

Fourth Industrial Revolution and its impact on Furniture Manufacturing SMEs

Lawrance Seseni

Department of Quality and Operations
University of Johannesburg
Auckland Park, RSA
sesenilawrance@icloud.com

Charles Mbohwa

Department of Quality and Operations
University of Johannesburg
Auckland Park, RSA
cmbhwa@uj.ac.za

Abstract

To date, the world has witnessed three different industrial eras. At the current moment, the world is following the industry 4.0 that is a German strategy for using high technology. This strategy is still in its infancy stage; however, organisations and universities are paying attention to this new strategy. The problems that SMEs face range from lack of skilful employees to securing financing. With that in mind, this study aims to find out if furniture-manufacturing SMEs will be participants or observers in the industry 4.0 era. This study is a qualitative study where a case study was developed out of 117-furniture manufacturing SMEs. It was found that the workforce is not highly skilled, they do not even run the business formally, they find it difficult to obtain funding and infrastructure makes it difficult to operate rate due to poor infrastructure. This study is limited to furniture manufacturing SMEs that are based in Gauteng province, particularly Johannesburg region. Therefore, the findings of this study cannot be generalised. Further study must be conducted on the programme of the classes that the workforce will undertake. This will help ensure that they get the relevant education for industry 4.0 and their sector.

Keywords

Industry 4.0, Furniture Manufacturing, SMEs, Smart Factories

1. Introduction and Background

The world has witnessed three different types of industries since the beginning of the 18th century. The first industrial revolution is also known as Industry 1.0 focused on the introduction and the use of mechanical machinery, this was in the 18th century. This was followed by the industry that was powered by electricity, the second Industrial Revolution also known as Industry 2.0 in the 19th century. Then the 20th century, computers and the internet were introduced and it made the third Industrial Revolution also known as Industry 3.0. Recently in the 21st century, there is a disruptive industry that is talked a lot about by the private sector, government and the entire community at large. The Fourth Industrial Revolution that some know it as Industry 4.0 is a disruptive industry. This Industry 4.0 also known as the Fourth Industrial Revolution is a build-up of the third Industrial Revolution. It encompasses the use of Big Data, Artificial Intelligence and the Internet of Things (Sivathanu & Pillai, 2018).

The question of this study is that, will furniture-manufacturing enterprises be participants or will they be spectators of the fourth industrial revolution? This question is asked simply because they to be a participant simply means you have to have the means of participating and have the skills required. It is also important to note that furniture-manufacturing SMEs play a pivotal role in the growth of the economy of the country with a contribution of 1.1%. They are known for employing over 26 000 employees. This sector has faced a major drop in the years 2009 until 2014. It was stated that the furniture-manufacturing sector has about 2 200 registered companies nationwide. The Department of Trade and Industry is currently working with consultants to better the registered furniture manufacturing companies (Seseni & Mbohwa, 2017).

However, SMEs in South Africa face a number of challenges. The challenges they encounter start from crime, corruption, government bureaucracy, access to resources etc., this makes it difficult for SMEs to do business (Seseni & Mbohwa, 2017). Now that everyone is talking about the fourth industrial revolution, government organisations want to be participants, big organisations also want the same, and some are already doing it. This is no shock because they have the required resources as far as capital and skills are required. Then the question could be that with all the challenges that SMEs are facing will they be able to be participants or will they be observers?

The research objectives:

1. To find out if furniture manufacturing SMEs will be participants or observers of the fourth industrial revolution.

2. To explore the implications of participating and observing the fourth Industrial Revolution.

Similar studies

Strange and Zucchella, 2017, conducted a study on Industry 4.0, global value chains and international business. Their purpose was to evaluate the adoption of the latest digital technologies such as Big Data Analysis, Internet of Things, Robotics and smart manufacturing. They wanted to find out if all the above mentioned latest digital technologies might affect the location of activities in the global value chain. They discovered that these latest technological trends might change the way activities are being done in business.

This study will have the following headings: 1. Introduction and Background, 2. Literature Review, 3. Methodology, 4. Discussions, Recommendations and Implications; and 5. Conclusions. The next section is a literature review.

2. Literature Review

Fourth Industrial Revolution

It is a fact that industries play a pivotal role in the economy of the nation. To this day, the world witnessed three revolutions (industrial) namely, the first industrial revolution also known as Industry 1.0. during this time, it was the second industrial revolution also known as Industry 2.0 then the third industrial revolution also known as Industry 3.0 (Sivathanu & Pillai, 2018). Fourth industrial revolution is a German's strategy that they proposed so that they may use high technology. This means that fourth industrial revolution also known as industry 4.0 is based on high technology and the internet. As this strategy was introduced during the Hannover Fair in the year 2011, many European countries decided to follow that strategy. It is worth noting that the fourth-industrial revolution is still in its infancy stage (Strange & Zucchella, 2017; Ghobakhloo & Abbas, 2018). It is worth noting that the first industrial revolution focused on introducing mechanical machines that used steam engines and water power. This happened at the end of the 17th century and at the beginning of the 18th century, while the second revolution then powered the industry with electricity in the 19th century. This strategy was driven by having assembly lines. The leader in this strategy was Henry Ford who made mass production official. In the 20th century, the industry then introduced computers, internet, and automation in the manufacturing processes. Currently, in the 21st century, it is about smart companies and digital technologies. It is focusing on artificial intelligence, big data analysis, and the internet of things (Sivathanu & Pillai, 2018; Ghobakhloo & Abbas, 2018).

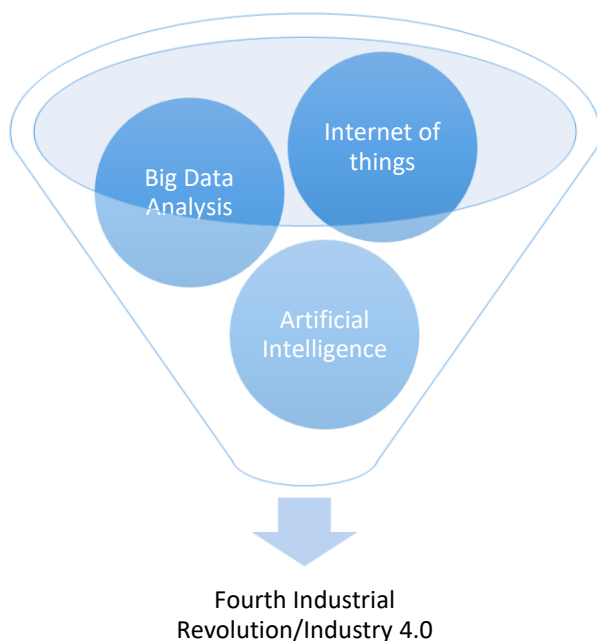


Figure 1 Fourth Industrial Revolution/Industry 4.0

It is believed that the majority of the Industry 4.0 technologies and designs have already been used for nearly a decade now. In addition to that, it has been said that Industry 4.0 will be followed whether people agree with this German's strategy or not. Furthermore, manufacturing SMEs need to position themselves so that they may be participants in this new phenomenon called Industry 4.0 so that they may remain competitive and relevant in the market (Ghobakhloo & Abbas, 2018). With that in mind, the question is, will furniture manufacturing SMEs that have limited resources such as workforce and finance be participants or observers in this new strategy? One needs bearing in mind the challenges that these furniture manufacturing SMEs have. The next paragraph will review the state of furniture manufacturing SMEs in South Africa.

The state of furniture manufacturing SMEs in South Africa

It is pivotal to know and understand that there is no universal definition of SMEs. Nevertheless, what the acronym stands for is Small Medium Enterprises (SMEs). In South Africa, the acronym has an edition of M that stands for Micro. In short, SMMEs that stands for Small Medium and Micro Enterprises. As it has been stated earlier that there is no universal definition. It has been said that countries define SMEs based on their economic status. Countries define SMEs based on the income they receive, the number of employees they have and the value of assets they have. Concerning their contribution to the economy, they are known for playing a pivotal role worldwide. In South Africa, there are over 90% of the registered SMEs. They have contributed to the creation of jobs of about 50% of the total labour force and they contribute 45% to the GDP (Gross Domestic Product). About the challenges that they face, they face numerous of them and are as follows: less skilled labour and difficulty in accessing financing, restrictive labour regulations, and theft and crime. It is worth noting that there are many other challenges than the ones mentioned earlier. The following diagram will illustrate the challenges that are faced by SMEs in South Africa. It is worth noting that the furniture manufacturing sector contributes 1.1% to the GDP with 26 000 employees. This was recorded in 2014 (Seseni & Mbohwa, 2017). The following diagram illustrates the challenges faced by furniture manufacturing SMEs in South Africa.



Figure 2 Challenges faced by furniture manufacturing SMEs in South Africa

How will industry 4.0 work?

As it has been mentioned, earlier that industry 4.0 is still in its infancy stage. Many organisations, research centres, and many universities currently prioritise it. However, there are still academics that still believe that this concept is still not clear. Moving from industry 3.0 to industry 4.0 requires a detailed roadmap that will focus on technology and on strategy. It has been said that a roadmap plays a pivotal role in the success of the organisation. This means that a roadmap about the implementation of industry 4.0 is crucial (Ghobakhloo & Abbas, 2018). It has been said that the digitalisation of things changes the corporate world due to organisations using the latest technologies that will also affect the entire community at large (Rachinger, et al., 2018). Using technologies for industry 4.0 is not that easy (Jun, et al., 2017). Therefore, it is a fact that in order for industry 4.0 to take place, it means organisations must have skilled labour who can be participants and financial resources to can be able to digitalise (O'Connor & Kelly, 2017). Concerning manufacturing enterprises, it has been said that this sector will not be immune to the practices of industry 4.0. At the current moment, manufacturing processes in manufacturing enterprises are based on isolated and automated cells with participants with limited communication with each other and the supply chain that is long. In contrary to that, manufacturing processes in the industry 4.0 era will be interconnected with technology as its foundation. This will increase the production line and improve the supply chain (The dti, 2018). This proves that industry 4.0 on furniture manufacturing SMEs may benefit from this German strategy provided they become participants.

3. Methodology

This study adopted a qualitative approach, whereby a case study was developed. This method is used because it has alluded that a case study helps with the in-depth understanding of the problem. In this study, a case study was developed out of 117-furniture manufacturing SMEs that are based in Johannesburg region at Orlando and Pennyville industrial Park, Pimville and Freedom Park.

Case study

Background

In this case study, 117 furniture manufacturing SMEs. The above-mentioned SMEs are based in residential areas or rather home-based, while others located in industrial areas. In this study, two industrial areas were studied. The studied industrial parks are as follows: Orlando Industrial Park and Pennyville Industrial Park. These two differently located enterprises operate in a different way.

Operations

Concerning the way industrial park furniture manufacturing SMEs function, they have fixed operations or rather strict trading hours. They only operate from Monday to Friday starting with their operations from 8 am until 4 pm. On public holidays, they do not operate at all. On the hand, the enterprise that is based in residential areas does not have fixed operations hours. They work according to orders that available. Concerning the way things are done in these enterprises, furniture-manufacturing enterprises that are based in industrial areas are more formal and professional, while the other ones that are based in residential areas (Freedom Park & Pimville) are less formal and less professional. The type of equipment that they use is standard and it is not the latest. They even have less equipment that is not even expensive. Most other enterprises even rent machinery from their competitors that have more equipment. This type of practice is common in industrial parks.

However, employees and employers are complaining that the endless power cuts, especially in the township, affect their enterprises because they sometimes to deliver on time to their customers due to the power cut. In areas such as Freedom Park, they always witness this problem that results in general employees resorting to striking request the counsellor to intervene. They, however, go for days sometimes without electricity. This does not only inconvenience the enterprise but the customer as well as some end up cancelling their orders and buying in other shops that have finished furniture. Some also complain that their network coverage is problematic as it takes forever to surf the net or to open a page on the internet. However, this is not for all networks but for some networks. Some of the enterprises do not do things professionally. They do not have a record keeping system for everything that happens in their enterprise. This makes it difficult to trace how much they spent and how much they have made. It also makes it difficult to have their customer base.

Employees

In all of these enterprises, they do not have a fixed number of employees who report to duty on a daily basis. Only the entrepreneur and/or manager who report to duty daily. As for other people, they are only called for duty on the conditions that there is work to be done. This means that there must be orders that need to be completed. In addition to that, the level of education of the people working in these enterprises is very low. With the majority of them who do not have tertiary education. These people are employed based on their skill of producing the product nothing more. Employers that have their manufacturing enterprises that are based in residential areas are also less skilled with the majority of them being foreigners while on the other hand, those that are based in industrial parks they have a bit of formal education. Some of them have tertiary education.

4. Discussions, Recommendations, and Implications

I. Lack of highly-skilled employees

As it is stated in the case study that employees that work in furniture manufacturing enterprises including the owners are less skilled. Because of this problem, it will be difficult for the aforementioned enterprises to can understand how industry 4.0 will work in their enterprises, as it required highly personnel. Furthermore, it has alluded that implementing industry 4.0 in enterprises requires a roadmap that will outline all the dos; this will make it difficult for the abovementioned enterprises to implement this German strategy successfully. The government through its departments such as the Department of Trade and Industry and others must train these people so that they may be ready and be able to understand the roadmap for implementing the strategy. However, as these people have different levels of formal education, the tasked Department must have different levels of education. Those with tertiary education should be in class and those with matric and less should be in their class. This will solve a problem that may arise of finding a balance when teaching these people. The lessons should be for introducing the concept of industry 4.0 in furniture manufacturing SMEs and advanced classes.

II. Lack of funding

It is no secret that most of the funding institutions are sceptical about financing Small and Medium Enterprises businesses. This makes it difficult for these enterprises to can purchase the latest machinery that has the latest technological trends. This makes it difficult to can compete with cheap imports from China. This also disadvantages local enterprises. Funding institutions require that the enterprises must have sufficient collateral in order for them to can be able to grant them financing. This becomes highly impossible for SMEs to can be able to produce collateral and fail to secure funding. The South African government through their Departments must increase their funding for SMEs. As it is evident that the management and general employees have less-skills, even if they get the funding it will be difficult for them to can manage and see to it that they return the money borrowed. Therefore, it must they still need to be mentored by these financial institutions and government institutions such as the Department of Trade and Industry on how to draft budgets and ways to grow their enterprises.

III. Infrastructure

Concerning infrastructure, it is evident in the case study that poor infrastructure is affecting enterprises negatively. This is not good as they fail to reach their target and in turn, frustrate the customers. The government must work on improving their infrastructure, particularly electricity. They must also focus on improving internet coverage, as the Internet of Things will require high usage of electricity and internet.

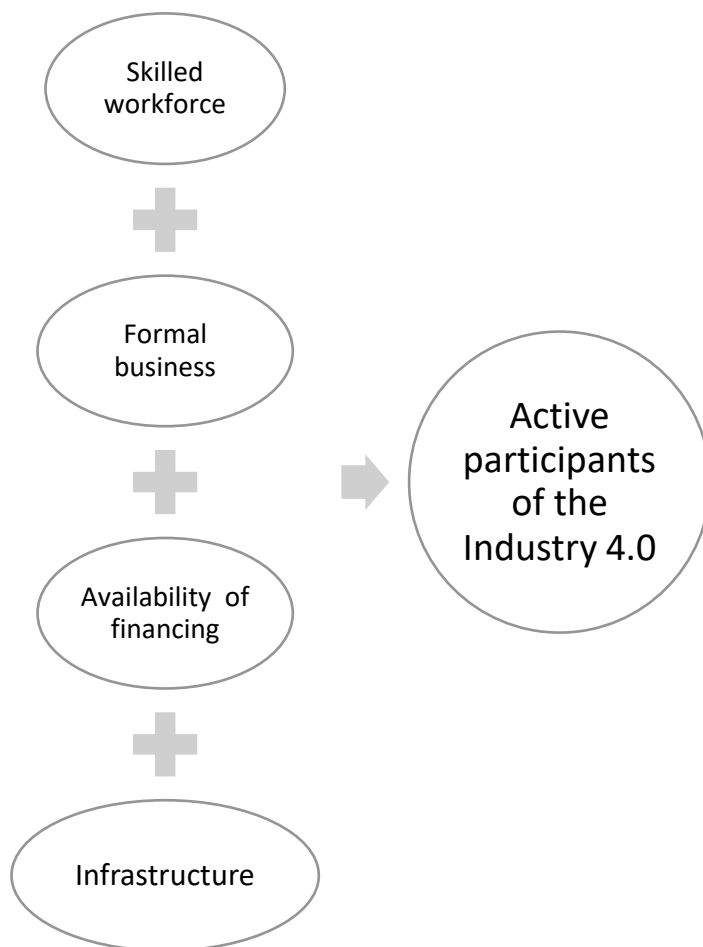
IV. Formal operations

Majority of these enterprises operate informally, they do not even have messed up record-keeping systems. Some of them hardly remember they have their financial records and does not really have an order book where they record their customer orders and their details. They just work based on remembrance. This may backfire when they want to apply for funding, as they will not have details as far as their financial statements are concerned. It will even be difficult for them to compile proper financial statements and prove their client base. These entities must make sure that they have to keep records of everything they do so that they may know how their monies are spent and who ordered what, when and when should it be ready for delivery.

This study has the following implication:

1. The enterprise must run their enterprise formally and professionally so.
2. The government must train them so that they may have the required skills to can be active participants in the industry 4.0 era.
3. Funding must be made available to those who may be willing to apply for funding so that they may be able to buy the latest technologies.

The skilled workforce will run the enterprise formally. Therefore, professionalism will lead the enterprise into doing things properly and formally so. This will even excite the institutions that may be readily willing to finance them. This does not only end here. This will also lead them into getting more business and earning respect from their customers. Where things are done professionally, customers get satisfied. Furthermore, these enterprises will be able to be active participants in the industry 4.0 provided there is proper infrastructure because they will be able to purchase and use the latest technologies. This will boost their enterprises. All the above-mentioned will boost the identified SMEs.



The above diagram illustrates how skilled, formal business, proper infrastructure and availability of financing contribute to being an active participant in the industry 4.0.

5. Conclusion

It has been said repeatedly that industry 4.0 is here to stay. Whether people agree with this German's strategy or not but somehow they will just have to follow. The way the cell phones penetrated the market is the same way industry 4.0 will penetrate the industry. To be participants in this industry will require that enterprises must be highly-skilled as using the latest technological trends that require new sets of knowledge. Some of the jobs will be lost in the process while some will be created. It is worth noting that furniture manufacturing SMEs in South Africa still have less skilled enterprises, they lack funding and still run their enterprises informally. This will make it difficult for them to be active participants as this strategy requires highly skilled personnel, finance for employing and hiring the highly skilled personnel and purchasing these technological trends. It is also important to know that for countries such as South Africa and other countries that are still developing will be challenged because this strategy requires proper infrastructure such as on point electricity and high-speed internet coverage. South Africa and other developing countries are still struggling with that. In answering the question of whether furniture manufacturing SMEs in South Africa will be participants in industry 4.0 era the answer is they may be provided the workforce is trained, infrastructure is fixed and financing coupled with mentorship is made available to entities that require it. If that is not addressed, industry 4.0 will remain a dream for the aforementioned entities. This study is limited to furniture manufacturing SMEs that are based in Gauteng province, particularly Johannesburg region. Therefore, the findings of this study cannot be generalised. Further study must be conducted on the programme of the classes that the workforce will undertake. This will help ensure that they get the relevant education for industry 4.0 and their sector.

Biographies

Mr. Lawrance Seseni is a Ph.D. 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 master's 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 Strategic Adviser (Alumni) in the student organization called Enactus 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, Big Data, and Artificial Intelligence. 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.

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