

Human Resource	
Skills/technical knowhow	This simply means that employees must possess the right skills for their duties that they have to carry out at the enterprise (Akkermans, et al., 2009).
Adaptability	Flexible enough to be able to gel well with new trends in the market and adapt to the latest technology or techniques used in the enterprise. They should not be resistant to change (Jiri, et al., 2017).
Reliability	This refers to employees being trust worthy and everyone in the enterprise can depend on their good work (Akkermans, et al., 2009).
Educational background	The education of employee, know what they have to do and they are more prominent at work (Akkermans, et al., 2009).

Table 1 Qualities of human resource

3. CASE STUDY

I. Case study debriefing

This case study examines the furniture manufacturing SMEs that are located at Soweto in Johannesburg. Johannesburg is in a metropolitan municipality found in Gauteng province. The province has the highest population as compared to other provinces in South Africa. The economic participation in this province (Gauteng) is very impressive. However, youth participation in entrepreneurship remain very low. This is not only seen in this province (Gauteng) but throughout the entire country.

II. Types of businesses at Soweto

There are different types of businesses one can find. There are urban farmers, funeral parlours, convenient stores, bottle stores, B & Bs, panel beaters, furniture manufacturers etc. majority of these enterprises are classified as SMEs, with a large number of very small enterprises. This study focused solely on furniture manufacturing enterprises. The studied enterprises (furniture manufacturing SMEs) are found in both in residential areas which other people call the "home based enterprises" while others call them "they are based at the back yard" and other enterprises are located at the business parks. This study focused at two industrial parks at Soweto, and they are as follows: 1. Orlando Industrial Park (Business Centre) and Pennyville Industrial Park (Business Centre). These studied business centres have different businesses in them.

A. Furniture manufacturing SMEs (Small Business Enterprises)

The studied furniture manufacturing SMEs are based in Soweto. These businesses are based in the businesses areas/industrial parks and at residential areas (home based). The primary business of the enterprise is to make manufacture furniture for two types of target markets which individuals and other enterprises that sell the final product to the public. The comparison between the two types of enterprise, which are home, based and business park based enterprises are illustrated in the table below.

Home based furniture manufacturing	Business Park based/Industrial Park based furniture manufacturing
SIMILARITIES	***SIMILARITIES***
Manufactures furniture	Manufacture furniture
Have limited equipment	Have limited equipment
Lack of finance	Lack of finance
DIFFERENCES	***DIFFERENCES***
Only sell what they have in the enterprise (Customers choose from what is being sold)	They only sell as per the customer's order
Only sell to individuals	Sell to both individuals and corporates
Only focus on the equipment they have	Have an option to hire equipment from competitors or other enterprises

Table 2 Comparison of township and Business Park based enterprises

B. Educational background of the staff and owners

The graph below (Figure 2) explains level of literacy of people working in these enterprises is very low. Majority of the employees do not have tertiary education. They have basic education with a vast of them without grade 12 that is the highest educational class in the country. This makes it difficult for the employees and owners to understand the techniques or to adapt to the latest technological advancements.

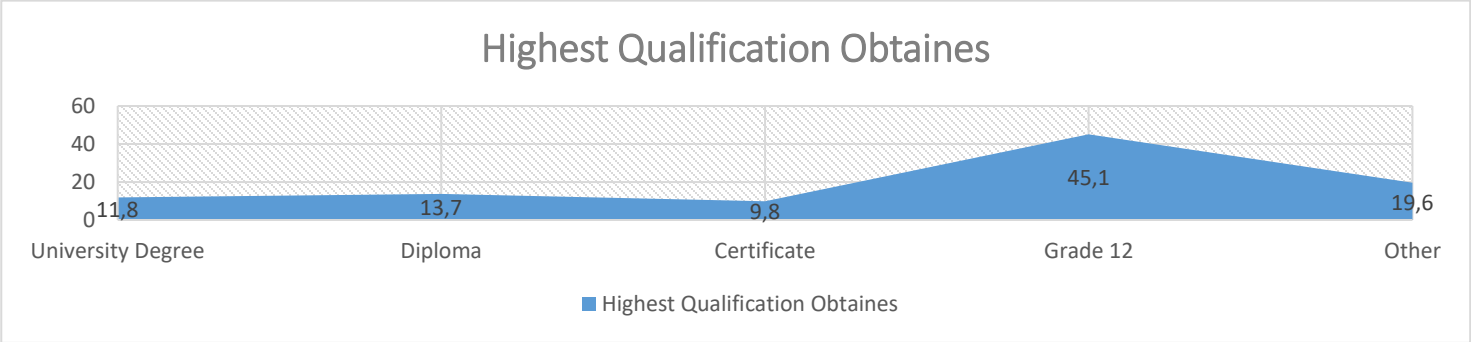

Figure 2 Seseni and Mbohwa, 2016

4. DISCUSSIONS AND RECOMMENDATIONS

4.1. Educational background

The educational level of the owners and employees of the furniture manufacturers is very low. Majority of them have basic education with a few of them who have been to institutions of higher learning. This will pose serious challenges if they attempt to employ Artificial Intelligence in their enterprises, as it requires AI requires staff members that is highly skilled. AI can only function to its full potential if the user knows how to operate it and it requires the literacy level that is very high. This AI was pioneered out of South Africa; therefor it will be bias to those who created it.

Recommendation

This study recommends that employees and owners of furniture manufacturing enterprises must be knowledgeable about the latest technology in the market and know how to use it. However, to use it to its maximum performance simply means that they should be able to operate it. They must understand End-user computing, they must be able to read and comprehend what the computer is saying and respond accordingly. They must invest highly on education programmes that will educate them on the use of technology such as End-user computing programmes etc.

4.2. Adaptability

SMEs that produce furniture are resistant to change, they believe in doing things the way they are used to. They are content with what they know and how they do things. Introducing something new to them will only pose many challenges as new things simply means that people ought to be trained and be familiarised with what is new. This also means that whoever is being trained or taught must be willing to be taught and not afraid to trying new things.

Recommendation

The employees and their employers must be willing to try new things. They must be eager to learn and be taught at all times, as there will always be latest technological advancements. Employers must also be aware of the software and Apps that they can use in their enterprises to improve the quality of their services.

4.3. The use of latest technology

Based on the observations, it is crystal clear that furniture manufacturing SMEs are not using the latest technology in their enterprises. They still use the old techniques of doing business due to the absence of current and appropriate technology in their enterprises. This makes the furniture manufacturing enterprises not to capitalise on the current enterprise. Moreover, these furniture manufacturing enterprises do not own most of the equipment that they use, they rent it whenever they want to use it.

Recommendation

This study recommends that the enterprise should take advantage of the latest technology and use Apps that will help improve their businesses. This will help the enterprise to capitalise on the current technology that will improve their performance and the service of their enterprise. Enterprises need to purchase the current technology and employ it in their enterprises.

4.4. Financial resource

It is pretty clear that furniture manufacturing SMEs do not have sufficient financial resource so that they can be able to purchase the latest technology and employ employees and Artificial Intelligence. This is as a result of not having sufficient capacity to mass produce their products and also sufficient marketing awareness.

Recommendation

Due to the limited resources that furniture manufacturing SMEs are facing, they must make sure that they are apply for funding from funding institutions such as the Department of Trade and Industry, National Youth Development Agency and commercial banks so that they can be able to purchase and employ the latest technology in their enterprises. This will boost their competitiveness.

5. IMPLICATIONS

The implications of this study are as follows:

This study is the first study to investigate the readiness of the furniture manufacturing SMEs in South Africa for Artificial Intelligence and robotics. In this study it was discovered that furniture manufacturing SMEs are not ready for Artificial Intelligence due to three factors. Namely, lack of finance for purchasing the latest technological advancements, high number of employers and employees not having higher learning education (Post matric education) and lastly they are not willing to adapt to new things. This simply means that in order for furniture manufacturing SMEs to be ready for Artificial Intelligence they have to be willing to adapting to new technological advancement, they must be educated enough to can even to operate the latest technological advancement and lastly there must be sufficient capital. Moreover, the employees and employers' educational background will motivate them to adapt to new things and adapting to new things will educate them in turn. In addition, their educational background will help them acquire financial resources from financial institution and again financial resources can help them acquire their required education for the enterprise as continuous education is very important. The last relationship is financial resource and adaptability, the relationship is that financial resources will make the enterprise to adapt at they will have the required education and the right technological advancements. The diagram below illustrates the relationship between adaptability, educational background, financial resource and the readiness of the furniture manufacturing SMEs for Artificial Intelligence.

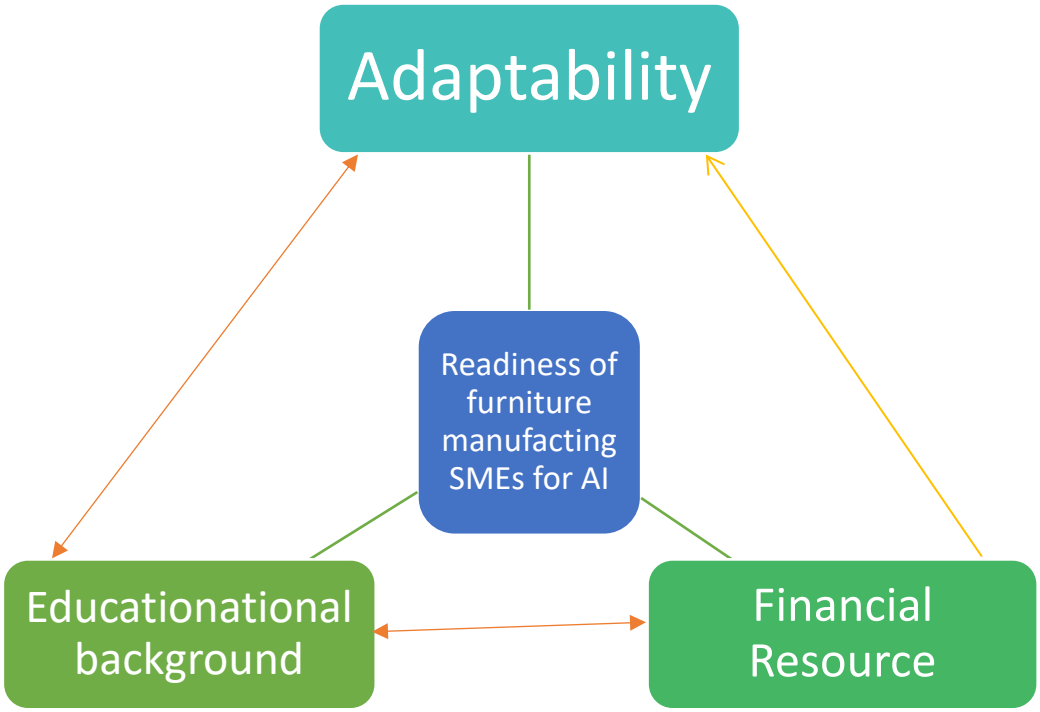

Figure 3 The readiness of furniture manufacturing SMEs

6. CONCLUSION AND LIMITATIONS

Artificial Intelligence first took off in the 1980s and 1990s. AI is defined as a computer system that uses the human or animal intelligence. This Artificial Intelligence is threatening to take over the white collar jobs, but it will improve the competitiveness of the enterprise. Employing AI in enterprises has its own its own pros and cons. As this study focused on furniture manufacturing enterprises that are based in South Africa in the Soweto region. These enterprises are facing numerous challenges such as lack of educated employees and employers, lack of financial resources etc. Even though there are differences and similarities between township based furniture enterprises (home based) and business park based furniture manufacturing enterprises, there is no much difference between the two enterprises. Based on this study, it is pretty clear that furniture manufacturing enterprises are not ready for Artificial Intelligence. In order for AI to take place it means that furniture manufacturing SMEs need to have sufficient resource, adaptability of the enterprise manpower and educated employers and employees. As this study is limited to furniture manufacturing SMEs that are based in South Africa, specifically at Soweto region, this did not study other industries such as Banking services, Agriculture, Hospitality etc. the findings of this study are limited to only furniture manufacturing SMEs. A replication study is on other sectors recommended so that a generalisation can be made about SMEs' readiness towards AI in South Africa even in other developing nations.

Biographies

Mr. Lawrance Seseni is a PhD Candidate in Operations Management at the University of Johannesburg. He is currently working at the same University at the faculty/college of Business and Economics where he serves as an Assistant Lecturer in the department of Business Management and a contract lecturer in the same institution but at the Centre of Small Business Development (CSBD). His masters study was on Quality Management in Furniture manufacturing SMEs (Small Medium Enterprises). He serves in different boards as a board of director, one of the boards he serves is IBASA YC (Institution of Business Advisers South Africa Youth Chapter). He is now serving as a board of director with a portfolio of co-secretary of the IBASA YC (Institution of Business Advisers South Africa Youth Charter). He is also serving as a Co-Faculty Adviser in the student organization called ENACTU University of Johannesburg. He served at Enactus University of Johannesburg since 2012 holding different portfolios. His interest in research is Knowledge Management in SMEs, Service and Product Quality within SMMEs. In the year 2017 he became a member of the University of Johannesburg IEOM student chapter where he currently serves as a Director of Finance.

Charles Mbohwa Professor Charles Mbohwa is the Acting Executive Dean at University of Johannesburg's (UJ) Faculty of Engineering and the Built Environment (FEBE). As an established researcher and professor in the field of sustainability engineering and energy, his specializations include sustainable engineering, energy systems, life cycle assessment and bio-energy/fuel feasibility and sustainability with general research interests in renewable energies and sustainability issues. Professor Mbohwa has presented at numerous conferences and published more than 150 papers in peer-reviewed journals and conferences, 6 book chapters and one book. Upon graduating with his B.Sc. Honors in Mechanical Engineering from the University of Zimbabwe in 1986, he was employed as a mechanical engineer by the National Railways of Zimbabwe. He holds a Masters in Operations Management and Manufacturing Systems from University of Nottingham and completed his doctoral studies at Tokyo Metropolitan Institute of Technology in Japan. Prof Mbohwa was a Fulbright Scholar visiting the Supply Chain and Logistics Institute at the School of Industrial and Systems Engineering, Georgia Institute of Technology is a fellow of the Zimbabwean Institution of Engineers and is a registered mechanical engineer with the Engineering Council of Zimbabwe. He has been a collaborator to the United Nations Environment Programme, and Visiting Exchange Professor at Universidade Tecnológica Federal do Paraná. He has also visited many countries on research and training engagements including the United Kingdom, Japan, German, France, the USA, Brazil, Sweden, Ghana, Nigeria, Kenya, Tanzania, Malawi, Mauritius, Austria, the Netherlands, Uganda, Namibia and Australia.

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