Assessing competitive advantage brought by Blockchain technology in supply chain systems: Vanderbijlpark retail business perspective

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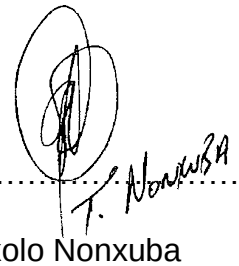
ABSTRACT

The aim of this study was to gather and understand how supply chain issues related to food safety, counterfeiting of goods and traceability affects retail businesses. Furthermore, the study assessed the perspective of retailers on employing Blockchain enabled supply chain systems to combat the challenges and create competitive advantage. This was done through establishing a research methodology that would suit the study, acknowledging that Blockchain is a ground-breaking technology, hence the approach taken was more of getting the views of the retailers, derive key elements that make up the shared views and evaluate the stance against the research questions. The study was undertaken by understanding the conventional supply chain systems (SCS), their weaknesses, and how there have affected the businesses. The research study ventilated that there are many challenges on food safety, counterfeiting of goods, and that these have affected businesses to a point that some of the brands existence were threatened. Some of the retailers shared that even though they may not have had first-hand experience on some of the challenges stated, they are frightened by what they have seen businesses go through. The study has recognised that Blockchain is a new business tool, and that not many retailers have had experience with if, however, it was interesting to see that many of the retailers understood how the technology works, and have shared that they are not aware of businesses that have rolled it out, Moreover, majority acknowledges that there is a huge competitive advantage that could be derived from its operations and yet the concern around security was noted.

Keywords: supply chain systems, retail business, food safety, counterfeit goods, traceability, Blockchain, defects, competitive advantage, security.

DECLARATION

I, Thanduxolo Nonxuba, declare that the research study which I herewith submit to the North West University as partial fulfilment of the requirements set for the Master in Business Administration (MBA) degree, is my own work. In instances where I have used other sources, citing, references and acknowledgements have been observed. This research has not been submitted before for any degree or examination in this or any other University.



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Thanduxolo Nonxuba

Signed at Vanderbijlpark on 23 February 2021

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- To my wife, Sophia Nonxuba, thank you for allowing me time and space to take on this journey. I know it took a lot of hours and days of happiness from us, but it was worth every bit.

- To my kids, Lundi and Lakhiwe, thank you boys for allowing me time to complete this degree. All the achievements and success that lie ahead are for you.

- To my line manager, Daniel Strydom, thank you for honouring my request of furthering my studies, and for approving funding, giving me days for studying and finally for opening doors for my professional growth.

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I dedicate this mini dissertation to my wife for holding our family together during this period and my late dad (who passed away in 2008).

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CHAPTER ONE: INTRODUCTION

1.1 INTRODUCTION

According to Van Asselt *et al.* (2017:13) there are many reported incidents in the supply chain network of the retail industry, related to defective deliveries, counterfeit goods and food safety. The most devastating issue here is that these discoveries are picked up at the retailer enterprises or even worse, reported by the consumer. According to Zhou *et al.* (2017:26) the costs related to lodging a query with the suppliers, time involved, disappointment on the side of the customer who gets to purchase the goods and subsequent reputational damage all make it necessary for an alternative option or system to be adopted in order to curb incidents of this nature, and when they occur, traceability of where the defect has taken place should be possible. Some of the suppliers along the supply chain line end up absorbing the blame because of the lack of traceability and the lengthy process involved.

This research discussed how the benefits provided by Blockchain enabled supply chain systems can help to curb and prevent recurrence of incidents mentioned above and improve customer confidence on all quality issues related to supply chain.

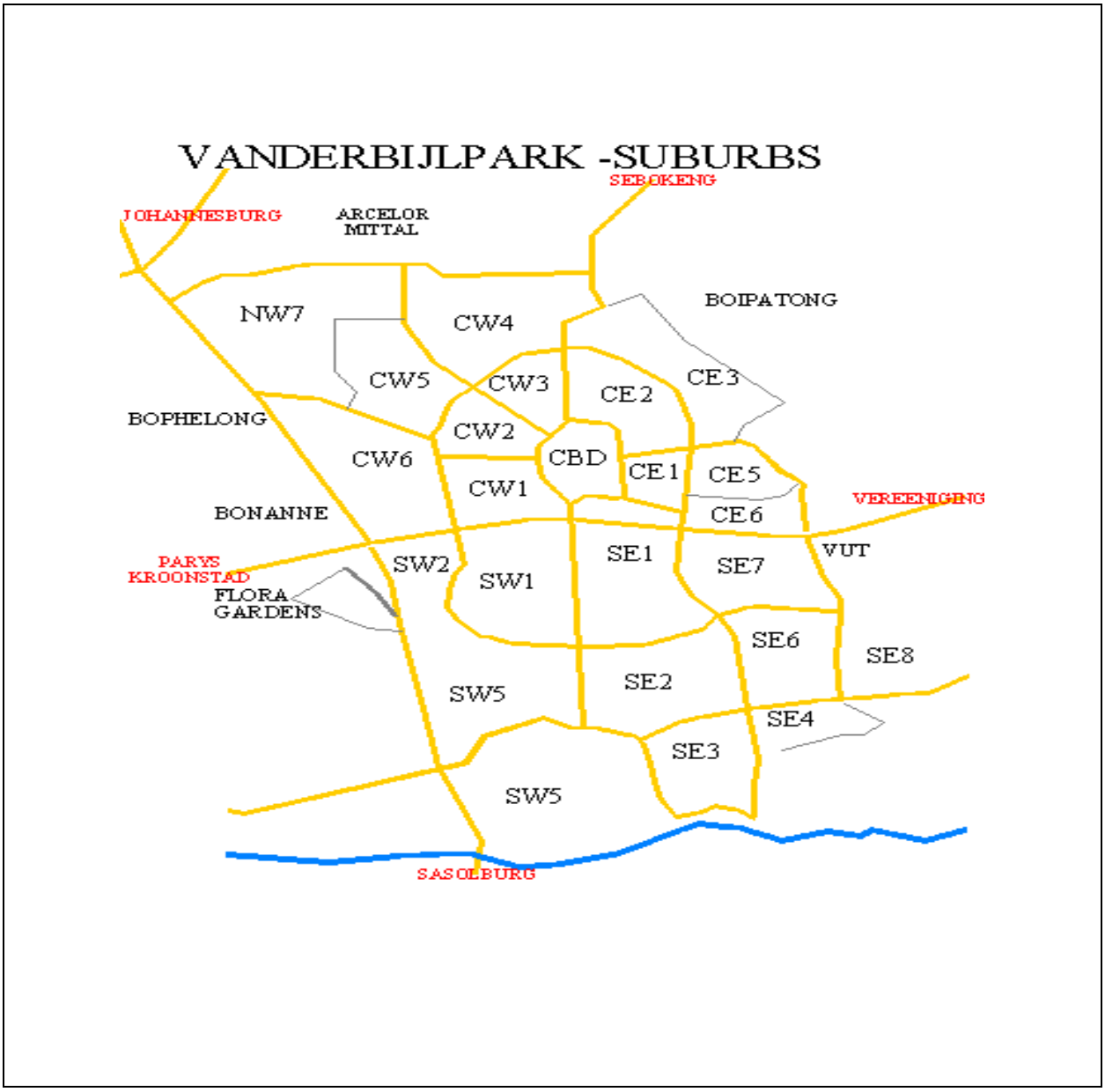
This research further looked at how the retailers could prevent issues with quality of supply and inefficiencies presented by the current systems through a Blockchain enabled supply chain system.

The retail experiences around food safety, counterfeiting of goods, and traceability are well captured in the available literature, indicating that many businesses have suffered and are continuing to do so even to a point of brand damage (Fernie & Sparks, 2018:20). The research problem for this study has been captured as follows:

The research focus was specific to the Vaal Triangle, with focus to Vanderbijlpark area.

Town population: Vanderbijlpark is an industrial city with 95 840 inhabitants on the Vaal River in the south of the Gauteng province of South Africa (StatsSA, 2011).

The Vaal Triangle areas that were covered as part of this research can be seen on Figure 1 below:



Source: (Vanderbijlpark-Line-Map-Suburbs, 2009)

Figure 1: Vanderbijlpark map

1.2 PROBLEM STATEMENT

There are many challenges that have been faced by retail businesses that have collapsed businesses and subsequently the economy. These challenges range from food safety, counterfeiting of goods, and subsequent issues related to their traceability. Food safety issues have affected product brands and reputation of the retailers, and ultimately leading to the collapse of businesses. Counterfeiting of goods have affected businesses in many scales, typically by providing a false alternative to customers, thus affecting the reputation of the brands and the potential cash that the business could have benefitted from. The effect of these challenges have left long lasting pains to businesses and have led to collapse of some as can be seen below:

According to Chammem *et al.* (2018:13) there are plenty cases of food safety that have been reported in the European Union and in Brazil. The cases are driven by the fact that many countries operate in a global space in terms of supply chain through global economic trade and this poses a risk of transferring diseases from one country to another. Chammem *et al.* (2018:13) goes on to say that this has in fact caused mistrust on the side of the consumer.

According to Grace (2017:13), Africa is the second largest continent affected by food safety. The affected areas in this regard are ranging from: imports, production, harvest, processing, retail, and home.

Majority of the time, the foodborne disease is detected by the consumer, probably through certain symptoms. The recent listeriosis incident is a typical case of events of this kind. There must be a measure somewhere in the supply chain line, where threats to food safety are detected before they affect or reach the consumer.

According to Alzahrani and Bulusu (2018:34), the conventional supply chain system rely mainly on the centralized system or point of control. This is done typically by government appointed authorities. Alzahrani and Bulusu (2018:35), the World Health Organisation (WHO) has estimated that about 10% of the pharmaceutical products are counterfeit and the bigger portion of these, being 30% are coming from the developing countries. This is

reported to have a potential of causing critical illness, thus putting more pressure on the already collapsing health system in regions like Africa.
The effects of this phenomenon have not received much research attention in South Africa, and this research has examined this with specific attention to the Vaal Triangle area to see how the identified gaps can be curbed by the use of Blockchain enabled supply chain system.

The last aspect that links directly to the two items above is the issue of traceability, where in cases when an occurrence in the form of counterfeit or food safety has been picked up, the process of tracing its origin is lengthy, costly, and furthermore poses reputational damage that some of the small and medium enterprises (SME) cannot afford.
A typical case in South Africa is around beef supply industry. According to Amuno *et al.* (2018:6), the supply network of the beef involves many stakeholders, from the farmer to the eventual consumer. The risks are associated with traceability if an eventuality related to food safety occurs is very high because of many role players in the chain network. Possibilities of closing this gap through a Blockchain enabled supply chain system will be explored in this research.

1.3 RESEARCH PURPOSE, GOALS AND OBJECTIVES

The objectives of this research are to explore how organisations in the retail industry, particularly in the area of the Vanderbijlpark can obtain competitive advantage through employing Blockchain technology in their supply chain.

The competitive advantage will be assessed at the perspective of the retailers on issues related costs of poor quality of the delivered goods and customer retention embedded on trust, as follows:

- By analysing how retail organisations in the Vanderbijlpark area have been impacted by quality issues such as food safety and counterfeit goods.
- By analysing how the process of traceability has been for the retailers upon discovering quality defects on the delivered goods.

- By assessing the preparedness of the retailers to take advantage and create competitive edge by implementing a Blockchain enabled supply chain system.

1.4 RESEARCH QUESTIONS

This study determined if the retailers in the Vanderbijlpark area can achieve competitive advantage over their competitors by eliminating costs and reputational damage associated with quality issues on the delivered goods. This was done by determining if the quality issues being addressed can be eliminated by employing a Blockchain enabled supply chain system to address the following questions:

- How effective have the conventional supply chain systems been in managing quality issues on delivered goods?
- Has it been an easy process for conventional supply chain systems to trace and close the quality defects picked up from delivered goods?
- What are the views of the retailers on employing a Blockchain enabled supply chain to address and combat quality issues?

1.5 ASSUMPTIONS

The assumptions for this study were based on three key fundamental elements of qualitative research. These assumptions include how the researcher perceived the realities of the study (ontology), the establishment of the foundation and knowledge base of the researcher (epistemology), the researcher's values affect the study or the outcome of the research (axiology) (Wargo, 2015).

The first assumption adopted by the researcher was founded on the ontology framework, assuming that the participants would corporate in an honest manner so that their lived realities are ventilated.

The epistemological assumption was accommodated by the limited meet and greet with some of the participants in order to understand their work environment and connect with

their perspective or views. Due to limitations brought by COVID-19, the meeting and exploring of the work environment of the participants was limited.

It was acknowledged by the researcher that there may be elements of bias derived from the role played by values (axiology), therefore the researcher revisited the records a few times on different occasions to establish the meaning derived from the participant's interviews was taking and used without alterations.

It was further assumed that the participants had the necessary capabilities to answer the questions, expose the phenomenon, and that the participants have equal interests in looking at the issues experienced in the retail supply chain network (Luoto *et al.*, 2017:9).

1.6 SIGNIFICANCE AND CONTRIBUTION OF THE STUDY

The studied literature in this research has mentioned many issues around areas in question: Food safety, counterfeiting of goods, and traceability issues in the retail business but most of it was more of general understanding without direct information or input from the affected retailers. This research took a step to explore how the retailers have been affected by issues mentioned above, what is their perspective around rolling out Blockchain enabled supply chain system to combat the problem.

1.7 DEFINITION OF KEY TERMS

Blockchain: Definition of Blockchain is taken from Bitcoin reference point, where the key elements are – transactions, consensus, and network. Zīle and Strazdiņa (2018:2) Defines it as "system where distributed ledger is described as a type of distributed database that can have different users (nodes), and Blockchain, in turn, is a type of distributed ledger, which is created like a chain of cryptographically linked 'blocks' with transactions and is sending all data to all nodes in its network".

Counterfeit: According to Isles (2017:4), there is no universally agreed definition for counterfeit, but it refers to substandard, spurious, falsely labelled, falsified and counterfeit

(SSFFC). In legal terms this refers to tempering with intellectual property and brand trademark protection.

Cryptographic: According to Gaddam and Aissi (2017:15), this is defined as a method of generating token and data element as a substitute for sensitive information, typically, using a token instead of primary account number (PAN)

Enterprise Resource Plan (ERP): According to Madapusi (2019:3), ERP is a system that interlink different functions in a firm to enable functions like finance management, procurement and supply chain, human resources management, etc.

Foodborne disease: According to Qingying *et al.* (2017:1) this can be defined as "an acute disease caused by ingestion of food that contains or is contaminated by toxic materials or infectious organisms".

QR: Jianfeng *et al.* (2017:1) defined quick response (QR) code as a tool used for mobile payment to store, transfer, recognize information, and can be decoded using mobile phones and security sensitive applications.

Retail: According to Oxford dictionary, retail is a business of selling good to the public, usually through shops.

SME: Small and Medium Enterprise

Traceability: According to Khan *et al.* (2018:2), this can be defined through the international organisation for standardization (Rani *et al.*), as "ability to follow the movement of products through specified stage(s) of production, processing and distribution"

WHO: World Health Organisation

1.8 CHAPTER OUTLINE OF THE DISSERTATION

The mini dissertation is divided into six chapters as follows:

Chapter One*:*

Introduction: This chapter provides a map of the research and gave a brief explanation of the methodology that was used in research design.

Chapter Two*:*

This chapter focuses on the literature review of the concepts of Blockchain technology driven supply chain in the retail industry. It explains in detail the traditional supply chain setup in the retail industry, its shortcomings and how the shortcomings affect the eventual customer demands or expectation Furthermore it elaborates how Blockchain technology can improve the situation, and also how flexible the retailer systems are to adjust to the new ways of work offered by latest technologies like Blockchain in order to maximize their competitive position.

Chapter Three:

This chapter focuses on the research methodology chosen for the study. In this case a qualitative method approach was chosen and a detailed description of the approach including its requirements was discussed.

Chapter Four:

This chapter presents and interprets the results.

Chapter Five:

This chapter discusses the findings.

Chapter Six:

Conclusion and recommendations: This chapter focuses on the conclusion and recommendations based on the findings. Recommendations were made based on the findings to guide retailers in the Vaal Triangle area on how to improve their supply chain systems utilizing the benefits presented, by technologies like Blockchain.

1.9 CHAPTER SUMMARY

In this chapter the background of the study, the problem statements were laid out. The chapter explained the objectives that need to be achieved in order to address the research questions. The following chapter two explains related work of the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

Supply chain management (SCM) is one of the major functions of the business that seats at the centre of its success in being able to achieve the key elements of customer satisfaction: Quality, time and costs. It is through supply chain systems that organisations can streamline their operations optimise production costs, eliminate waste through quality management systems, and help businesses improve delivery time. Therefore, supply chain system can be used by businesses to adapt their competitive edge over their competitors. Consequently, this was the part that was explored in this study to determine the flaws within the conventional supply chain systems and how the Blockchain can bring a competitive advantage to businesses by eliminating some of the issues, thus, gaining confidence from customers.

Blockchain is known to many through the so called “bitcoin” cryptocurrency form of transactions. As part of the next generation technology introduced by industry 4.0, Blockchain is one of the technologies that has been earmarked to takeover supply chain. The attitude of the business toward this technology is of interest in this research as many business leaders have still stigmatised Blockchain by associating it with bitcoin and therefore, seeing it as untrusted technology. Some of the business will probably choose to stay with their conventional supply chain systems, but the question is, do they stay because the conventional systems can still do the job or because of lack of knowledge about Blockchain? This was explored in this research.

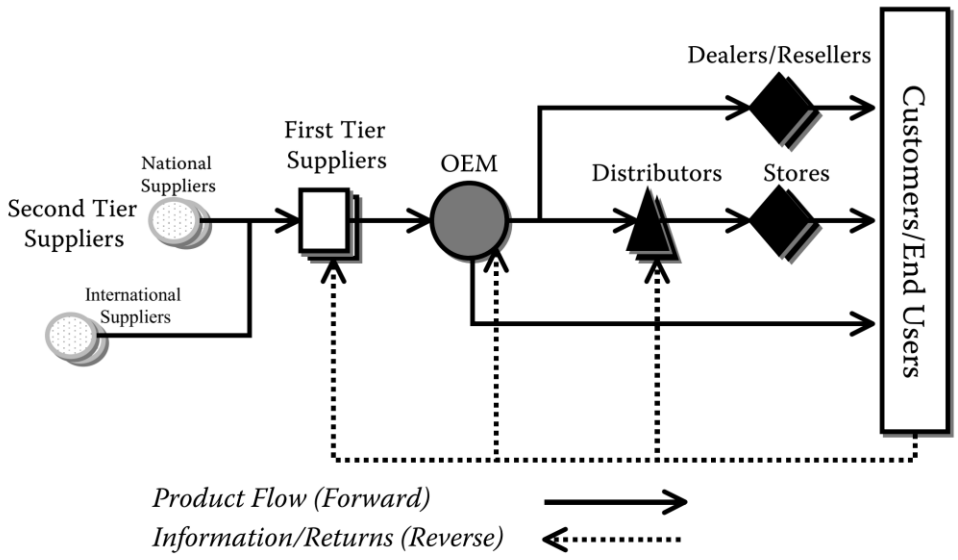
The literature is very specific on issues around food safety, counterfeiting of goods, and traceability when issues get picked up, specifically in the retail industry (Raak *et al.*, 2017:20). The main segments of retail industry that will be assessed are supermarkets, furniture shops, hardware stores, restaurants, and clothing stores.

2.2 SUPPLY CHAIN IN RETAIL DEFINITION

According to Ayers and Odegaard (2017:28), supply chain is a process that involves many different operations that include physical goods, information, finance, knowledge sharing with the ultimate aim of satisfying the customer, as can be seen on figure 2. In retail business specifically, it is very interesting to appreciate the challenges involved in ensuring that the store is stocked up with products or goods that are fresh, and of best quality. The process and the history in terms of the consumer experience is the one that carries the belief and lead to customer retention (Fernie & Sparks, 2018:24).

The supply chain system (SCS) being such a complex process by virtue of the many intervention steps involved from raw materials, transportation, packaging, storage, and consumer demand, challenges are inevitable. In the case of this research, the following challenges or aspect will be covered, both under conventional and Blockchain enabled supply chain systems:

- Food safety
- Counterfeiting
- Traceability



Source: (Ayers & Odegaard, 2017:26)

Figure 2: General supply chain process

2.2.1 Food safety

Food safety has been of concern for many years due to many people around the globe suffering from foodborne diseases. The trace of this phenomenon is traced mainly on handling practices, either at home, during production, processing, packaging, delivery, and storage (Moreb *et al.*, 2017:2).

Food safety management is defined as a process where procedures are set on how handling of all the steps involved should be structured (Griffith *et al.*, 2017:3)

The retail sector is confronted with the an ever increasing challenging of ensuring food safety, not only at primary production, but through all the process phases to the consumer (Van Asselt *et al.*, 2017:7). Food safety assurance is one of the most basis for retail businesses to maintain their competitive advantage, particularly with so much legislations being put down by national and international authorities (Ding *et al.*, 2019:27).

2.2.2 Counterfeiting

Counterfeiting is defined as a process of deception, where one person produces a product that resembles a copyrighted trademarked with the aim of deceiving the potential customers in order to make gains that would have been enjoyed by the original product (Saeed & Paracha, 2019:1)

Counterfeit goods supply has been on the rise for many years and surprisingly, it is using the same legitimate modes of transportation as the original goods to move from its origin to the consumers (Kennedy *et al.*, 2017:2).

The phenomenon of usage of counterfeit material in construction is also on the rise as many organisations try to lower the costs in order to maximise profits, thereby, exposing themselves to a whole world of lookalike materials from the suppliers, including hardware stores (Sheeraz & Ahad, 2017:5).

The intensity of the importance of identifying and combating counterfeit goods doesn't only focus on ensuring that the product propriety rights of the owner are protected, but also looks at ensuring that people's lives and environment are not put at risk, as there are

examples of something as simple as a fastener that was counterfeited killed people, reduced defence readiness and imposed a huge cost on tax payers (Engebo *et al.*, 2017:4).

It is believed that the solution of this big problem of counterfeit goods rests more on ethical aspects, both from the side of the retailer and that of the consumer, because, when the behavioural attitude from both sides is inclined towards the intension of using counterfeit goods, then they will do it, and the opposite is true (Quoquab *et al.*, 2017:11).

2.2.3 Traceability

Traceability, specifically in supply change terms is defined as a process that seeks to track the provenance and the cycle of goods and products, looking at each input or steps, from the raw material, production, packaging, storage, transportation, to the end user (Tara, 2019).

According to Charan and Panghal (2018:4), traceability systems are necessary for facilitating an administrative system in order to equip the supply chain possible means to administer, trace back, and ensure sustenance security and quality using imperceptible traits (IT).

With such a big drive around a quicker location of the origin of faults, either in food borne diseases or counterfeit goods supply, there is a big drive to quickly restore credibility and be able to return back to business and prove to the consumer that it is safe to shop again (Ingrassia *et al.*, 2017:6); a system that can help with such is necessary, and it can be seen that the conventional systems have struggled with the problem for a very long time (Kumar *et al.*, 2017:2).

2.3 CONVENTIONAL SUPPLY CHAIN SYSTEMS

According to Weerasinghe (2018:1), the current setup of supply chain quality assurance includes set agreements from the get-go with the suppliers. These would typically, in the case of a franchise be common agreements on agreed products, quality requirements

based on the customers being served. Typically, one may find that the quality rules being followed by Woolworths are more stringent to those by Shoprite because of the customer base. A blog written by Knight (2016:1) further suggests that retailers are using quality management system (QMS) to improve efficiency on the quality issues in the supply chain network. This implies that many retailers would typically have a process in place on how the products are procured, under what criteria, how the suppliers are approved, and the interventions during production to ultimately receiving the product at the premises.

According to Emerson (2017:1) who has shared a lot of experiences to smaller retails regarding supply chain is of the opinion that a lot of today's surviving retailers are doing it through networks with reputable suppliers. She reckons that there have been cases where smaller operations have hit a knock due to issues with the quality of supply. Therefore, a lot of issues with present systems lie on quality management systems, which smaller operations may not have good amount of investments to curb those. Emerson (2017:1) further says that the issues in quality of supply is also being addressed by processes and protocols (Meyer *et al.*). This is done by implementing systems that get agreed to with the suppliers on how quality approval criteria (QAC) is defined.

The other aspect shared by Corrigan (2018:1) is around ensuring that the supplier chosen by the retailer must be compliant with the local laws or regulations (LLR) to be used as one of the supplier confidence boosters.

Allen (2016:1) refers to one of the important aspects in supply chain as speed. Allen (2016:1) reckons that the current supply systems do not support the speed deliveries required by some of the customers. The system makes limitations in terms of flexibility of being able to link up with the supplier and have the product or part delivered to the store. This is particularly risky for the smaller enterprises as it tarnishes the name of the business due to customers getting frustrated.

The current supply chain is now operating in a global space, where suppliers and customers from different countries and regions meet, say (Cascone & Chasen, 2018:1). The pair further reckon that this setup is driven by competition in lowering prices (CLP), providing best quality, presence in global market.

According to Chammem *et al.* (2018:1), businesses operate in a global space and by extension, there is always a drive to look for affordable stock, better lead times, and flexible delivery schedules to meet the demand. Chammem *et al.* (2018:2), further states that the challenge posed by the global market are around issues of quality, where businesses receive the delivered goods, only to be surprised by damages, counterfeiting, and food safety.

According to Weerasinghe (2018:1), the current setup of supply chain quality assurance includes set agreements from the get-go with the suppliers. These would typically, in the case of a franchise be common agreements on agreed products, quality requirements based on the customers being served. Typically, one may find that the quality rules being followed by Woolworths are more stringent to those by Shoprite because of the customer base.

2.3.1 Problems with the conventional supply chain systems

As mentioned in the background of the study, the current systems have quite a number of loopholes that compromise both the businesses and the consumers.

Asaad (2018:1) has listed several issues that had a big setback in the retail, particularly the food chain business. These are:

2.3.2 Lack of traceability

The current system does not really have an easy system where the supplied product is easily traceable through its network of supply. This is a big problem because it is becoming more of an issue in today's market demand for quality assurance, for traceability and after sales support should something go wrong. A typical case as suggested by Amuno *et al.* (2018:2) the beef supply is channelled through multi network lines before reaching the consumer. One should imagine that in the chain there are many lines involved: slaughtering, preservation, distribution channels, packaging, storage, further distribution to retailers, then the consumer. Bako *et al.* (2019:5) states that a traceability system linking all the steps of the supply chain have not entirely been released

under the conventional supply chain network. Grace (2017:13) state that the food in the kitchen should be traced accurately back to the farmer.

2.3.3 Poor storage and warehousing practices

O'Byrne (2018:1) has emphasized lack of housekeeping in many of the warehouses as of causes for the eventually poor quality of the supplies to the customers. O'Byrne (2018:1) reckons that many of the suppliers do not invest in this because it lacks compliance through regular audits. Moreb *et al.* (2017:5) suggest that there is a general understanding of storage and warehousing of goods, but it varies based on the education level of the personnel involved and issues around compliance.

2.3.4 Inadequate health and safety management

O'Byrne (2018:1) highlighted this as one of the highlights for defaulting suppliers were there is not much care put in place in ensuring that the goods being supplied to the customer are of best quality and have met the minimum regulatory standards. Wallace *et al.* (2018:15) suggest that the government programs that have been implemented thus far have not been able to curb issues around health and safety of the food supply in the retail. For that reason, it is necessary for retailers and government to start looking at means to combat this.

2.3.5 Communication issues between parties.

A blog written by Wilson (2018:1) suggests that poor communication between parties has affected many businesses, where there was loss of productivity as a result of the supplier not delivering the goods on time due to misunderstanding. Issues around communication barriers due to cultural misunderstanding, leading to incorrect deliveries have been noted by (Niemann *et al.*, 2018:9).

2.4 BLOCKCHAIN CONCEPTUAL FRAMEWORK

According to Saberi *et al.* (2019:3), Blockchain is a system that is composed of a series of databases and records that are shared in a transparent platform that is accessible to all the subscribers. This system has a potential of integrating different ERP systems that are used in the supply chain network by different organisations so that businesses can monitor the movements of their goods across the different points of the value chain.

❖ **How Blockchain Works**

According to Kumar and Iyengar (2017:5), Blockchain can be integrated into the ERP systems and can monitor the complete cycle from raw materials to the delivery to the end user. This is facilitated as follows:

- **Production:**

  During this phase the raw materials are packed and given tags that get integrated into the Blockchain system and issued with a digital profile. The product information is made transparent for all users to see, this will include how the raw material is manufactured, all quality protocols are observed. Furthermore, making transparent the process of manufacturing it into a complete product is undertaken, and information related to all the users who were involved in each step.

- **Procurement**

  At this stage, a complete profile of the product is visible and gives the user a complete transparency where the product has been, the qualification criteria signed off, the warehousing and transit details.

- **Processing**

  This is the stage feeds from the raw materials. This stage can only be allowed by the Blockchain process when the raw material digital profile has been cleared. This stage also captures details of the product related to cleanliness, handling, packaging and storage, and this is profiled electronically and made visible to all the users.

- **Distribution**

Once the goods have been shipped from processing, the details around quality, storage, and transit are tracked and the system is updated of any events that take place in the chain and the digital profile of the goods is updated.

- **Retailing**

When the retailers receive their batch of supplies from distribution channels, they scan the digital profiles of the goods and all the quality satisfactory events get to be visible across all the stages of the supply chain. Independent auditors can go to any stage of the supply chain and scan the goods and get the details of where it has been, where its raw materials are from, what qualification criteria they were subjected to, how they have been stored, and handled.

❖ **Blockchain security measures**

According to (Andrew, 2020), Blockchain is very safe based to how its engineering is modelled. The design of the system is such that it is tamper-proof, and it achieves this through three elements:

Decentralisation: which controls the centre of the information, thus creating a single version of what is visible in the system. This is achieved by updating all the users in the chain when there has been any activity taking place on any of the nodes or if there is any addition into the system (Cunningham, 2016:18).

Cryptography: this is described as a muscle of the Blockchain system as it facilitates hashing of all nodes cryptographically. This basically hides the identity of the nodes by creating algorithms to create a new identity of the node (Pasala *et al.*, 2020:5). The key behind this kind of protection is that it is not possible to reverse engineer without tempering with the total flow of the whole Blockchain data.

Consensus: if there is a new block or change to be done to any of the blocks, there must be a consensus on all parties involved that the change can be made, a new

block can be added, and there would be no changes taking place without consensus from all the nodes in the chain (Cachin & Vukolić, 2017:20).

With all the above mentioned, there is a weakness in the system in the sense that, there is a so called 51% attack, which happens a minority of colluding partners could find a way to stop the other nodes from adding new blocks (Sayeed & Marco-Gisbert, 2019:14). When this is done, the eventual result is that they get to control or drive the network. The limitation to it is that it is extremely expensive and a long process for the 51% attack to see the light, therefore making it less easy for fraud to be undertaken, but the chances of it happening are still there.

- **Advantages of Blockchain**

The main value propositions offered by Blockchain are around the four key elements (Saberi *et al.*, 2019:4): decentralisation of the system, security, auditability, and smart execution. These elements combined offer businesses a great advantage in being able to track and monitor the movements of their goods across all stages of value chain.

- **Disadvantages of Blockchain**

The very security elements of the system contribute to the shortcomings faced. The fact that the system requires a consensus from all the nodes for the action to be complete, the process is slowed down due to speed, hence frustrating the users.

Blockchain operates with a lot of data in order to complete the desired steps, therefore its accurate functionality depends on the accuracy of the input data. Hence, so much data that needs to be processed, the costs associated with data input are very high.

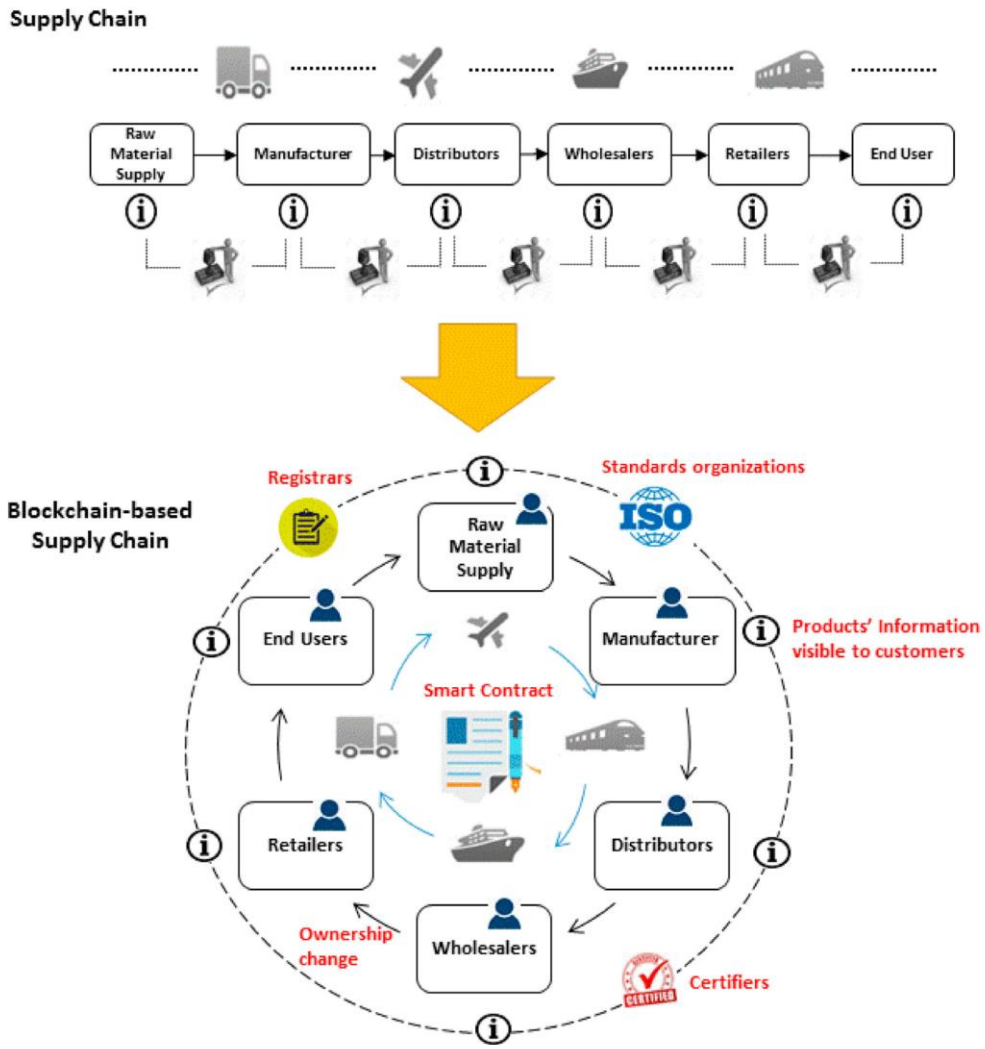
There are unavoidable security flaws like the 51% securing risks that can take place, even though the chances of it happening are slim, the possibility still exists.

2.5 HOW A BLOCKCHAIN ENABLED SUPPLY CHAIN CAN IMPROVE THE SITUATION

Tucker (2018:1) suggests that many people confuse or limit Blockchain to Bitcoin, where it is suggested to be limited to cryptocurrency. Dash (2018:1) suggests that it is time to look at Blockchain beyond and separately from Bitcoin in order to leverage what it can offer, especially in the supply chain industry.

Banerjee (2018:2) suggests that the conventional ERP methods of supply chain have put a lot of strain in the retail businesses even though maximum investment in terms of infrastructure has been put in place. The issues experienced are around insufficient insight on the visibility of their products while they are in the chain network. Banerjee (2018:5) further states that it is through technologies like Blockchain that these identified gaps can be filled through expanded visibility throughout the supply chain network, concurrency amongst different ERP systems.

According to Kumar and Iyengar (2017:5) a typical rice supply chain would require the stakeholders who are: Production, procuring, processing, distribution, retailing, and the consumer. The layout of how Blockchain enabled supply chain system would work is shown on Figure 3 below:



Source: Saberi *et al.* (2019:6)

Figure 3: Blockchain-enabled Supply Chain flow

2.5.1 Traceability through Blockchain

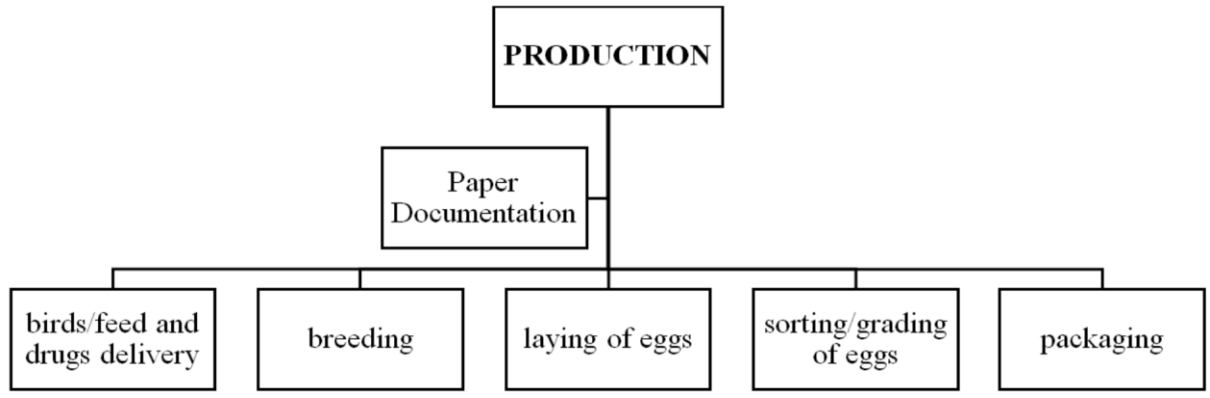
According to Biswas *et al.* (2017:2), there are a number of tracing systems that have been employed in the retail industry, these include barcode, radio frequency identification, electronic product code, etc. Many issues have been raised with the current systems, and these include authenticity of every product. The current system has had flaws in being

able to trace everything within reasonable speed, costs, and limited resources back to its origin and it becomes a costly exercise, say (Biswas *et al.*, 2017:2).

Khuu *et al.* (2019:11) raised a concern around the price effect introduced by the complete traceability cycle in the supply chain, especially in instances where retailer are looking at options to reduce supply chain costs. Khuu *et al.* (2019:11) further state that some of the consumers are prepared to pay based on the history on issues around food borne diseases.

Bako *et al.* (2019:4) has outlined that there are many errors in the current ways of tracing the products, with focus on poultry production and distribution chain. The suggestion also points out issues around lack of complete transparency and the time it takes to locate the origin of a disease when it has surfaced.

The traceability on Blockchain enabled supply chain network is managed in the form of blocks, where the activity and approval are captured in the central system and is visible to all the system users. A typical case of such a system is shown Figure 4 below:



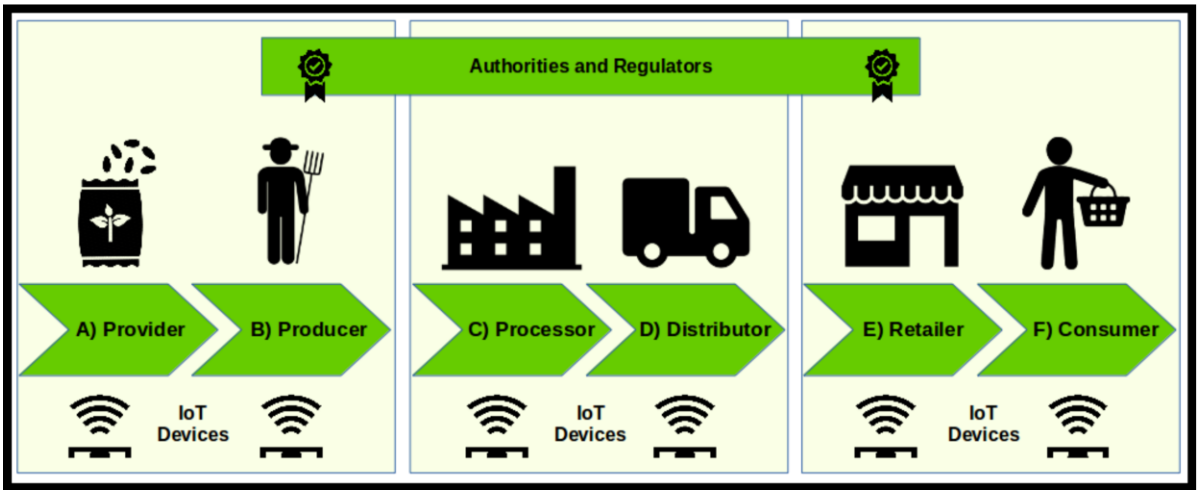
Source: Bako *et al.* (2019:4)

Figure 4: Blockchain traceability data flow among different entities

The benefits offered by this traceability block system are that the initiator of each step in the system, even the one that gets to temper with the step can be traced back. This is an important feature that gives all the stakeholders in the chain complete visibility on all activities taking place on their products.

A gap was also identified by Wallace *et al.* (2018:5) in the agricultural environment, where the supply chain merely tracks and keeps records of orders and deliveries, without any assurance features like transparency, traceability, and auditability. This is the gap that could be bridged by the Blockchain enabled supply chain.

A classic setup of how the traceability could benefit the retail traceability through Blockchain enabled supply chain is shown on Figure 5:



Source: Wallace *et al.* (2018:3)

Figure 5: Blockchain traceability flow in agriculture

2.5.2 Food safety in the supply chain

According to Ogunbanjo (2018:1), it took very long for the origin of the listeriosis epidemic to be found, thus making it difficult to curb the problem before it could propagate to larger areas.

This is one of the areas where the retailers could benefit with the implementation of the Blockchain enabled supply chain. According to Bennett *et al.* (2018:4), many people fall ill after consuming contaminated food every year, all around the world.

According to Rani *et al.* (2017:2) there are issues that have been detected with regards to meat safety in the post-slaughter processes, particularly farm-to-fork chain. The writer

puts it clear that the existing inspection processes do not entirely cover all the loops in the chain.

According to Du-Plessis *et al.* (2017:18) there is insufficient microbiological monitoring information on the fresh produce like cabbage, spinach, and the likes. This phenomenon is adversely felt or prominent in South African smaller town areas and townships. Khonje and Qaim (2019:1) states that there is a need to modernize the food supply chain system in the poor areas of the communities. The emphasis seeks to address issues of food safety that are not properly regulated in the poor areas or communities.

2.5.3 Combating counterfeit goods

The retail market is one of the contaminated areas of business with counterfeit good. A report by Partington (2019:1) suggests that there has been a massive rise on production of counterfeit goods in the retail industry. These in fact find their way into the retailers, distributers, and ultimately the customer purchases something that is not original. The eventual threat arising from this is the reputational damage from the unhappy customer. (Beal, 2019) suggests that the results of reputational damage are detrimental.

According to Alzahrani and Bulusu (2018:7) Blockchain offers possibilities in the supply chain system to trace the authenticity of products through track- and-trace method on which the technology can pick up modifications, cloning, and tag reapplication tracks.

Ruciini (2017:105) has pointed out some of the elements that suggest reasons why many retailers have not been keen on employing systems that are cryptographic with quick response code (QRC) characteristics to combat issues related to counterfeiting. These include: Cost effectiveness, Merchant attitude toward the system, and governance issues. These aspects were scrutinized during the research.

Selvan and Azizul Rahman (2017:5) points out an element around the purchasing of counterfeit good; that some of the buyers purchase the goods knowing their counterfeit status. This is a market that has really suppressed the main line products because of the growing demand. (Selvan & Azizul Rahman, 2017:1).

Park-Poaps and Kang (2018:195) suggest that counterfeiting is not generalized. It is mainly on certain products based on consumer demand and activity levels in the market. This, therefore, may lead to an investigation if one is price conscious on the implementation of the Blockchain cryptographical system that the main affected brands get to be subjected to this supply chain process.

It has been suggested by Alzahrani and Bulusu (2018:2) that about 10% of medicine in the supply chain network are counterfeit and this has been a long battle. One can only imagine the amount of money lost by business fraternity in these kinds of operations.

2.6 CONCLUSION REMARKS

From the collected data it can be concluded that many scholars agree on the intensity of the challenges that confront supply chain systems in retail industry. There are many challenges that the literature has pointed out, but this research focused specifically on those around food safety, counterfeiting of goods, and traceability. From the gathered data, it is clear that these are legacy challenges that have existed for centuries and many retailers have tried to find a way around it, either through a structured system, or structured network of supply chain systems to try and ensure that the problem is neutralised; despite the efforts put in, the challenge still exists. The challenges around food safety and counterfeit of goods both have detrimental effects on the retailers as they can possibly carry a potential reputational damage and can have long lasting effects on the business and the future of the retailer.

The opportunities to combat and put the retailers at ease, brought by the implementation of Blockchain enabled supply chain system are quite promising. It will be interesting to see how the retailers view the employment of such a system as a strategic advantage. The gains brought by this system are quite promising and are addressing the very pain points that the retailers have been confronted with for many years.

With the challenges faced by the retailers having been exposed through the literature, and the benefits brought by the Blockchain technology; this research will focus on getting the point of view from the retailers around the extent of challenges ventilated by the

literature, and how they view the employment of Blockchain technology as a strategic advantage.

2.7 CHAPTER SUMMARY

Various aspects of supply chain as applicable to this research were explored. Firstly, the nomenclature on supply chain were defined by focusing on the terminology. Food safety, counterfeiting of goods, and traceability were all defined. Secondly, the current situation around food safety, counterfeiting, and traceability was deliberated, where the literature that has been collected indicate that the legacy challenges that have faced the retailers around food safety, counterfeiting of goods and traceability are still prominent to this day, despite the measures that have been put in place either by the respective companies or authorities from the state of associations.

The indications from gathered literature are that, Blockchain enabled supply chain can combat the challenges mentioned above, and that businesses that opt for this system have the possibility of strategic advantage, Businesses gain customer loyalty, longer customer retention, and quicker detection methods when a problem has been picked up, thus reducing costs associated with the long hours, days, or months trying to locate the origin of the problem.

In some instances, the affected product gets to be removed from the shelves for a very long time until the investigation has been concluded, and in some instances, it may be the end of that product. This has been the case with listeriosis on cold meat, and again with pilchard tined fish. The affected retailer may not be able to come back to business again. In one of the cases, it was found that the counterfeit fasteners led to a death where the structure collapsed when the fastener failed. These challenges have a potential of reputational damage. Blockchain technology is new and has not really been tested but promises to combat most of the challenges presented in this document, exposes the retailers to something that they can use as a competitive advantage by giving their customers best quality assurance. The fact that some customers see it necessary to purchase products despite the price, typically, in the case of Woolworths, and some Hallal

products, indicate that there are many consumers that buy value that is embedded on quality assurance.

The final aspect is around the fact that Blockchain is a ground-breaking technology, but the view of the retailers on using this technology as a strategic advantage by proving quality assurance of their products or goods, specifically in the Vanderbijlpark has not been tested, which will be the focus of this research.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter explains the methodology that has been employed in this study to understand weaknesses of the conventional supply chain systems regarding food safety, goods counterfeiting, traceability, and the perspective of the retailers around using Blockchain enabled supply chain systems to create or derive competitive advantage. The methods that have been employed, the approach taken, the paradigm that sets the basis of the research, the setup of the research instrument and the sizing of the population and sampling have been covered in this section.

3.2 RESEARCH APPROACH

This research followed a qualitative research approach; where data was gathered systematically, arranged and organized, analysed and interpreted, and the report developed to suggest and address the concerns raised (Tracy, 2019:4). The outline of the methodology that was applied on this research was chosen in order to address the research questions and achieve the set objectives (Tracy, 2019:44).

3.3 RESEARCH PHILOSOPHY, PARADIGM, METHODOLOGIES AND METHODS

3.3.1 Paradigm

This research followed an interpretative phenomenological approach (IPA), where the focus was to allow participants in the retail business who have shared similar experiences around quality of delivered goods, particularly food safety and counterfeiting to open up about those experiences, without any distortions (Alase & Studies, 2017:3). This paradigm has been chosen by the researcher because Blockchain is a ground breaking

technology with not much history to draw from; therefore, the approach was looking at how the retailers are viewing the possibilities brought by the technology to combat the quality issues that have faced the industry over the years.

3.3.2 Research design

This research followed an exploratory research strategy; where an attempt was made to discover if the retailers in the Vanderbijlpark area can gain competitive advantage by implementing a Blockchain enabled supply chain system to combat some of the known quality issues that have confronted the business for many years. The exploratory research design suites this study because Blockchain is a ground breaking technology with not much evidence in terms of its roll out; therefore, the perspective of the retailers will be collected and analysed to determine their point of view regarding the technology and the competitive edge it promises (Swedberg, 2018:3). This was achieved through data collection by interview process; see research instrument, **item 3 under addendum**. The data was analysed against the research questions and conclusions drawn (Tracy, 2019:208).

3.3.3 Research method/process

Population

The following retail segments, within the Vanderbijlpark area will form part of the sample:

- Supermarkets
- Restaurants
- Furniture shops
- Hardware stores
- Clothing stores

A list of retailers was sought from the Golden Triangle Chamber of Commerce (GTCOC), and those that are not appearing on the list were also included since the researcher is familiar with the area being sampled.

The actual population size was determined after the researched objectives were realized through the codes generated reaching saturation.

Sample method/technique and sample size

The research followed an open-ended questioning, from which a sample size was determined upon reaching saturation.

A slope accumulation curve based on populated categories was determined and used as a stopping criteria or data saturation point (Tran *et al.*, 2017:3). For example, from the first 10 samples of the interviews, predictions were made by analysing the collected data to determine if more interviews would add value to the research or a saturation point has been reached. Same was done at size intervals 15 and 20 until a stopping point was reached.

The samples were grouped into different stratum as follows:

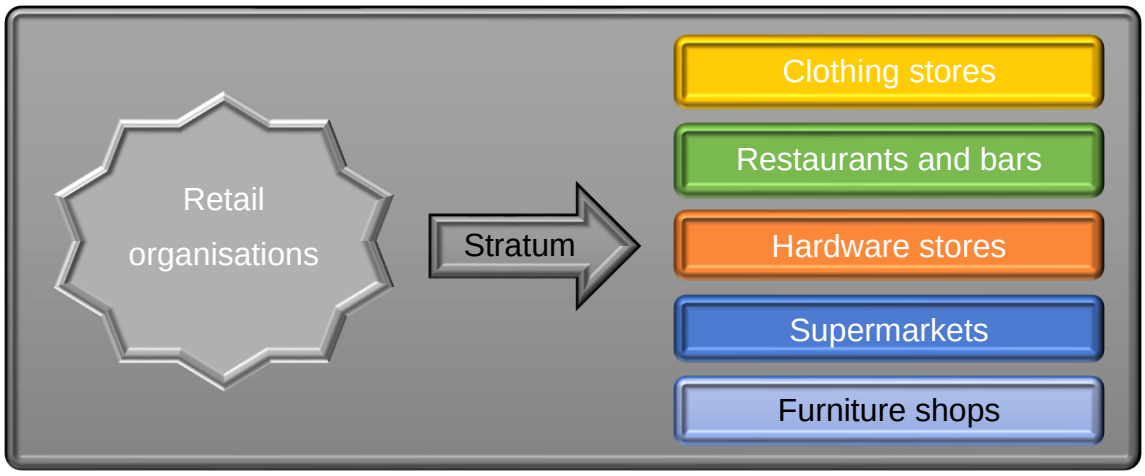
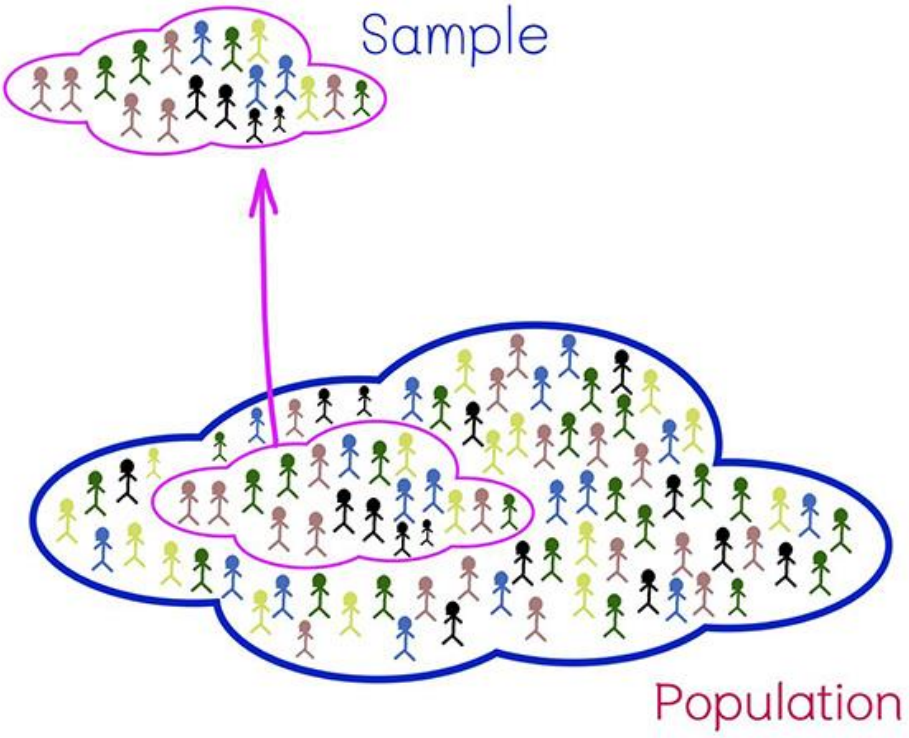


Figure 6: Sampling Strata model

A systematic random sampling approach was applied on the collected samples, where each unit selected on the sample stood an equal chance for making the ultimate sample size for the specific stratum (Rahi & Sciences, 2017:3). This was done by putting the samples in a hat and a starting number was selected, followed by an interval number from the hat; from there, the samples were picked through an observed protocol based on the

interval until a number meeting the slope pattern curve to represent the population saturation was reached (Tracy, 2019:154).

For this research, the size of the population is the total number of participants based on the chosen retail organisations. The sample is composed of individuals who agreed to participate and gave consent that their contributions in terms of interview responses could be used for this research. The researcher would want to use the gathered sample size to generalise the results across the retail business as depicted by results patterns as shown on figure 7 below.



Source: (Tom, 2018)

Figure 7: Research population and sample

This research did not have an absolute sample number from the start, but the approach was to conduct interviews on selected samples based on the semi-structured questions,

the focus was on interviewing responsible personnel who were responsible or aware of the supply chain processes, systems and challenges in the chosen organisations. The interview process was conducted until saturation was reached, indicating that further interviews may not add any new patterns (Hennink *et al.*, 2017:17). Interviews were conducted with the five clustered retailers, see figure 6. The researcher created a saturation model that would be used to monitor the trends and establish if new patterns are gathered from the conducted interviews and to see that saturation has been reached, see figure 8 below.

The researcher kept making notes of the codes from the conducted interview notes in order to see the patterns from the gathered data. Saturation was reached at 11th participant as can be seen on figure 8, but a further 9 interviews were conducted as the dates were already set out with the retailers. The 9 interviews didn't add much of value to the research as there were not much new patterns noted, but rather they gave the researcher an assurance that saturation was reached.

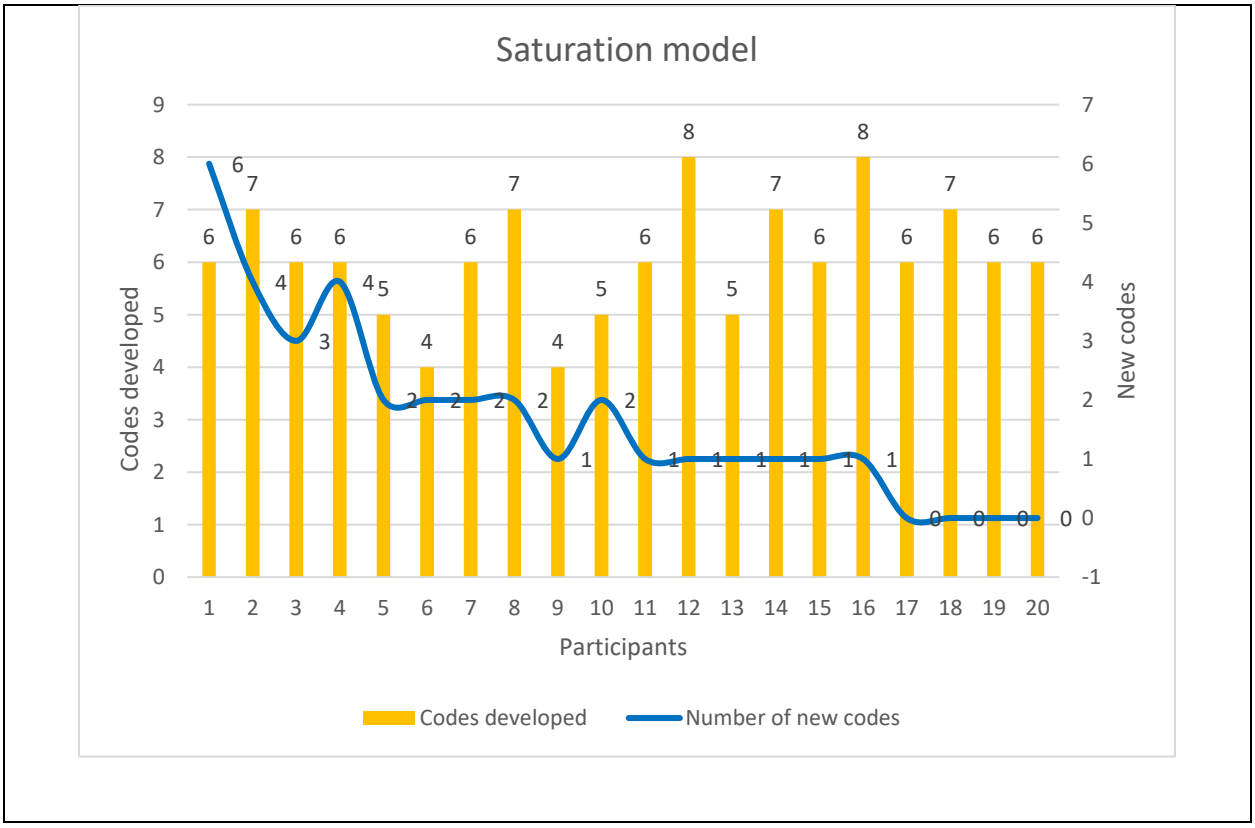


Figure 8: Saturation model

Data collection process

The data collection for this study was in the form of semi-structured interviews; where interview questions were developed by the researcher based on research questions, required participants were identified, request for participation sent, agreement to participate received from participants, interview sessions were undertaken, records of interviews were kept through detailed minutes, audio and/or video visuals. The interviews were initially planned to take place through face-face contact meeting as a preference, but because of challenges imposed by restrictions implemented due to COVID-19 pandemic, a platform like ZOOM video call, or any other that was better suited for both the researcher and the participants was used as a primary alternative for the interviews (Moser & Korstjens, 2018:5). The list of questions has been structured carefully based on the research questions, see interview guide on appendices**.**

3.4 SURVEY INSTRUMENT

This research followed a qualitative approach, where the researcher used the Interpretative Phenomenological Analysis (IPA) techniques to get the lived experiences of the participants and compare against what is depicted by the literature (Alase & Studies, 2017:10). The descriptive and subjective nature of qualitative research method was used by the researcher to interpret the responses from the participants derived from the open-ended questions.

It followed therefore, that a survey instrument in the form of semi-structured interviews was drawn up by the researcher with the support from subject matter experts. The aim was to ensure that the instrument covers all that was necessary in order to help the researcher address the research questions and objectives.

The researcher conducted semi-structured interview questions, see Annexure 3 with selected subject matter experts within the information technology, and retail business to ensure that the technology business benefits, and the lived experiences are captured. The research instrument was, therefore, setup such that it captures all the three main research questions and objectives:

- Experiences with the current supply chain systems
- Competitive edge brought by Blockchain enabled supply chain system
- Traceability

The data collected from the semi-structured interviews was clustered according to categories of interest, and trends from those were analysed based on the literature review.

The initial plan from the researcher was to face to face interview sessions with the participants, but due to limitations and safety requirements as they relate to COVID-19, it was necessary to send the invitations to participants by email and arrange a virtual session. For those who could not or have means for virtual sessions, a provision for a telephonic interview was made.

The ethics clearance for this research was obtained from the University ethics committee of the North West University (NWU). Only upon receipt of the ethics clearance, the researcher went on to issue out interview invitations for participants.

The semi-structured interview questions, letter of consent, letter describing the nature of the study and the ethics clearance code were sent together by email to the participants. A date for interviews was agreed upon by the researcher and the participants from the respective retail stores and this was secured using virtual meeting invitations.

The research instrument was shared with subject matter experts in academia, statistical research, and business. The aim of this exercise was to ensure that the necessary areas are covered and that there is flow in terms of what is generated and the research questions. The research instrument was then sent to a language and grammar editor to ensure that professional usage of terms and sentences is observed.

The questionnaire was made of 27 semi-structured questions, divided into six sections. The first section looked at acquiring verbal consent from the participant before the start of each interview session. The second section discussed the biographical information of the participants. This section takes care of all aspects related to the age, management level, years of service, years the company has been in business, number of employees in the business, and the category in the retail sector were also explained in this section.

The third section looked at business operations; covered here was mainly the understanding of what supply chain system they have in place at present.

The fourth section looked at establishing the experiences with the conventional supply chain systems, looking at aspects that relate to food safety and counterfeiting of goods.

The fifth section looked at aspects related to the traceability process under the current conventional supply chain systems, more specifically to how the process unfolds to track down the root cause of the identified issue, to closing it off.

The sixth, which is the last section looked at how the perspective of the retailers to utilising Blockchain enabled supply chain systems as a competitive advantage to root out the issues related to food safety, counterfeiting of goods, and traceability.

Thereafter, an agreement to participate in the research was obtained from the specific retail organisation and an appointment was set based on the time that was suitable for both parties. During the interview, the researcher recorded the proceedings with the consent of the participants. The participants had the semi-structured beforehand in order to prepare themselves, however, probing questions were undertaken by the researcher for the participant to clarify the statements to ensure that all the aspects of the research questions and objectives are covered.

Notes were compiled by the researcher, derived from the interview voice records. The notes were categorised according to the specific sections of the research instrument. Codes were allocated according to the trends derived from the interview notes and were categorised into the sections that speak to the research questions and objectives.

Once codes were allocated, Atlas.ti software was utilized for analysis. Several reports were generated from the software and these have made up the report that has been presented in this research.

To ensure trustworthiness of the research, the following elements were observed (Korstjens & Moser, 2018:3):

3.4.1 Credibility

Member checking procedures was employed to ensure that the results generated from the collected data represent plausible information taken from the original data and that the interpretation of original views has not been altered (Madill & Sullivan, 2018:5).

3.4.2 Transferability

Thick description was used to check degree within which the research results are transferrable in another context to ensure that the eventual behaviour and experiences made sense to those who may view the results later (Nowell *et al.*, 2017:3).

3.4.3 Dependability and confirmability

An audit trail was observed by describing all the research steps that were undertaken from the very beginning of the research, development a report of findings and the report was kept for the entire duration of the study (Kalu & Bwalya, 2017:10).

3.4.4 Reflexibility

A diary was used to prepare for interview sessions, during analysis, and on results discussions to ensure that the findings of the research are pure and without influence (conceptual lens, explicit and implicit assumptions, preconceptions and values) from the researcher (Nowell *et al.*, 2017:3).

3.5 DATA COLLECTION/FIELDWORK

The list of retail businesses operating in the Vaal Triangle area was collected mainly from the Golden Triangle Chamber of Commerce (GTCoC). The fact that the researcher also resides in the Vaal Triangle area was beneficial in adding known retailers to the research population and eventual sampling. Levine *et al.* (2018) suggested that data collection needs to be gathered from a reputable being for credibility.

Due to the scope of the research, only the researcher performed data collection through interviews. The first preference from the research was to do face-face interviews in order to build and maintain rapport during the interview process (Farooq & De Villiers, 2017:3).

Due to challenges presented by the implementation of lockdown due to COVID-19 pandemic outbreak, it was necessary to employ a virtual interview session in a video enabled platform like ZOOM in order to maintain the rapport necessary for the participants to feel comfortable to speak.

3.6 DATA CODING AND ANALYSIS

Once the data was collected it was fed on excel sheet, coded and categorized into variables aligned to the research questions in order to be recognized by Atlas.ti statistical software (Friese, 2019:10). Categories were developed and constructive meaning analysis was employed for this research as follows (Nowell *et al.*, 2017:4):

- the researcher familiarized himself with the data: this was done through engaging with data, triangulating data, documenting thought about potential categories, storing of data, and keeping records of all notes collected.
- Generate initial codes: this was done by using a coding framework, audit trail of codes generated, documentation of all meetings and debriefs.
- Searching for categories, this was done through triangulation, diagramming, and keeping detailed notes of concepts, categories, and constructive meaning.
- Reviewing the categories: by looking for adequacy of generated categories and constructive meaning, referring to the raw data.
- Defining and naming categories: by referring to the triangulation, debriefing, and documentation of constructive meaning.
- Producing report

3.7 ETHICAL CONSIDERATION

According to Resnik (2018:116), the role of research cannot only be around advancing science and information in the academia, but care and due diligence must be employed to protect people and promote trust. For that reason, this research ensured ethical consideration to protect all parties involved as part of the study. This was facilitated as follows:

3.7.1 Ethical principles considered:

- All possible ethical issues that had a potential to harm participants were identified and eliminated as much as possible and the risks involved made known to the participants. This was issued together with the research instrument in the form of the “participant information sheet”.
- An informed consent letter was drawn up and accompanied the research instrument to the selected sample before they participated in the survey**.** This was to ensure that participants were fully aware of what the research was about, the purpose of the research, who the sponsors of the research were, if any, and their rights around participation in the research.
- The ethical clearance form part of this research and was facilitated through the North West University ethical committee. **See ethics clearance number on the research instrument template under annexure 2.**
- The research instrument, informed letter of consent, and the information sheet were distributed by email to the participants so that they could familiarize themselves with the research, their rights, contents of the research instrument.
- The identity of the participants was protected by ensuring that the data capturing only focuses on variables being measured and not the names of the participants, their race, nor the name of the organisation.
- The participants were requested to send an email response to the researcher as an indication of their voluntarily willingness to participate in the interview.
- Once the willingness response was obtained, the researcher set a reasonable time for the interview session so that the participants could have enough time to check that the proposed time suits their schedule.
- Before the beginning of the interview session, the researcher afforded the participants an opportunity to ask for clarity if there were areas that needed to be cleared and to check if the participant was still comfortable to continue with the interview.

3.7.2 Other ethical considerations

- The data collected as part of this research was purely to be used for the purpose of this research and was not be shared to external parties. The researcher was open to signing a confidentiality agreement if deemed necessary by the participant.
- For the duration of the research, the researcher was liable to keep the collected data strictly confidential as stipulated in the informed consent form.
- The results in the form of the research findings can be shared with the participants who are interested.
- The University information management policy was employed in managing the data from when it is submitted and facilitated archiving.

3.8 CHAPTER SUMMARY

This chapter covered the research methodology that was undertaken to ventilate the perspective of the participants on challenges facing retail organisations with regards to food safety, counterfeiting of goods, traceability, and how their views are in employing a Blockchain enabled supply chain system to combat the issues and create a competitive advantage for their businesses. The research methods, paradigm, sampling techniques, limitations have been covered in this section.

The literature review in the previous chapter of this study provided the overall concept of Blockchain in supply chain systems, with a specific focus in the retail sector that is clustered around Vanderbijlpark, Gauteng. Areas of interest based on the study were around gaps that have been identified in the current supply chain systems, these being: food safety, goods counterfeiting, and traceability. The research went a step further to look at how difficult it has been for the current supply chain systems to combat these issues, how Blockchain enabled systems could help combat them.

Numerous sources indicated that issues with food safety, counterfeiting of goods, and huge struggles with traceability are a big problem with the current supply chain systems. Some of the sources are also indicating that the ground-breaking technologies like Blockchain could be of use to combat the issues identified. This research seeks to identify

the links between what the literature is depicting and the realities from the perspective of the retailers.

The focus on chapter three was to establish a foundation on what research methods will be used to ensure that the research objectives mentioned in chapter one are met. Chapter three built on the foundation laid out in the previous two chapters and the focus areas are: research procedure, data analysis, and results.

CHAPTER FOUR: DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 EMPIRICAL RESULTS: DEMOGRAPHICS

- **Experience with conventional systems**

Out of the 20 participants interviewed across five of the retail segments chosen in this research; the three categories of interest were mapped out for each of the demographics.

There was a noticeable high ground and density under the experiences with the conventional supply chain systems, see figure 9. The higher impact seems to have been felt by the younger group on the selected participants, with the age category of 36-45 years reading high on both the ground and the density than other categories. This is of no surprise when one looks at the fact that the older generation group is normally comfortable with older systems and they know how to get their way around them, while the younger generation leaders still see more possibilities of system improvement against the status quo. Some of the aspects that have contributed on the issues that the businesses have experienced under the conventional supply chain system have been widely shared across all ages. Largest of them can be seen with a larger ground rating of 16; these being: bad reputation, strenuous supplier qualification processes, flawed compliance process with ground rating of 15, cheaper options rating of 13, loss of trust and sub-standard raw materials both with a ground rating of 12.

Many of the participants were at senior management level in their respective organisations, shown by a ground rating of 156 and a density of 10. Most of the managers cited bad reputation as their utmost concern around the issues arising from the conventional systems, shown by a ground rating of 16, and flawed compliance process shown by a ground rating of 15, see figure 10;

The experiences around food safety and counterfeiting have been felt largely in big businesses, in this case shown by the ground rating of 297 and density of 18 on both number of employees and years in business. For the purposes of this research both

parameters, number of employees and years in business have been used to categorize the size of the business.

- **Experience with traceability process**

The traceability process has been found to be one of the aspects that have affected the attitude of businesses toward the current supply chain systems. Two main issues have been plainly put out and shared by many retailers across all spheres covered in this research, see figure 10. Two main elements of interest have been noted to be that the process is long, shown by ground rating of 15, while the fact that it is a costly exercise has been received a ground rating of 13. Both these clearly frustrate the retailers, that it takes long to find the origin of the issue, and this can in some cases affect the customer relationship as it makes it difficult for retailers to meet customer demands or expectations due to the fact that they are not in control of the process. While they are busy searching for the root cause of the issue the customers are busy looking for an alternative. The other factor noted by the retailers is that of the location of defects. Some have shared that the defects were picked up at the warehouse, indicated by a ground rating of 15, others shared that the issues were picked up at the source, meaning from the farm, or manufacturer with a ground rating of 14, some were located on arrival at the store, with a ground rating of 12, and some were located by customers shown by a ground rating of 11. Besides the ground rating which indicates the prominence of the variety of locations were the defects or food safety issues, their arrest/location is widespread. One can only think of the ones that get picked up by customers in terms of how it must have affected their relationship. Even the instances where the arrest is made on arrival at the store is also threatening because it affects the stock availability, leading to the customers looking for an alternative elsewhere. The sentiments mentioned above have been shared across all demographics that formed part of this research. The 36-45-year age category has registered a ground rating of 160 and a density of 9, while senior managers with ground rating of 156 and a density of 10. Companies with largest employment, in this case more than 10 and less than 50 numbers and those that have been in business for more than 10 years shared the sentiments, shown by a ground rating of 297 and a density of 18.

❖ **Use Blockchain system for competitive advantage**

After the issues with conventional supply chain system and traceability were ventilated through the interview process, the participants were asked about their understanding of Blockchain enabled supply chain system, and their opinion around its use to derive a competitive advantage by combating the issues raised. In this case competitive advantage was highlighted by 7 key words mentioned by the participants, boosting customer confidence, maintaining high quality of supply, maintaining reputation, reduce customer complaints, reduce process costs, simplify supplier onboarding process, simplify traceability process, see figure 11.

Top of the list with the 36-45- and 55-60-year categories, boosting customer confidence was highly rated with ground rating of 15, for the 46-55-year category, reducing customer complaints was their highest priority with ground rating of 18. The rest of the competitive elements were fairly shared amongst the groups and still showed a large degree of importance with the lowest ground rating at 14.

Top of the list for those at director level was reducing customer complaints, indicated by a ground rating of 18 and a density of 7. Middle management raised simplifying supplier onboarding process as their highest priority, indicated by a ground rating of 14, and shared fairly by others. Senior managers had on top of their list reducing customer complaints and simplifying traceability process at the same scale, with a ground rating of 15, and this has been shared fairly by others as well.

Companies that have been in business between 16-20 years have on top of their list maintaining high quality of supply and reducing customer complaints, shown by the ground rating of 14 and 18, respectively. Those who have been in business 11-15 years have shared reducing customer complaints and simplifying traceability process, shown by a ground rating of 18 and 15, respectively. Companies with over 20 years in business have at the top of their list boosting customer confidence and reducing customer complaints, both shown by a ground rating of 15 and 18, respectively.

When it came to sizing of the business based on the number of employees, those with less than 10 indicated that the competitive elements around boosting customer

confidence, maintain high quality of supply, maintaining reputation, and reducing customer complaints were at the top of their list; while those with employee base of more than 10 and yet less than 50 shared that reducing customer complaints, and simplifying traceability process were at the top of their list.

4.2 EMPIRICAL RESULTS: OPERATIONS

After the demographics were considered, the operational aspects of the organisations were looked at. It can be noted that despite the ERP system used by the respective organisations, even the ones that didn't have one in place, the challenges arising from food safety and counterfeiting of goods are felt across.

Experience with conventional systems

- **Clothing:**

It can be seen from figure 12 that the clothing stores had on top of their list issues that relate to bad reputation, flawed compliance process, and strenuous supplier qualification process at the same scale, followed by loss of customers and reputation also at the same scale.

- **Furniture:**

The furniture stores have shown loss of trust at the highest peak, followed by bad reputation, cheaper options, strenuous supplier qualification process, and sub-standard raw materials at the top of their list. These are elements that relate to challenges the businesses have encountered. The furniture category was composed of 52 ground rating with a density of 3, indicating that is it also not far off in terms of representation in this retail category when compared to the rest.

- **Hardware:**

The hardware stores had at the top of their list bad reputation, cheaper options that were being offered by the counterfeit counterparts, flawed compliance process that was failing to but barriers of entry for counterfeit operators, and strenuous supplier qualification process. From the retail representation, one can see that the category of hardware stores

was not spared from the challenges experienced by the counterparts as demonstrated by the ground rating of 51 with a density of 3.

- **Restaurants**

The restaurants had at the top of their list bad reputation, loss of trust should any issues with food safety arise, and strenuous supplier qualification process. The rest of the challenges were distributed and had a strong contribution to the setbacks suffered by retailers due to the shortcomings related to the fact they find it hard to control logistical challenges, particularly when it comes to the quality of supply.

- **Supermarkets**

One would have expected that the supermarkets share almost similar challenges with the restaurants, but it is noted from this report that the supermarkets have their own respective challenges. These are demonstrated with flawed compliance process that lead on the list, followed by bad reputation, loss of customers, and strenuous qualification process. What is of interest though is that all these challenges are derived from the same fears that the restaurants have, assurance of food safety.

Experience with conventional system traceability

In the case of traceability issues or difficulties experienced by the retailers, there is no evidence that the use of a specific ERP can simplify the traceability process. However, it does show that the absence one can make the situation even more difficult.

- **Clothing:**

It can be seen from figure 13 that the clothing stores had on top of their list when it comes to challenges related to traceability, the fact that it is a costly exercise and the fact that it is a long process. Along these they raised that most of the defects were located at the source during manufacturing, located at the warehouse before distribution to the stores, and located by customers by returning the goods with found defects.

❖ **Furniture**

The findings with the furniture stores are shared close with what the clothing stores have shared. This is indicated by the fact that issues around the process, costly exercise and that it is a long process are prominent, and the location of defects are equally distributed across all the sources identified.

❖ **Hardware**

It is also common in this cluster of the retailers that traceability of defects is a long process and a costly exercise. The defects have been located at different sources except for by customers. This is very interesting because many organisations are protecting their reputation, meaning if there is a defect, rather it must be located in-house before it gets to the customers.

❖ **Restaurants**

This cluster rated highly the fact that traceability is a costly process, and a little lower the fact that it is a long process. One does wonder if this may have something to do with the fact that some of these restaurants are franchises, so the issue easily gets transferred to the divisions and gets to disappear on the sight of the local store. However, the location of defects related to food safety has been widespread across all spheres of the logistics chain.

❖ **Supermarkets**

In the case of the supermarkets it has been found that the process of traceability is both long and costly, and that the location of defects in terms of food safety is also widespread and equally distributed amongst all the sources that form part of this research.

Use of Blockchain enabled supply chain system as a competitive advantage

This section outlined the perspective of the retailers on the use of Blockchain enabled supply chain system for competitive advantage. This is based on the issues ventilated above. What has been found is, since Blockchain enabled supply chain system is a ground-breaking technology, many retailers are not entirely aware of it, but they are

interested in a system that can help them address the challenges stated above. As can be seen on figure 14, despite the ERP system currently in use by the retailers, there is a dire need to establish a competitive edge over competitors especially in a market that is so strained. The elements that came out of the different interviews with the retailers are boosting customer confidence, maintaining high quality of supply, maintaining reputation, reducing customer complaints, reduce process costs, simplifying supplier onboarding process, simplifying traceability process.

- **Clothing:**

The key elements of competitive advantage that the clothing stores primarily identified as potential drivers for them to have interest in Blockchain enabled supply chain system are boosting customer confidence, simplifying supplier onboarding process, and reducing customer complaints. The rest of the elements were also considered but at a lesser scale. The main area that the clothing stores are trying to protect themselves against is the issue of counterfeiting. It has been shared widely by the clothing retailers that while their customers are attached to specific brands, the alternatives that are being offered by counterfeit syndicates make it very difficult for the businesses because of easy platforms like online shopping where it is difficult to verify the trademark.

- **Furniture**

There are three key main elements of competitive advantage that top the list for hardware retailers that they would look for in an alternative supply chain system; a system that can help them maintain high quality of supply, reduce process costs, simplify traceability process when a defect has been located. The rest of the elements were shared by the retailers at a lesser scale. The furniture stores are working on reducing process costs while maintaining quality, this is where they find it easy to fall in the trap of suppliers with sub-standard materials, ending up affecting the quality of their supply to customers.

- **Hardware**

The hardware stores had two competitive elements at the top of their list, a system that can help address the issues encountered by reducing customer complaints and simplifying traceability process. The challenges faced by the hardware stores are very

close to those of the furniture stores. The rest of the elements were also widely shared across the hardware stores but at a lesser scale.

- **Restaurants**

The restaurants had at the top of their list reducing customer complaints, maintaining high quality of supply, reducing process costs. The rest of the elements were widely shared amongst the retailers. The main issues that the restaurants were concerned about were those related to food safety and the quality of their meals or service. Many of them shared that if any of these are compromised, they stand a chance of losing deeply to a point of no return.

- **Supermarkets**

Reducing customer complaints was at the top of the list amongst this group of retailers. Boosting customer confidence, maintaining high quality of supply, and simplifying traceability process were amongst the most important. The rest of the elements were mentioned but at a lesser scale. The challenges raised by the retailers in this cluster were very similar to those from the restaurants, but what they are looking for from an alternative system as a competitive advantage are varied.

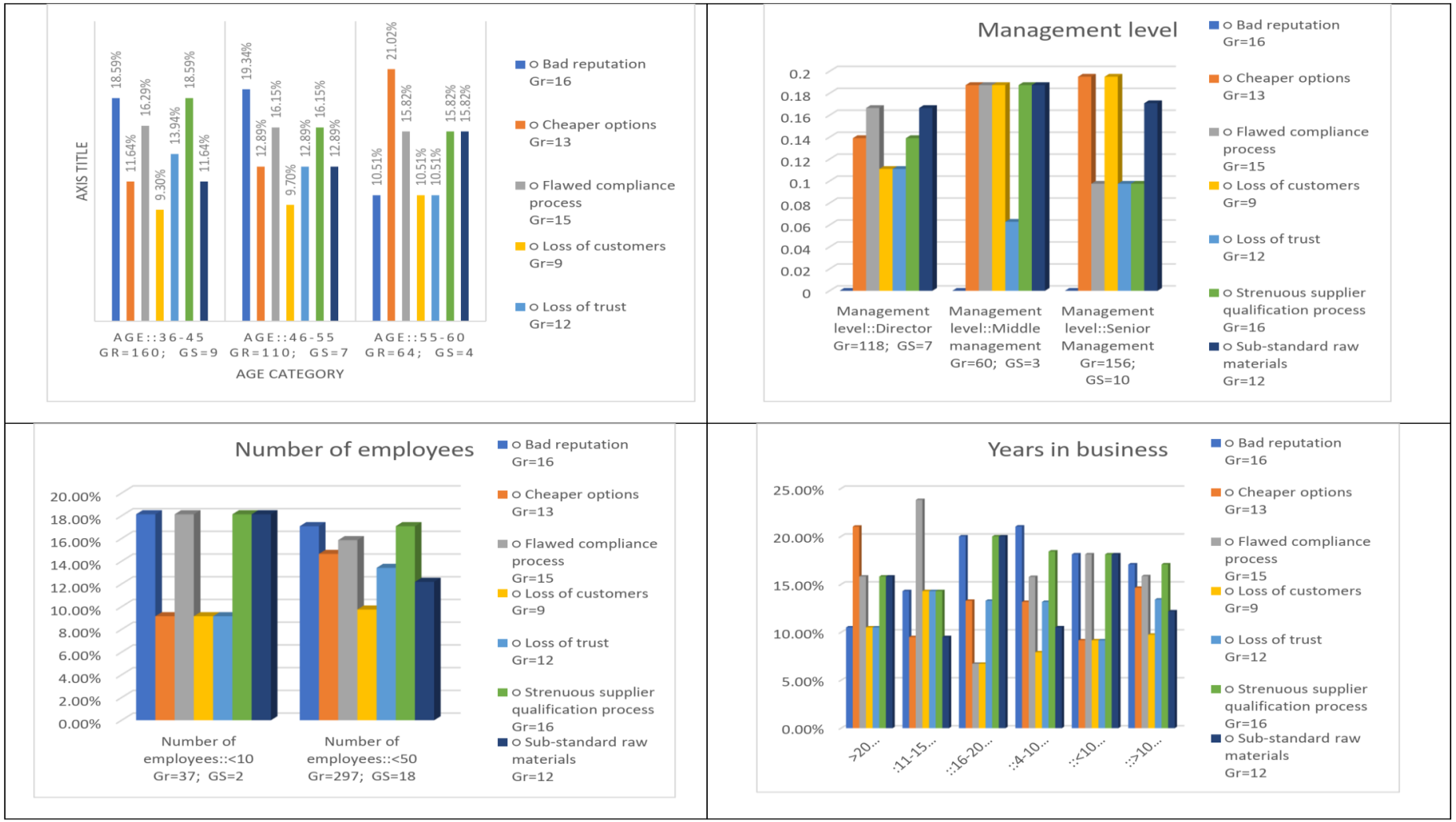
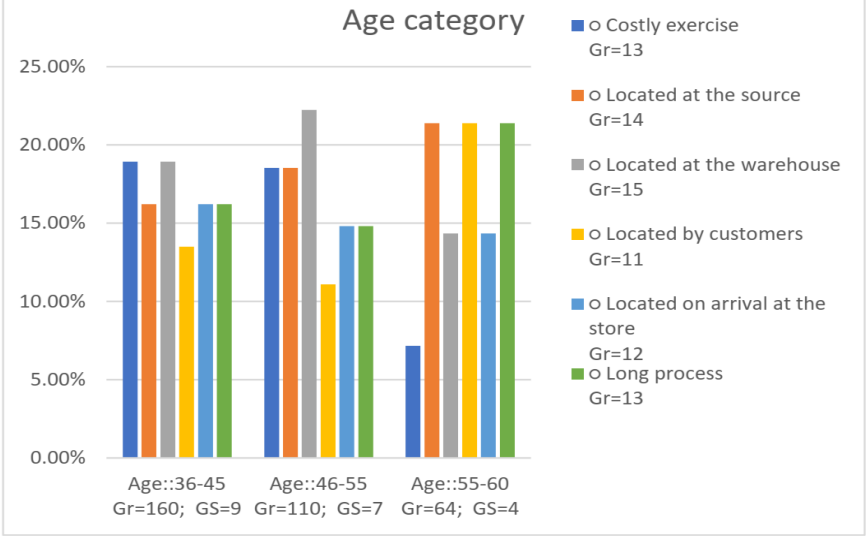
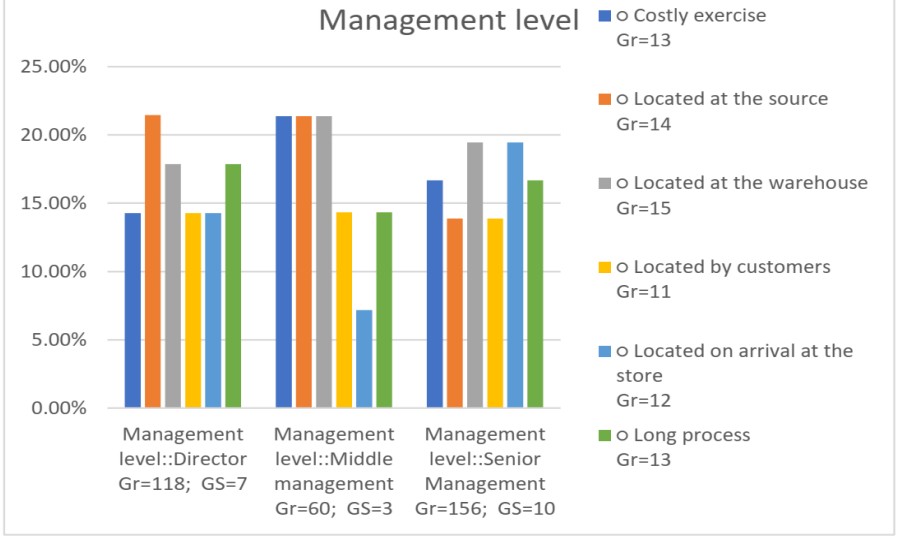


Figure 9: Demographics in conventional supply chain systems.


Age category
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Age::36-45
Gr=160; GS=9
Age::46-55
Gr=110; GS=7
Age::55-60
Gr=64; GS=4
o Costly exercise
Gr=13
o Located at the source
Gr=14
o Located at the warehouse
Gr=15
o Located by customers
Gr=11
o Located on arrival at the store
Gr=12
o Long process
Gr=13


Management level
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Management level::Director
Gr=118; GS=7
Management level::Middle management
Gr=60; GS=3
Management level::Senior Management
Gr=156; GS=10
o Costly exercise
Gr=13
o Located at the source
Gr=14
o Located at the warehouse
Gr=15
o Located by customers
Gr=11
o Located on arrival at the store
Gr=12
o Long process
Gr=13


Number of employees
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Number of employees::<10
Gr=37; GS=2
Number of employees::<50
Gr=297; GS=18
o Costly exercise
Gr=13
o Located at the source
Gr=14
o Located at the warehouse
Gr=15
o Located by customers
Gr=11
o Located on arrival at the store
Gr=12

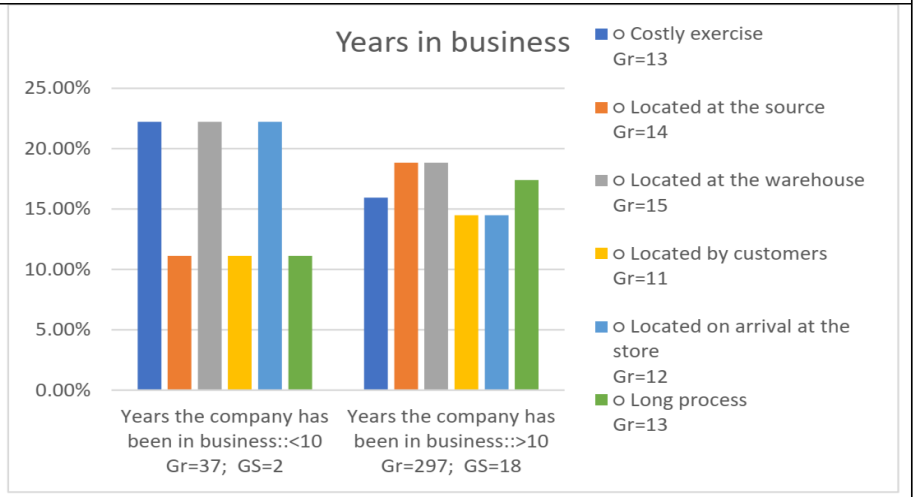

Years in business
25.00%
20.00%
15.00%
10.00%
5.00%
0.00%
Years the company has been in business::<10
Gr=37; GS=2
Years the company has been in business::>10
Gr=297; GS=18
o Costly exercise
Gr=13
o Located at the source
Gr=14
o Located at the warehouse
Gr=15
o Located by customers
Gr=11
o Located on arrival at the store
Gr=12
o Long process
Gr=13

Figure 10: Demographics on traceability under conventional supply chain systems.

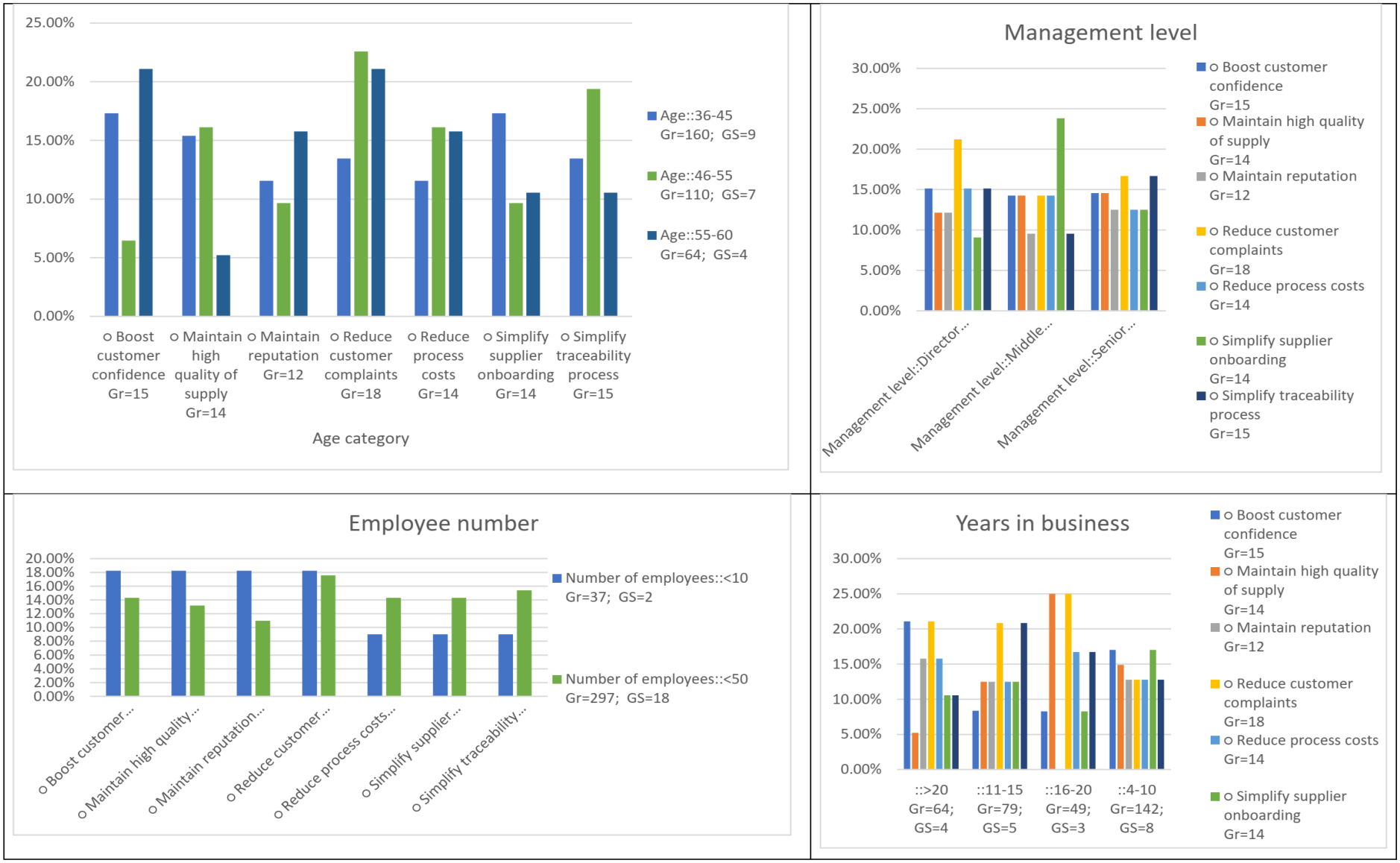


Figure 11: Demographics on use Blockchain system for competitive advantage

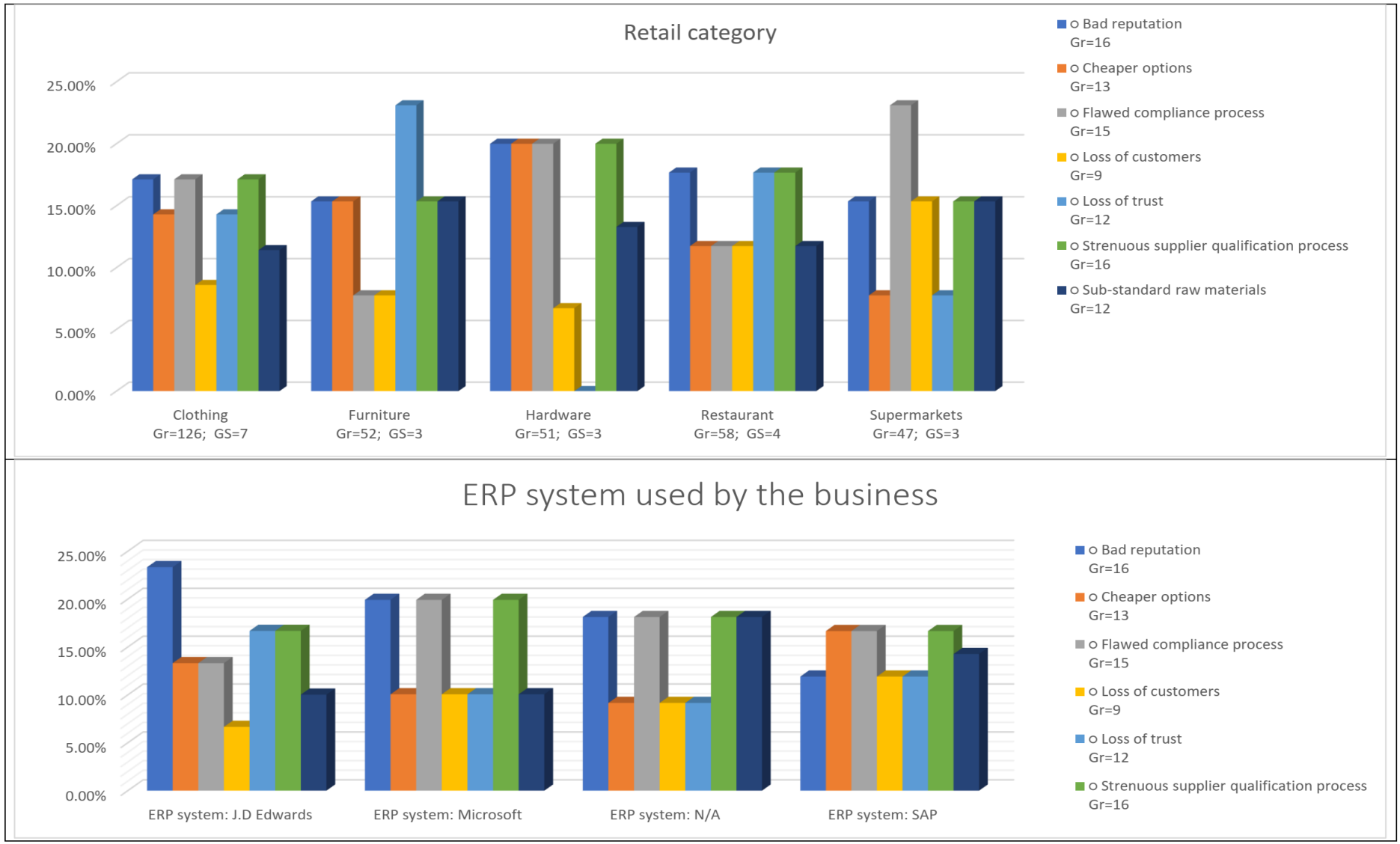


Figure 12: Retail category: experience with conventional supply chain systems

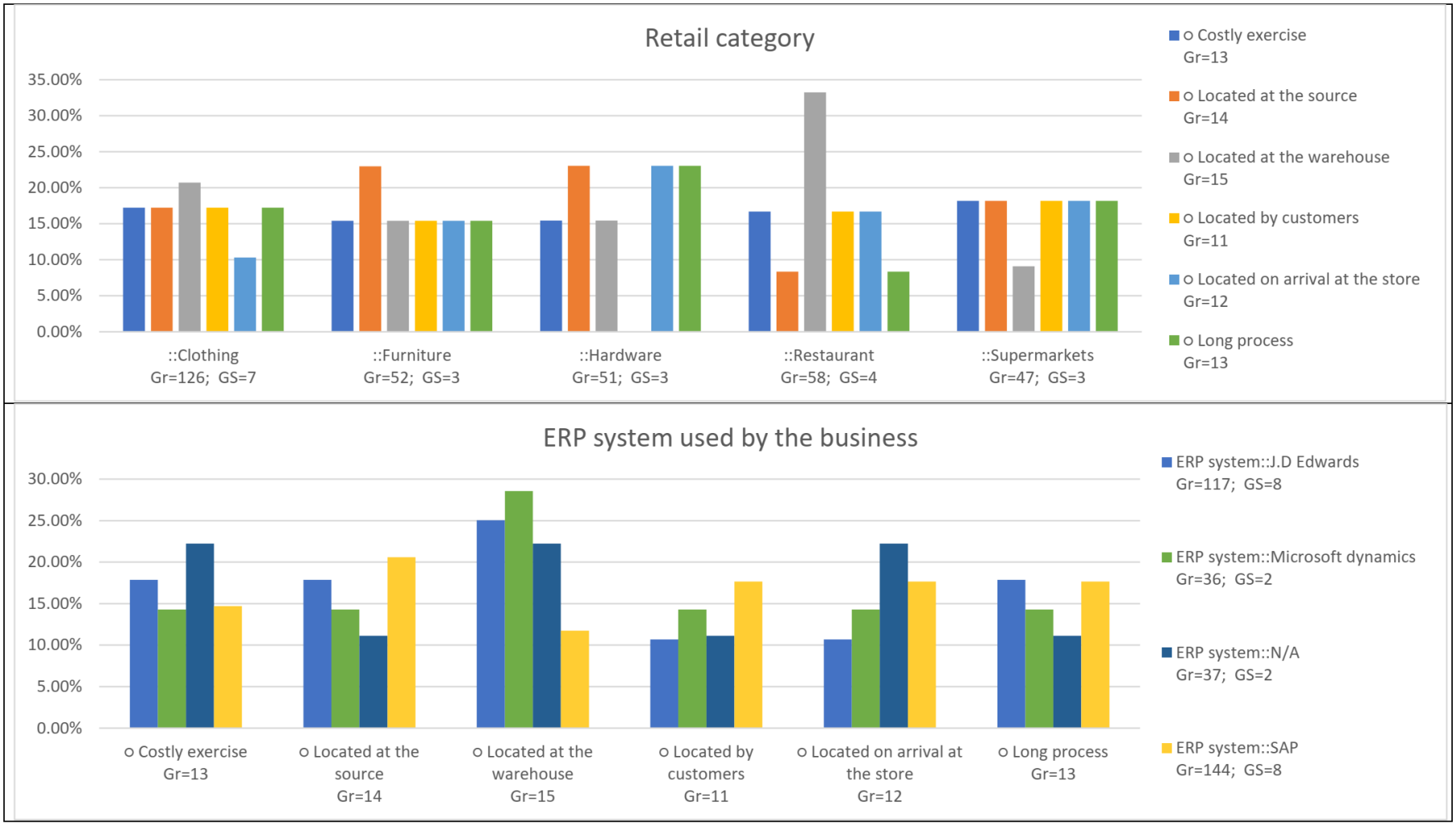


Figure 13: Retail category: traceability under conventional supply chain systems

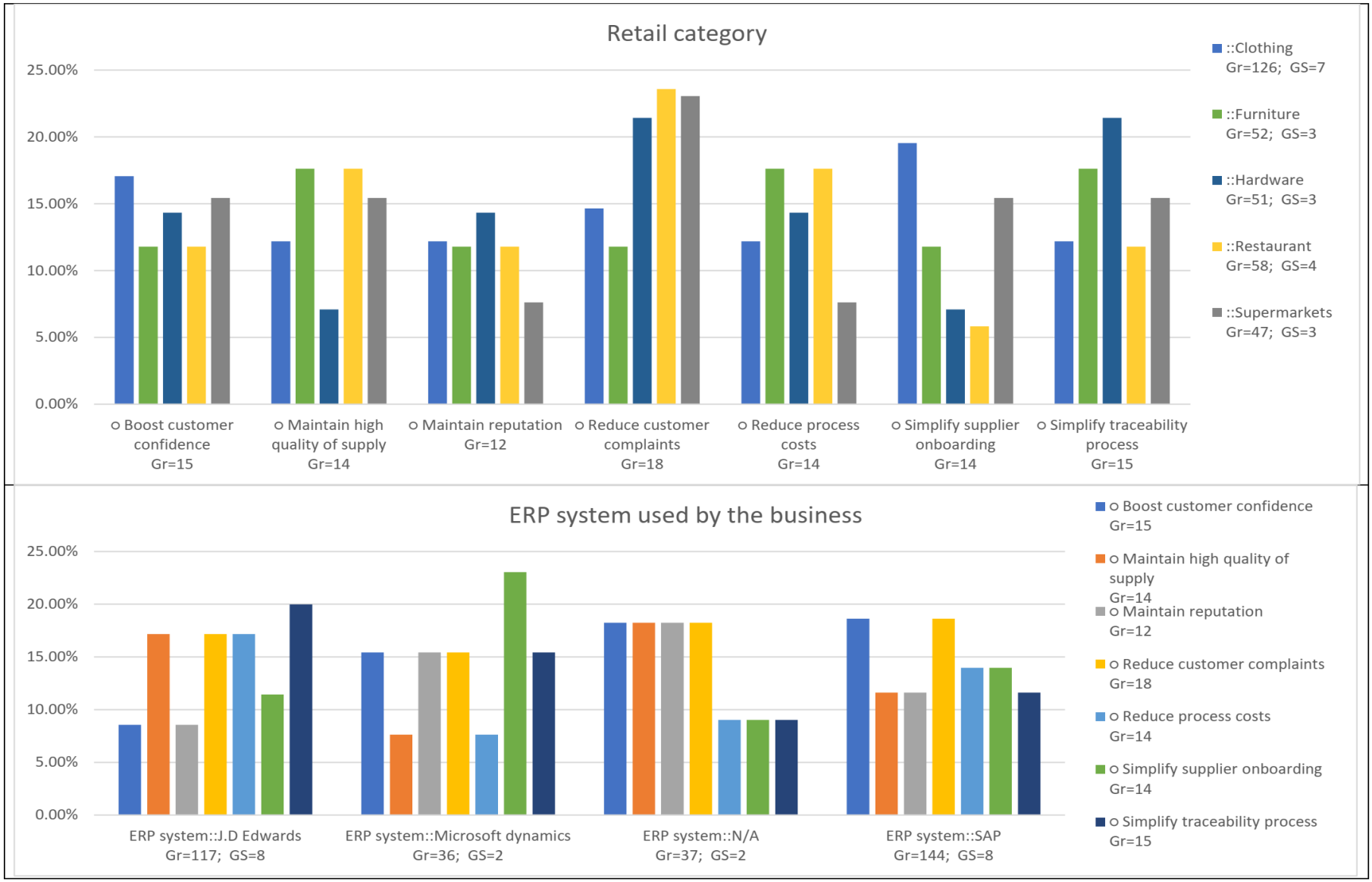


Figure 14: Retail category: on use Blockchain system for competitive advantage

4.3 CONCLUSION REMARKS

This chapter conducted an API analysis and presented the results derived from the reported generated by Atlas.ti. The description of the results started by explaining the demographics of the participants. The results indicated that the participants ages were ranging from 36-45, 46-55, and 55-60, with the 36-45-year category holding the largest participation number indicated by the density of 9. There is some evidence that suggest that the stores that are managed by the younger generation of managers were very keen in expressing challenges experienced under the conventional supply chain systems, and also were firm believers that a Blockchain enabled supply chain system with features that are capable of addressing their challenges will surely give them competitive advantage.

The management level of the participants was ranging from senior managers, middle managers, and directors, with the largest number of them being senior managers of their respective stores. Most of the stores did not have a specific supply chain management specialist, this function was being served by the responsible store manager. The research has ventilated that irrespective of the level of management, the key pain points were widely distributed across all level of management, and the interest to create a competitive advantage by addressing the pain points was widely welcomed, but there was a bit of a gap when it came to the understanding of this ground-breaking technology Blockchain, with the younger managers showing more interest and older ones with a bit of reluctancy to change the operations system.

Many of the stores that participated in this research had employee numbers of more than 10 and less than 50, which represents the largest stores according to this research, indicated by a density rating of 18. The research results indicate that despite the size of the store the challenges that face the industry are widely distributed, even though there is an indication that the smaller scale retailers are affected much less compared to the bigger players. This may be attributed to the complexity of the supply chain process, as the bigger players have more stakeholders involved in the process.

The businesses that formed part of the sample of this research have been in operation, some for 4-10 years (8), 11-15 years (5), 16-20 years (3), over 20 years (4). This indicates that the businesses with a larger participation number in this research were new in the

area, less than 10 years. The expression from the participants seems to come from both their lived experiences and those that have affected the industry as a whole, therefore, despite the age of the store the expression of the challenges were much similar and the desire for a system that can create competitive advantage by addressing the challenges expressed was widely shared by the businesses despite their years in service.

Finally, the retailers were clustered according to their operations and the ERP system used. The results found that clothing stores were the highest hit when it came to issues related to counterfeiting, followed by furniture stores, then hardware stores. Restaurants had the hardest hit when it came to issues related to food safety and quality of supplies and service compared to supermarkets. One must note though that the margins between these two were very close, probably because they are faced with similar challenges. In terms of attaining competitive advantage through a system that can combat the challenges raised, the most prominent elements were to reduce customer complaints, boost customer confidence, simplify traceability process, simplify supplier onboarding process, maintain high quality of supply, reduce process costs, and maintaining reputation.

4.4 CHAPTER SUMMARY

This chapter discussed the method and findings of the API study. The methodology covered the procedures and the limits of the qualitative study, also looking at the research instrument that was used. The study discussed the demographics of the participants by profiling them according to their age, management level, number of employees, size of the company.

After the interviews were undertaken the responses were coded according to the three elements of the research, experience with the conventional supply chain systems, traceability issues, and competitive advantage that could come from use of Blockchain. The codes were categorised according to the elements that were being investigated by this research. From there, frequency analysis was undertaken for each of the segments to determine the perspective of the participants and results were derived.

CHAPTER FIVE: INTERPRETATION OF FINDINGS

5.1 INTRODUCTION

This chapter looked at interpreting the findings of the research with a specific focus of addressing the research objectives. The focus was around addressing secondary research question, which in turn would help in addressing the primary research question. These are divided into three segments: the effectiveness of the conventional supply chain systems to combat challenges related to food safety and counterfeiting of goods, the effectiveness of the conventional supply chain systems to trace the origin of the issue to closing it off, and finally, the appetite of the retailers to consider Blockchain enabled supply chain system to address the issues raised.

5.2 INTERPRETATION OF FINDINGS

5.2.1 Effectiveness of the conventional supply chain systems to combat issues related to food safety and counterfeiting of goods

This chapter has discovered that despite the quality assurance systems that are facilitated by the existing operation systems of the businesses, there are many loopholes that are found in the system and get to compromise the eventual quality of the goods. This has been widely shared by the literature and has been confirmed by the lived experiences shared by the different retailers. The research has discovered that even though many retailers didn't have a direct impact in the form of being the ones to experience the said phenomenon, their feeling is that the fact that the experience has been felt by the industry, they are not spared from having their day. One of the key elements that was widely shared by the supermarkets and restaurants is that of the listeriosis outbreak, how it affected different businesses, how it put a stigma on brand reputation. The retailers felt that something similar can happen again, and in some cases, it may not be a global pandemic but rather specific to the store.

The literature has also lamented the use of reputable suppliers as means of ensuring consistent quality of supply, however, the retailers shared that some of them are looking

at reducing process costs, therefore, they would like to explore other suppliers, something that is very difficult to do because it takes long to qualify a supplier and there is a lot at stake should things not go according to plan. This is linked to a comment shared by one of the participants, that, it is very difficult in today's time to balance between competitive pricing, best quality, and on time delivery, something that was shared by the literature.

5.2.2 Effectiveness of the traceability systems under the conventional supply chain

The literature has shared that the current systems are not readily prepared to trace the origin of defects, they are reactive in instances where poor quality is picked up. The research findings support the suggestion by the literature as the process of tracing defects was widely disapproved by the participants across the different segments of retail. The research discovered that the defects were located almost at all points of the logistics chain, those being: source, warehouse, arrival at the store, and by customers. Some of the participants shared that the process is very long as the defect needs to be acknowledged by one of the recipients on the supply chain process, something they have found to be very difficult as some of the players are trying to protect their own reputation and costs associated with the resupply. The long process of tracing eventually leads to high costs associated with hours spent on investigations, and sometimes having to remake the product because the customer cannot wait for the completion of the tracing process. The retailers also mentioned that their current systems are not full proof against counterfeit goods, they see this especially with the drive toward globalisation, cutting costs by finding alternative and affordable raw materials, use of smaller and start-up suppliers.

The research, therefore, shows that there are indeed, gaps in the conventional supply chain system when it comes to traceability. These gaps are affecting both the retailers and the customers.

5.2.3 The views of the retailers on employing a Blockchain enabled supply chain system to address and combat quality issues

The literature suggested that a Blockchain enabled supply chain system has the capacity to present a transparent supply chain process to different businesses including retail. This

benefits the system stands to bring to businesses tie up exactly to what the retailers would like to see. Many of them shared that the process is not completely visible, thus making it difficult to curb issues as they come to the surface. The retailers want to have a proofed system, where they can be able to easily identify the best suppliers and maintain that quality across all the supply chain steps. This is something they are battling with at present moment, where it is not easy to completely curb issues before they get to the customers. Amongst some of the elements raised by the retailers in terms of what they regard as elements of competitive advantage are: reduce customer complaints, boost customer confidence, simplify traceability process, simplify supplier onboarding process, maintain high quality of supply, reduce process costs, and maintaining reputation. These elements are well aligned to what the literature suggests as benefits offered by use of Blockchain enabled supply chain systems.

5.3 ECONOMIC IMPLICATIONS TO BUSINESSES

Figure 15 indicates that the major fear from the businesses is the eventual loss of customers. The many elements that have been shared by the different retailers form a network and if not addressed can potentially result to the loss of customers.

Figure 16 indicates that the detection of the issues raised across the retailers is widespread across different points of the supply chain network. Due to that widespread, the process of addressing it is long and therefore leads to it being a costly exercise because of the number of hours and resources involved in closing or addressing it.

The network on figure 17 indicates all the competitive advantage elements that were raised by the respective retailers. It is evident that the goal is to boost customer confidence in order to retain and attract more customers. Therefore, many businesses are looking for systems that can help them combat the issues raised and help them to ultimately be in the position where the customers can trust them.

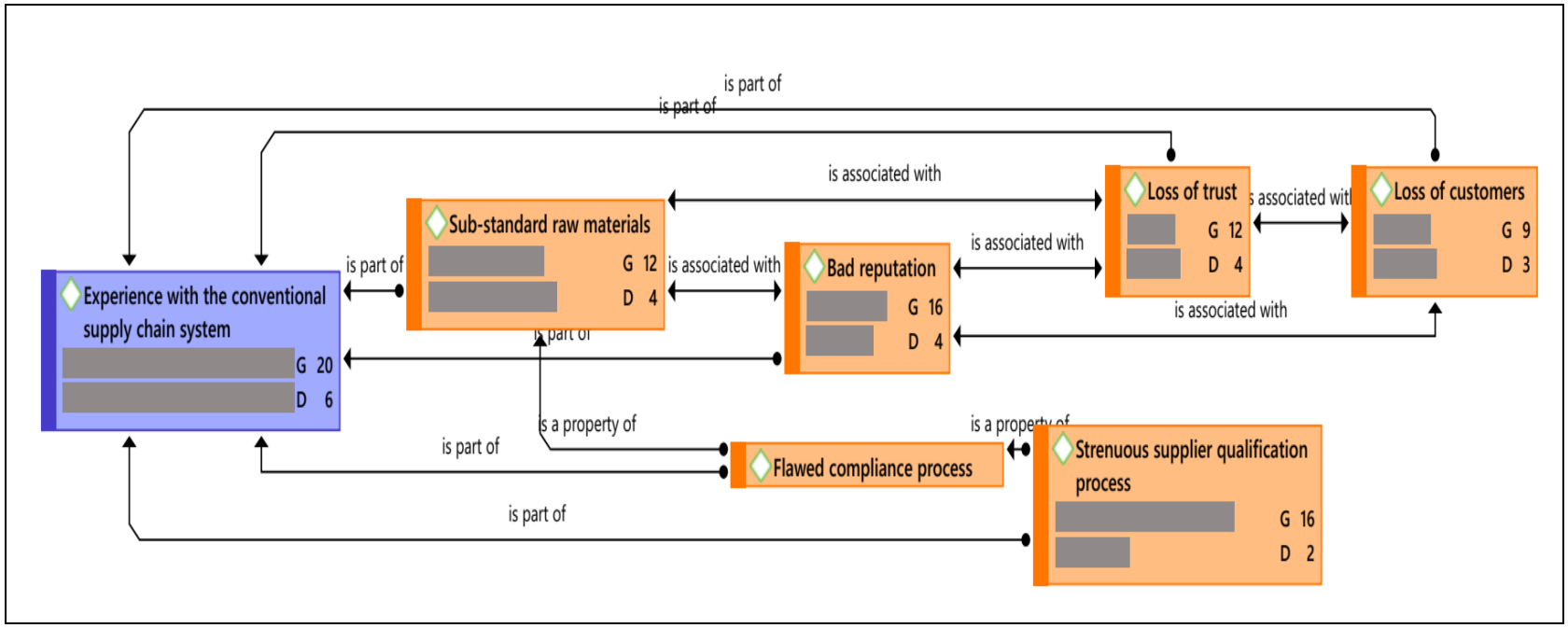


Figure 15: Network: experience with conventional supply chain systems

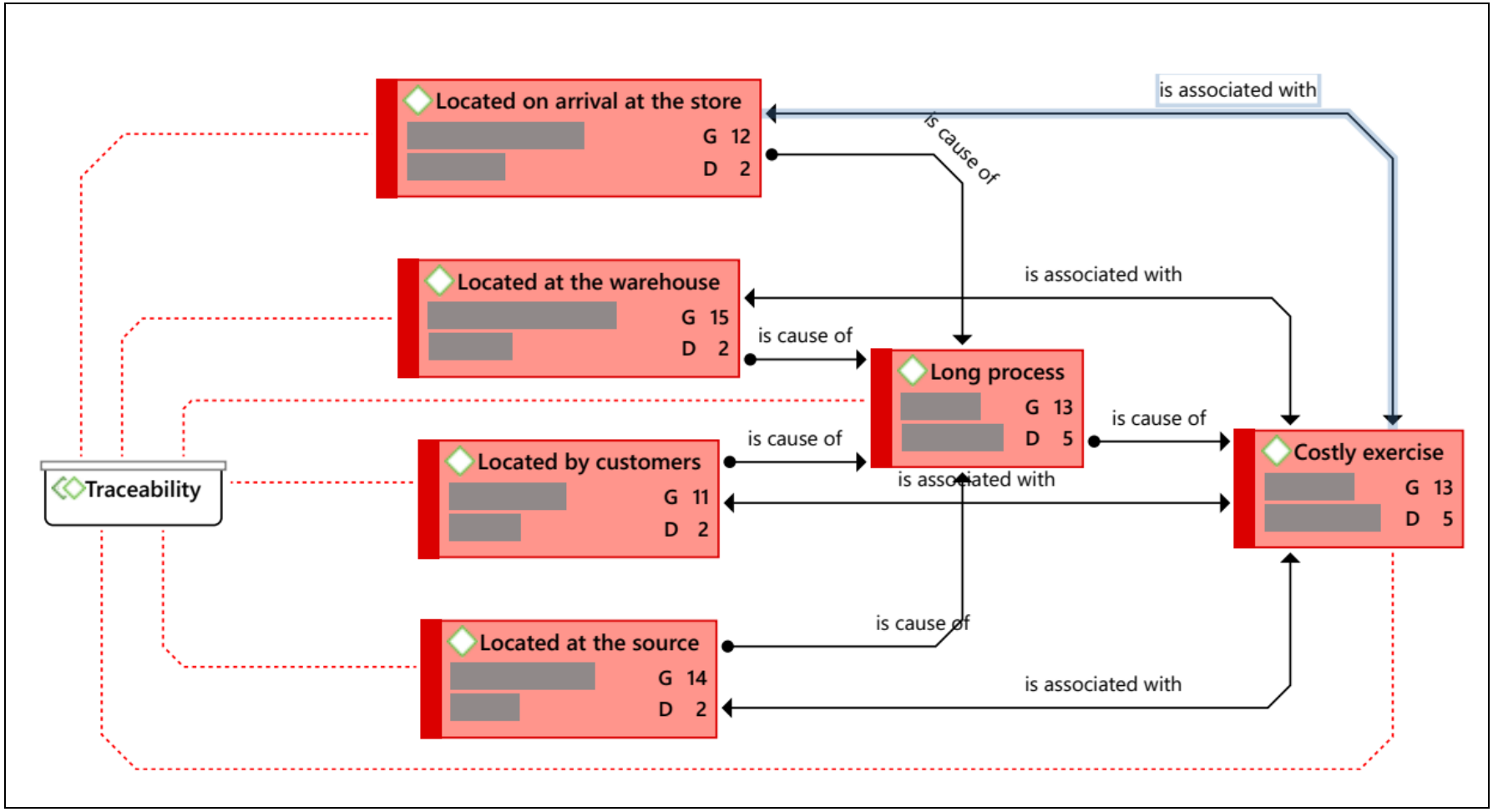


Figure 16: Network: Traceability experience with conventional supply chain system

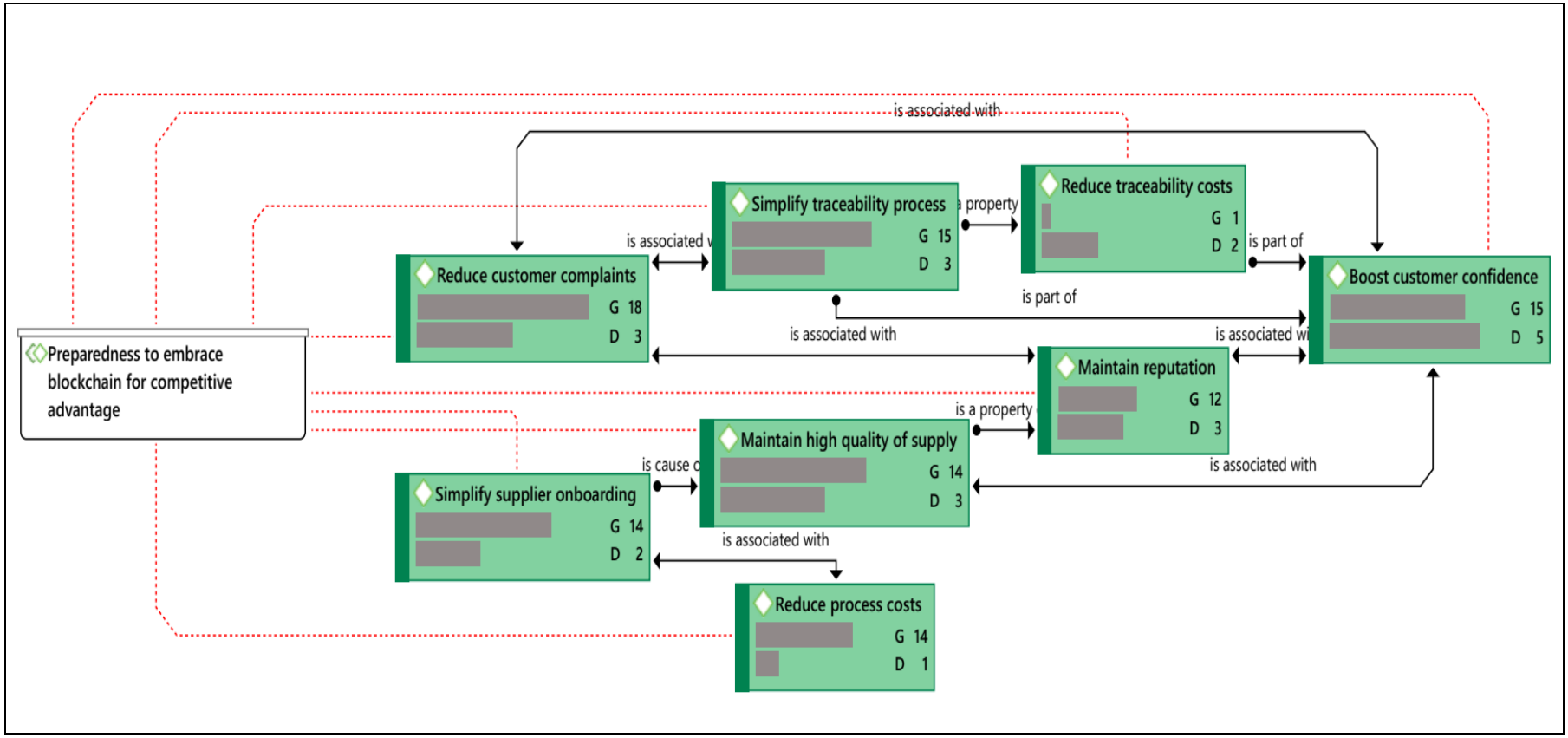


Figure 17: Network: Competitive advantage brought by Blockchain supply chain system

5.4 CHAPTER SUMMARY

This chapter discussed all the elements of the research questions, where it ventilated that the findings of the research around the shortcomings of the conventional supply chain systems are well aligned with what is suggested by the literature. This was shared widely across all segments of the retail businesses that formed part of this research. Issues around traceability in the event that a defect either on food safety or counterfeiting of goods were researched and big gaps were found, where in some circumstances, the defects were picked up by customers, which has a big potential of being detrimental to the business.

It has further been found that the retailers are open for alternative systems including a Blockchain enabled supply chain system for them to maximize their competitive advantage. Some of the retailers are quite comfortable with what they currently have as the experiences they shared are industry wide and not their lived experiences. Even though they share the fear sentiments, they are still quite comfortable with the systems they are using.

CHAPTER SIX: EVALUATION OF THE RESEARCH AND CONCLUSION

6.1 INTRODUCTION

The objective of this chapter was to summarise all the chapters that form part of the study, making reflections on the approach and its relevance in order to establish if the objectives of the research were met. It further established whether what has been presented by the literature that was consulted and the results findings explain the appetite for retailers to explore use of Blockchain enabled supply chain system for competitive advantage.

6.2 OVERVIEW OF THE RESEARCH

The research structure is composed of six chapters. Below is a brief overview of each of the chapters and the contributions they made toward the research study reaching its objectives.

Chapter 1: this chapter outlined the purpose of the research. Furthermore, the chapter provided a specific context under which the research was going to be conducted, why the study was necessary, and what objectives or questions will be addressed.

Chapter 2: the literature review was conducted under this chapter, where issues related to the conventional supply chain systems were studied. The study was focused on specific issues that speak to the objectives of the research. These included experiences of the retailers around food safety and counterfeiting of goods, experiences regarding traceability when issues are discovered, and finally the Blockchain enabled supply chain system, its benefits, shortcomings, and competitive advantage offered to businesses.

Chapter 3: this chapter discussed the research paradigm, the approach, and design. The research paradigm followed an interpretative phenomenology approach (IPA), where the participants could share their experiences in order to derive findings and arrive at conclusions. A qualitative research approach was undertaken by systematically gathering data, analyse, interpret, and arrive at findings. A semi-structured interview questionnaire

was developed and used as a research instrument. The interviews were recorded and transcribed, from there codes were developed using Atlas.ti software.

Chapter 4: the data collected was analysed and categorised according to the research objectives. No themes were derived as this was not the aim for this research, rather, the data was coded and clustered into the different categories that feed into the set objectives for this research. The analysis was undertaken in order to arrive at specific conclusions regarding the three main objectives and ultimately address the main research question. The establishment that came from the research is that, the retailers are keen on the use of Blockchain enabled supply chain systems that offer the benefits that they highlighted. There are, however, limitations in the sense that, while some of the retailers were excited about the competitive benefits offered by Blockchain supply chain system, their businesses are not entirely flexible to change to a new system due to costs and resistance to change.

Chapter 5: this chapter interpreted the results and findings. It went on to develop a framework for each of the three key elements of this research, where it was established what are the main contributors to the experiences with the conventional supply chain systems, the traceability, and competitive advantage through the use of Blockchain enabled supply chain system.

Chapter 6: this chapter looked at length how the study has been able to address the main research questions and key objectives.

6.3 RESEARCH QUESTIONS REVISITED

The main research question was “assessing competitive advantage brought by Blockchain enabled supply chain systems, retail”. This was addressed by the responses that were obtained from the participants to the three secondary questions. Below is a brief summary of how the secondary questions were addressed.

Secondary question 1: Have you ever heard of Blockchain enabled supply chain system?

This question was addressed by interviewing different participants across different clusters of retail, supermarkets, restaurants, hardware stores, furniture stores, and clothing stores. The findings around this question vary depending on the extent of knowledge of the supply chain systems on the side of the participants, and sometimes age. Generally, the managers are aware of Blockchain as a ground-breaking technology, and they understand its benefits based on their understanding of bitcoin. So, most of the retailers were looking at the system more on what it can offer but not entirely understanding its operation. Normative and culture-cognitive influences were also at play some of leaders were not really keen to change, and also worry some of a system they do not fully understand, but the influence of this was at a low scale as the most managers were much younger and keen to adopting new technologies.

Some of the extracts from the interviews went as follows:

- NX: Yes, I understand Blockchain from the point of view of bitcoin and I have heard that its scope is being widened to business operations.
- MK: I understand that there is a big drive from businesses to move into Blockchain supply chain system.
- MS: I have not really heard of Blockchain being used for business but knowing what it is already doing in cryptocurrency space, I am looking forward to what it can do for businesses.

Secondary question 2: Do you think a supply chain system with capabilities of combating issues related to food safety, counterfeiting, and traceability of goods would benefit your business?

Based on the fact that some of the retailers may not have been aware of a Blockchain enabled supply chain system, the elements that are theoretically the basis of this system were shared and the participants were asked to share their view on what their view is around them. The retailers despite their level of knowledge of the Blockchain supply chain system all have shared that a system with such capabilities would benefit their businesses.

Some of the highlights from the responses went as follows:

- JZ: Yes, such a system would simplify our processes and help us curb issues before they reach our customers.
- BG: Definitely, because we would like to be in a position where we can reduce the chances of food safety outbreaks, and if they get to come up, that we get to arrest them before they get to the customers.

Secondary question 3: What elements of competitive advantage offered by a supply chain system would you like for your business?

This question has close base to that on question 2, but the aim was to get the business leaders to think more of supply chain systems as a tool that could be used for competitive advantage, either on cost optimisation, quality improvement, or on time delivery. The responses from the different retailers were clustered according to key words that they used. The key words were coded, then ground and density of each code was measured to determine which of the elements that make up competitive advantage were more prominent. Some of the key words that came up describing competitive advantage were

- SM: for our business we are looking at reducing customer complaints related to the quality of what we have delivered. This has been more prominent in instances where we had a change in our process or there is a new supplier that came onboard. This has a big potential of damaging our reputation and the brand. Therefore, we are looking at strengthening our supplier onboarding process with reputable suppliers that will help us reduce customer complaints.
- MN: one of the recent examples that affected brands is that of pilchard tin fish, where the stock had to be taken off the shelves across all stores. This is a quality issue that was supposed to have been picked up before making its way to the shelves. This has a potential of damaging that brand permanently. Therefore, there is a need for a system that can help retail brands to protect and curb quality issues and be able to trace and close off as immediate as possible when defects arise.

6.4 RELEVANCE OF THE RESEARCH METHODOLOGY

In this section the researcher is making reflections on the chosen methodology to find out if the intended objectives of the research have been achieved or if a different one could have yielded in better results. This research sought to understand the perspective of the retailers in utilising Blockchain enabled supply chain systems to achieve a competitive advantage by addressing the key challenges that are hard to curb with the conventional supply chain systems. The key elements that the research looked at were food safety, goods counterfeiting, and traceability.

The interpretative phenomenology approach (IPA) was suitable for this research as it was looking at ventilating the lived experiences and perspective of the retailers. To some extent there, a case study approach could have benefited the research more, but since Blockchain is a ground-breaking technology, there are no known businesses who have already adopted such a system. Under such considerations, the IPA approach has benefited this research by addressing the objectives, and ultimately answering the research question.

6.5 RELEVANCE OF INSTITUTIONAL THEORY OF THE STUDY

The literature was used as a foundation to understand the benefits of a Blockchain enabled supply chain systems. There is enough theoretical evidence of what the system can do for different businesses, but there is very little in terms of lived experiences that show how businesses have migrated from legacy systems and gained the benefits shared by literature. So, a lot of businesses are looking at the advantages that are brought by Blockchain with caution because it is a system that has never been tested. Some of the participants raised issues around security and that is something that some parts of literature have covered.

Generally, there is enough theory or literature that suggest how the system would work and how it can combat and curb the challenges faced by businesses in the 21st century, particularly as it relates to supply chain systems. More evidence of how businesses adopted the system and changed their fortunes in terms of establishing competitive

advantage is necessary and it will put some of the questions that have been raised by businesses to rest.

6.6 CONTRIBUTION OF THIS STUDY TO THE BODY OF KNOWLEDGE

This study has proven to be very relevant and will add a remarkable value to the body of knowledge. This is made possible by issues that have been ventilated as part of this research and how these have affected the retail business from brand damage to direct revenue drop influenced by the counterfeit alternative products that have given consumers who have no real attachment to original brands and are driven price bargaining, and food safety that has resulted in brand collapse through issues experienced by customers . There is enough literature that speaks about what blockchain technology can do for the retail business, but there is not enough that shares the perspective of the retailers on how the technology can improve their operations and help create a competitive advantage by combatting the issues raised on food safety and counterfeiting of goods, an aspect that has been covered by this research.

The businesses further expressed how these challenges have translated into revenue losses that have been made evident by some key business elements:

- Drop in sales revenue due to options that have been presented by alternatives coming from counterfeit goods. The expression from the retailers is around the fact that some customers cannot really differentiate between counterfeited and original brands, therefore their pull interest is the competitive pricing.
- Brand damage that has been influenced by some occurrences that changed customer views and perspective around the product, thus, leading to a big collapse of the brand, and subsequently the business. These are issues that could have had a different outcome had they been detected before reaching the customers. This has been the case on brands like Pilchard and tyger brands with the listeriosis outbreak.

6.7 RECOMMENDATIONS

Taking from the findings from this research, the following are being recommended:

- There is a need for sufficient awareness campaign for business retailers on technologies like Blockchain that can help to help combat the issues raised.
- Governments need to accelerate the roll out framework of Blockchain technology in order to set a foundation for information security and management.
- Governments need to intensify their role on efforts to combat the production and subsequent sale of counterfeit goods. There must be measures put in place to set ground on the legal requirements for any business in the retail space. This also needs to cover the regulation of online trading that has been largely used for the movement of these counterfeit goods.
- The retailers need to also look at what role they can use to inform the public of their brands so that the consumer can know what to look for when purchasing and make informed decision.
- Retailers need to put efforts in educating themselves about the Blockchain technology so that by the time they are ready to enter the space, they are well aware of the technology will bring, how it operates, and how they can maximize the benefits out of it.

6.8 RECOMMENDATIONS FOR FURTHER STUDIES

This segment of the research gives a recommendation on further studies that can be undertaken on competitive advantage brought by Blockchain enabled supply chain systems in retail businesses. The area of focus in this research was around Vanderbijlpark, which put a limitation in terms of how the study could be broadened. It would be of interest to broaden the scope by focusing on retail businesses at a larger scale, typically across Gauteng. The methodology could also be revisited to look at covering both qualitative and quantitative approach. The qualitative approach would look at confirming or relooking at the findings of this research and the quantitative approach

would look at correlation between certain variables of the study so we can see which variables of the study influence the other.

6.9 LIMITATIONS OF THE RESEARCH STUDY

Some of the limitations that the researcher has picked up are:

- Unquantifiable effects of COVID-19 Pandemic. The researcher initially wanted to have a one on one round table kind of a setup with the businesses. This could not be possible due to limitations brought by COVID-19 and therefore, only virtual meetings were possible, thus taking away the advantage brought by face to face interactions.
- Availability of relevant personnel at the retailers in order to ensure maximum coverage of the sample population. Initially, the researcher wanted to have at least two personnel into order to get the perspective from both business leadership and from the personnel responsible for the supply chain. This was possible in some businesses and in some not.
- Access to information, where some of the retailers may feel that the research may compromise their position. This has been addressed by giving confidence to the retailers, particularly on the side of the ethical consideration.
- The fact that some of the interviews were done telephonically has also been a limitation because of the amount of airtime spent. This resulted in the interview session being rushed and therefore, some of the explanations from the business leaders had to be cut short.

6.10 REFLECTION ON THE RESEARCH STUDY

Undertaking this research study was a very challenging journey in many ways than one. Firstly, the topic was around one of the ground-breaking technologies that form part of the fourth industrial revolution. The understanding of the technology as a business tool on the side of the managers was a big hurdle. Also, the fact that this type of technology had very little of lived experiences just made the journey even harder.

Secondly, the fact that the research was undertaken during the COVID-19 pandemic limitations made it very difficult as people were not so keen in committing to participate in the study. The initial thought from the researcher was that the interviews were going to take place at the retailer premises, but the conditions made it necessary that virtual tools be used instead. Some of the participants didn't even have ZOOM and a telephonic conversation in such cases was used. This was also an expensive exercise as it brought costs that the researcher never anticipated. Besides all the hurdles and challenges experienced, the research was a joyful journey for the researcher. The researcher learnt a lot about Blockchain as a business tool and added it to his business toolbox. The experiences shared by the business leaders during the interviews were an eye opener and have exposed the conventional supply chain systems, opened lots of opportunities for ground-breaking technologies, while their fears have a potential of testing the make-break of the new technologies.

6.11 CONCLUSION REMARKS

This study contributed in many respects in both ventilating challenges faced by the retail supply chain conventional systems and understanding the perspective of the retailers toward employing a ground-breaking technology system in the form of Blockchain to combat the situation and create competitive advantage.

The research exposed challenges around food safety, where retailers have had experiences of a potential reputational damage, sometimes not coming from their direct operations, but rather from the other channels of the supply chain systems.

Some of the retailers shared their experiences around brand damages that they have seen in the retail fraternity, and sometimes experienced themselves, relating to quality issues that should have been picked up somewhere in the supply chain process but ended up at the hands of the customers.

Issues around counterfeiting of goods and brands were shared by retailers, where the biggest challenge expressed was around the onboarding of suppliers and lack of control on raw materials used due to drive toward reducing process or production costs, thus

exposing the businesses to many sub-standard materials, leading to bad reputation when detected by customers.

Finally, the research has ventilated the perspective of the retailers to adopt Blockchain enabled supply chain systems to combat the issues raised and create competitive advantage. The research showed that the desire for the retailers to adopt Blockchain supply chain system is mainly driven by the fear of falling victim of what the retail businesses have experienced, reputational damage. The fears around the fact that this is a ground-breaking technology, thus not much of lived experiences has been shared in similar businesses does put a bit of twist on their appetite.

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APPENDICES

ANNEXURE 1: CONSENT LETTER

LETTER OF INTRODUCTION AND INFORMED CONSENT
FOR PARTICIPATION IN ACADEMIC RESEARCH

Title of The Study:
Assessing competitive advantage brought by Blockchain technology in supply chain systems: Vanderbijlpark retail business perspective

Researcher:
Thanduxolo Nonxuba
Student number: 31048838
North West University
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You are cordially invited to participate in an academic research study due to your experience and knowledge in the research area; namely, supply chain in retail businesses.

Purpose of the study: The purpose of the study is to define gaps and shortcoming arising from supply chain systems related to food safety and quality, counterfeit goods, incorrect deliveries, delays in commercial conversions, traceability and arrest of issues arising from the system. The study seeks to determine your opinion on possible competitive advantage that can be gained by combating the issues above through the employment of Blockchain enabled supply chain system; how much awareness and faith does the business have in Blockchain, quantification of the issues experienced, how flexible businesses are to change or adapt their systems.

The results of the study may be published in an academic journal. You will be provided with a summary of our findings on request. No participants names will be used in the final publication.

Duration of the study: The study will be conducted over a period of 9 months, counting from the January 2020 and its projected date of completion is 30 November 2020.

Research procedures: The study is based on known incidents arising from supply chain systems. Articles issued from industry experts and academics will form the base of the theory and findings will be contrasted against these. Semi-structured interview questions have been drawn up and will be submitted to you via email, followed by an interview process that will take not more than 30 minutes of your time.

What is expected of you: Please make time to go through the information sheet supplied in order to familiarise yourself further and understand your rights. Upon agreement by both parties, an interview session will be scheduled for a time that suites your schedule.

Your rights: Your participation in this study is very important. You may, however, choose not to participate and you may also stop participating at any time without stating any reasons and without any negative consequences. You, as participant, may contact the researcher at any time in order to clarify any issues pertaining to this research. You will get and keep a copy of the signed consent document.

Confidentiality: All information shared and discussed during this course will be treated as confidential. The information gathered through this survey is purely for academic purposes with no intentions of sharing and making it public. The name of your organisation will remain anonymous; hence the structure of questions only requires knowing your line of operation within the retail industry. The relevant data will be destroyed, should you choose to withdraw.

WRITTEN INFORMED CONSENT

I hereby confirm that I have been informed about the nature of this research.

I understand that I may, at any stage, without prejudice, withdraw my consent and participation in the research. I have had enough opportunity to ask questions.

Respondent: _____

Researcher: _____

Date: _____

Contact number of the Researcher: _____

VERBAL INFORMED CONSENT *(Only applicable if respondent cannot write)*

I, the researcher, have read and have explained fully to the respondent, named

_____ and his/her relatives, the letter of introduction. The respondent indicated that he/she understands that he/she will be free to withdraw at any time.

Respondent: _____

Researcher: _____

Witness: _____

Date: _____

ANNEXURE 2: PARTICIPANT'S INFORMATION SHEET

Ethics clearance reference number: [NWU-00703-20-A4]

INFORMATION SHEET FOR RESEARCH PARTICIPANTS

Invitation

You are hereby invited to participate in this post-graduate research study. Before you decide whether you would like to take part, it is important for you to understand the reason as to why the research is being conducted, what your participation will contain and what the process consists of. Please take your time to read the following information carefully. You are welcome to ask any questions for clarification if you so wish before making your final decision.

Study topic

The aim of the study is to determine if the retail businesses can gain competitive advantage by arresting issues around food safety, counterfeiting of goods and traceability through employment of Blockchain enabled supply chain system.

Study origin

This is a post-graduate project initiated and conducted as part of Master of Business Administration (MBA) mini-dissertation. Therefore, this research project has been approved by the North-West University - Faculty of Economic and Management Science's Ethics Committee (Ref number: [NWU-00703-20-A4]).

Who will be taking part in the study?

The invitation to participate is for retail organisations (Supermarket, Clothing stores, Hardware stores, Restaurants, Furniture shops) in the Vaal Triangle Area, particularly Vanderbijlpark. The research approach undertaken in this study cannot establish the number of participants in advance. This will be determined by drawing up patterns, indicating that saturation point has been reached; therefore, more participants will not add new information.

Do I have to participate?

It is important to note that although your participation will be highly appreciated and critical to the success of the research study, your participation is completely voluntarily, and you are allowed to withdraw from the process at any stage if you wish to do so, without any negative consequences.

How will the data be collected?

A semi-structured interview guide has been drawn up and shared with you. Upon agreement by both yourself and the researcher, a suitable time slot will be set aside for the interview. This will preferably be face-face; but due to challenges imposed upon us by COVID-19 pandemic, an online meeting platform like ZOOM, Microsoft teams, or any suitable for all parties may be used.

How will my responses and information be kept confidential?

The profiling of the participants will not include names, it will be codes, e.g.: participant 1. Your identity and that of the organisation will remain entirely confidential and no personal information will be requested. Therefore, you are not required to provide your name or surname. The numbering (participant 1) is only is used for quality data capturing processes and for screening any errors before statistical analysis. The hard copies of the interview notes will be captured in an electronic password-protected data file. The data file and hard copies will be securely stored by the research supervisor as a custodian at the University.

What are the risks involved?

This study has been classified as minimum risk and you are only asked to provide about 30 minutes of your time interviews. The risks involved in taking part are minimal and alleviated by the anonymous nature of the code labelling of the participants, instead of actual names.

What will happen to the results?

Once the data analysis is completed, the anonymized results will be reported in the researcher's dissertation. The findings will also be used to provide a general report to the organisations who took part in the study, if requested. The report will include quantification of problems around food safety, counterfeiting and traceability in retail and the appetite of the organisations to adapt a Blockchain enabled supply chain system to curb the issues raised. The final copy of the full report findings will be held by the North-West University. Furthermore, the anonymized data and results may be used for peer-reviewed academic publications in journals or to present at conferences. At no point will individual results be reported, only the total group results.

Who can I contact for more information or to ask questions?

For more information about this study please contact the researcher using the following contact details:

Mr. Thanduxolo Nonxuba
MBA Student
North-West University Business School
Faculty of Economic and Management Sciences
Cell: 0823807595
Email: thandu.nonxuba@gmail.com

ANNEXURE 3: SEMI-STRUCTURED INTERVIEW GUIDE

Dear Participant,

Assessing competitive advantage brought by Blockchain technology in supply chain systems: Vanderbijlpark retail business perspective

You are herewith invited to participate in the interview session as part of my MBA research project at the North-West University (NWU). In this research, we are interested in your experiences on issues around food safety, counterfeit goods, and traceability. The interview session will take you approximately 30 minutes of your time, nothing more than that. We can assure you that all the information we receive will remain confidential. Please note that the responses from everyone will not be identified, but rather the results of the group will be used in this study.

Please answer all questions as accurately and honestly as possible. Once the interview has been completed, the researcher will analyse the data, and the summary findings will be presented to participating institutions (e.g.: NWU statistics department), and we will work with them on how to respond to the results. In this way, your contribution to the research could benefit you and your colleagues in the future.

It is important that you understand that it will not be to your disadvantage if you choose not to participate. Participating is completely voluntary, and you can withdraw from the study at any time. If you are comfortable with the content and meaning and you have no objections, please respond on email to the researcher so that an interview session that suites you can be arranged. If you have any queries that we have not addressed and would like to discuss these with us, please do not hesitate to contact us.

Yours faithfully

Mr. T. Nonxuba
Primary researcher
North-West University
(082) 380 7595
thandu.nonxuba@gmail.com

Dr. N. Ndlovu
Study supervisor
North-West University
(018) 299 4023
35181680@nwu.ac.za

Semi-Structured interview
Qualitative interview introduction
Identification: e.g.: participant 1 Length: 30 minutes Primary goal: To understand things the way you see them in the form of a conversation focusing on your experiences, your opinions and what you think or feel about the topic covered in this research
Verbal consent
Do you agree to willingly participate in this interview? Verbal consent was obtained from the study participant Verbal consent was not obtained from the study participant
Background information:
Age category: Are you in management level: How many years have you been with the company: How many employees does your organisation have: How many years has your organisation been in business: Which category of retail is your business (Supermarket, Restaurant, etc.):
Business operation related questions:
Does your organisation have a formal supply chain system: Probe: if no, what is the reason for not having one?

Probe: if yes, which enterprise resource plan (ERP) is used in your organisation? (SAP, J.D. Edwards, Microsoft dynamics; etc.). Probe: how many years has this ERP been in operation?
Experience with conventional supply chain systems:
Can you tell me about your experience on quality issues related to food safety or counterfeiting of goods as it applies to your business? Probe: how big is this problem? Probe: of the challenges explained, where did most of them get picked up? Probe: Have the quality issues affected your relationship with customers (trust, customer retention)? Probe: Have the issues affected the image or reputation of the company? Do you keep records of cost of poor quality, even if it is in the form of percentage of revenue?
Traceability and close-out of quality issues
From the above experiences, how has the process been in tracing and locating the origin of the defect, from when it is picked up to the close out process? Probe: Upon reporting the defect to the supplier, do you get involved in locating the origin? Probe: Is it an easy process to trace and locate the defects? Probe: do you think the current supply chain systems make it easy to locate the origin of defects? If so, how?
Blockchain enabled supply chain system:
Have you ever heard of Blockchain? Have you ever heard of Blockchain enabled supply chain system? Do you think a supply chain system with capabilities of combating issues around food safety or counterfeiting of goods and offer easy means of tracing and locating origin of defects is necessary? Do you think a Blockchain enabled supply chain system can offer you competitive advantage? How flexible is your business to change to new systems?

ANNEXURE 4: LANGUAGE PROOF READING AND EDITING CERTIFICATE

Angela Mabhena
Freelance Writing & Editing Services
130 Tulip Gardens
Shamroc Street, Vorna Valley
Midrand, 1685
c/o Department of Language and Social Sciences Education
University of Limpopo
Email: angelalillymabhena@gmail.com;
angela.mabhena@ul.ac.za
Cell: 0787560140

13 December 2020

To Whom It May Concern

This is to confirm that I have done language editing on the required sections of the following mini dissertation:

Title:

Assessing competitive advantage brought by Blockchain technology in supply chain systems:Vanderbijlpark retail business perspective

Author:

Thanduxolo Nonxuba (North West University, Student no: 31048838)

Do not hesitate to contact me if the need arises.

Many thanks and regards,

Angela Mabhena (Ms)

Member:English Academy of Southern Africa (Council member, 2016-)
Research Fellow: School of Languages and Communication Studies, University of Limpopo (2018-)

ANNEXURE 5: ETHICS CLEARANCE

NORTH-WEST UNIVERSITY
YUNIBESITI YA BOKONE-BOPHIRIMA
NOORDWES-UNIVERSITEIT

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Web: http://www.nwu.ac.za

Economic and Management Sciences Research
Ethics Committee (EMS-REC)

19 June 2020

Dr N Ndlovu
Per e-mail
Dear Dr Ndlovu,

EMS-REC FEEDBACK: 19062020
Student: Nonxuba, T (31048838)(NWU-00703-20-A4)
Applicant: Dr N Ndlovu - MBA

Your ethics application on, *Assessing competitive advantage brought by Blockchain technology in supply chain systems: Vanderbijlpark retail business perspective,* which served on the EMS-REC meeting of 19 June 2020, refers.

Outcome:

Approved as a minimal risk study. A number NWU-00703-20-A4 is given for one year of ethics clearance.

Due to the Covid-19 lock down ethics clearance for applications that involve data collection or any form of contact with participants are subject to the restrictions imposed by the South African government.

Kind regards,

Mark Rathbone

Digitally signed by Mark Rathbone
DN: cn=Mark Rathbone, o=North-West University, ou=Business management, email=mark.rathbone@nwu.ac.za, c=ZA
Date: 2020.06.26 11:41:15 +02'00'

Prof Mark Rathbone
Chairperson: Economic and Management Sciences Research Ethics Committee (EMS-REC)

ANNEXURE 6: TITLE REGISTRATION

Private Bag X1290, Potchefstroom
South Africa 2520

Tel: 018 299-1111/2222
Fax: 018 299-4910
Web: http://www.nwu.ac.za

Higher Degree Administration
Tel: 018 299 2626
Email: 21711542@nwu.ac.za

14 September 2020

Dear Mr Nonxuba

REGISTRATION OF TITLE

Note has been taken that you wish to submit your **(mini-)dissertation/thesis** for examination. The registered title as it must appear on the examining copies and on the title page of the final copies is indicated below. An example of your title page will be sent together with this letter.

Assessing competitive advantage brought by Blockchain technology in supply chain systems: Vanderbijlpark retail business perspective

The above-mentioned title may under **no circumstances** be changed without consulting your supervisor and obtaining the approval from the relevant committee in the mentioned faculty, in regard of which this office must be furnished with the latest approved title.

In the instance that you wish to submit for examination, please inform your supervisor/promoter accordingly. *Also ensure absolute adherence to the prescripts of A Rule 4.10 for the submission of a Master's study and of A rule 5.10 for the submission of Doctoral thesis.*

If you intend on not submitting, please submit the Notice of Not Submission form. The Notice of Not Submission form is available at the Higher Degree Administration Office or the administrative manager of the faculty.

Your attention is drawn to the following matters regarding the above.

- You may submit your examination copies from **1 September 2020 to 18 December 2020 to possibly qualify for the Autumn (May) graduation ceremony in 2021.**
- **Submissions received after 18 December 2020 will be considered in time for examination towards possible graduation during the Winter (July) graduation series.**
-

You are required to submit your examination copy in the following format:

- **One electronic copy in Word format and one electronic copy in PDF format to be submitted in a drop box created for you for this purpose on the eFundi website by HDA. You may also submit via email, or in person, over the counter to an HDA official.**

The following forms must be submitted with your examination copies:

- **The signed Solemn Declaration form**
- **TurnItIn report (Only the summary)**
- **Copy of your ID**
- **Personal particulars form (only applicable for PhD students)**
- Please update your courier address as well for the purpose of sending your degree certificate to the correct address after a ceremony. **Please visit the DIY Student 360º to ensure that your personal details are correct on the system and on your degree certificate please**

For ease of reference, herewith a reference to the following useful resources:

- General Academic Rules (A-Rules):
- Manual for Master's and Doctoral Studies:
- Policy on academic integrity:
-

I trust you find the above in order. Please do not hesitate to contact the undersigned for any more related information.

Yours sincerely

Ms N Blom
for REGISTRAR

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ANNEXURE 7: TURN-IT-IN REPORT

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by THANDUXOLO NONXUBA

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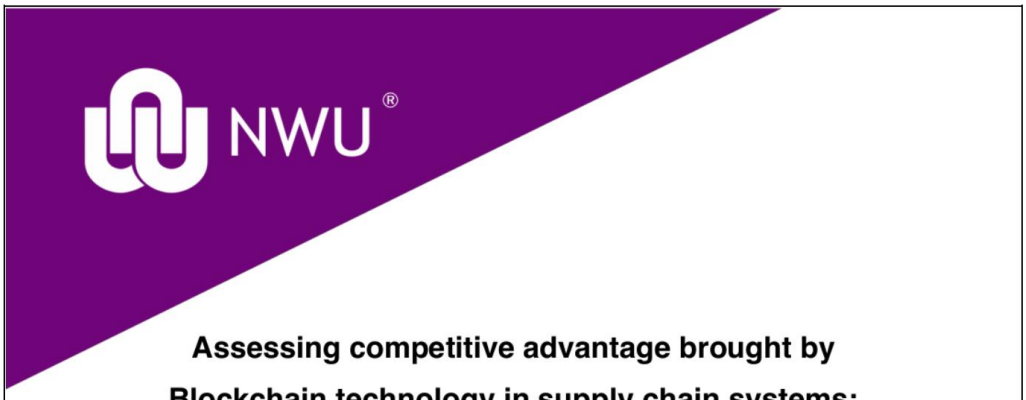

Assessing competitive advantage brought by Blockchain technology in supply chain systems: Vanderbijlpark retail business perspective

T Nonxuba

orcid.org 0000-0002-2775-9119

Mini-dissertation submitted in partial fulfilment of the requirements for the degree *Master in Business Administration* at the North-West University

Supervisor: Dr N Ndlovu

Examination: November 2020

Student number: 31048838

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ANNEXURE 8: ATLAS.TI REPORTS

	Retail category::Clothing Gr=126; GS=7	Retail category::Furniture Gr=52; GS=3	Retail category::Hardware Gr=51; GS=3	Retail category::Restaurant Gr=58; GS=4	Retail category::Supermarkets Gr=47; GS=3
	Table-relative	Table-relative	Table-relative	Table-relative	Table-relative
	Clothing Gr=126; GS=7	Furniture Gr=52; GS=3	Hardware Gr=51; GS=3	Restaurant Gr=58; GS=4	Supermarkets Gr=47; GS=3
○ Bad reputation Gr=16	17.13%	15.35%	20.00%	17.68%	15.35%
○ Cheaper options Gr=13	14.30%	15.35%	20.00%	11.74%	7.75%
○ Flawed compliance process Gr=15	17.13%	7.75%	20.00%	11.74%	23.10%
○ Loss of customers Gr=9	8.59%	7.75%	6.71%	11.74%	15.35%
○ Loss of trust Gr=12	14.30%	23.10%	0.00%	17.68%	7.75%
○ Strenuous supplier qualification process Gr=16	17.13%	15.35%	20.00%	17.68%	15.35%
○ Sub-standard raw materials Gr=12	11.42%	15.35%	13.29%	11.74%	15.35%
Totals	100.00%	100.00%	100.00%	100.00%	100.00%

Table 1: Experience with conventional supply chain systems by organisation

	Does your business have a ERP system::No Gr=37; GS=2	Does your business have a ERP system::Yes Gr=297; GS=18	How long have you been using the ERP::>10 Gr=276; GS=17	How long have you been using the ERP::>5 Gr=21; GS=1	How long have you been using the ERP::N/A Gr=37; GS=2
	Table-relative	Table-relative	Table-relative	Table-relative	Table-relative
○ Bad reputation Gr=16	18.13%	17.08%	17.10%	16.67%	18.13%
○ Cheaper options Gr=13	9.16%	14.64%	14.48%	16.67%	9.16%
○ Flawed compliance process Gr=15	18.13%	15.85%	15.80%	16.67%	18.13%
○ Loss of customers Gr=9	9.16%	9.75%	9.22%	16.67%	9.16%
○ Loss of trust Gr=12	9.16%	13.41%	13.15%	16.67%	9.16%
○ Strenuous supplier qualification process Gr=16	18.13%	17.08%	17.10%	16.67%	18.13%
○ Sub-standard raw materials Gr=12	18.13%	12.18%	13.15%	0.00%	18.13%
Totals	100.00%	100.00%	100.00%	100.00%	100.00%

Table 2: Experience with conventional supply chain system: by ERP systems

	::Clothing Gr=126; GS=7	**::Furniture** Gr=52; GS=3	**::Hardware** Gr=51; GS=3	**::Restaurant** Gr=58; GS=4	**::Supermarkets** Gr=47; GS=3
	Table-relative	Table-relative	Table-relative	Table-relative	Table-relative
	::Clothing Gr=126; GS=7	::Furniture Gr=52; GS=3	::Hardware Gr=51; GS=3	::Restaurant Gr=58; GS=4	::Supermarkets Gr=47; GS=3
○ **Costly exercise** Gr=13	17.24%	15.41%	15.45%	16.69%	18.18%
○ **Located at the source** Gr=14	17.24%	22.97%	23.04%	8.35%	18.18%
○ **Located at the warehouse** Gr=15	20.70%	15.41%	15.45%	33.24%	9.09%
○ **Located by customers** Gr=11	17.24%	15.41%	0.00%	16.69%	18.18%
○ **Located on arrival at the store** Gr=12	10.32%	15.41%	23.04%	16.69%	18.18%
○ **Long process** Gr=13	17.24%	15.41%	23.04%	8.35%	18.18%
Totals	100.00%	100.00%	100.00%	100.00%	100.00%

Table 3: Experience with traceability under conventional supply chain systems: by organizations

	ERP system::No Gr=37; GS=2	**ERP system::Yes** Gr=297; GS=18	**ERP::>10** Gr=276; GS=17	**ERP::>5** Gr=21; GS=1	**ERP::N/A** Gr=37; GS=2
	Table-relative	Table-relative	Table-relative	Table-relative	Table-relative
	ERP system::No Gr=37; GS=2	ERP system::Yes Gr=297; GS=18	ERP::>10 Gr=276; GS=17	ERP::>5 Gr=21; GS=1	ERP::N/A Gr=37; GS=2
○ **Costly exercise** Gr=13	22.22%	15.94%	15.62%	20.00%	22.22%
○ **Located at the source** Gr=14	11.11%	18.85%	18.76%	20.00%	11.11%
○ **Located at the warehouse** Gr=15	22.22%	18.85%	18.76%	20.00%	22.22%
○ **Located by customers** Gr=11	11.11%	14.49%	14.05%	20.00%	11.11%
○ **Located on arrival at the store** Gr=12	22.22%	14.49%	14.05%	20.00%	22.22%
○ **Long process** Gr=13	11.11%	17.39%	18.76%	0.00%	11.11%
Totals	100.00%	100.00%	100.00%	100.00 %	100.00%

Table 4: Experience with traceability under the conventional supply chain systems: by ERP systems

	::Clothing Gr=126; GS=7	::Furniture Gr=52; GS=3	::Hardware Gr=51; GS=3	::Restaurant Gr=58; GS=4	::Supermarkets Gr=47; GS=3
	Table-relative	Table-relative	Table-relative	Table-relative	Table-relative
	::Clothing Gr=126; GS=7	::Furniture Gr=52; GS=3	::Hardware Gr=51; GS=3	::Restaurant Gr=58; GS=4	::Supermarkets Gr=47; GS=3
○ **Boost customer confidence** Gr=15	17.07%	11.79%	14.33%	11.79%	15.42%
○ **Maintain high quality of supply** Gr=14	12.18%	17.62%	7.09%	17.62%	15.42%
○ **Maintain reputation** Gr=12	12.18%	11.79%	14.33%	11.79%	7.63%
○ **Reduce customer complaints** Gr=18	14.65%	11.79%	21.42%	23.58%	23.05%
○ **Reduce process costs** Gr=14	12.18%	17.62%	14.33%	17.62%	7.63%
○ **Simplify supplier onboarding** Gr=14	19.54%	11.79%	7.09%	5.83%	15.42%
○ **Simplify traceability process** Gr=15	12.18%	17.62%	21.42%	11.79%	15.42%
Totals	100.00%	100.00%	100.00%	100.00%	100.00%

Table 5: Perspective is using Blockchain as a competitive advantage: By organizations

	ERP system::No Gr=37; GS=2	ERP system::Yes Gr=297; GS=18	ERP::>10 Gr=276; GS=17	ERP::>5 Gr=21; GS=1	ERP::N/A Gr=37; GS=2
	Table-relative	Table-relative	Table-relative	Table-relative	Table-relative
	ERP system::No Gr=37; GS=2	ERP system::Yes Gr=297; GS=18	ERP::>10 Gr=276; GS=17	ERP::>5 Gr=21; GS=1	ERP::N/A Gr=37; GS=2
○ **Boost customer confidence** Gr=15	18.24%	14.29%	14.28%	14.29%	18.24%
○ **Maintain high quality of supply** Gr=14	18.24%	13.18%	13.10%	14.29%	18.24%
○ **Maintain reputation** Gr=12	18.24%	10.98%	10.72%	14.29%	18.24%
○ **Reduce customer complaints** Gr=18	18.24%	17.58%	17.87%	14.29%	18.24%
○ **Reduce process costs** Gr=14	9.02%	14.29%	14.28%	14.29%	9.02%
○ **Simplify supplier onboarding** Gr=14	9.02%	14.29%	14.28%	14.29%	9.02%
○ **Simplify traceability process** Gr=15	9.02%	15.38%	15.48%	14.29%	9.02%
Totals	100.00%	100.00%	100.00%	100.00%	100.00%

Table 6: Perspective in using Blockchain enabled supply chain systems: by ERP systems