Assessing the effect of inventory management on the profitability of manufacturing enterprises in South Africa

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DECLARATION

I hereby declare that the mini dissertation submitted herewith to the North-West University in partial fulfilment of the requirements for the Master of Business Administration (MBA) degree is my own original work. It has not been previously submitted to any other institution for evaluation purposes.

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To be able to learn and study toward a postgraduate qualification is a privilege not granted to many, and for this opportunity, I am truly grateful.

ABSTRACT

Inventory constitutes a large part of the total investment of manufacturing companies, so its management is of utmost importance. Inventory management is the efficient oversight of goods or materials within a company. It involves managing inventory levels, storage, tracking, and valuation. The goal is to ensure the right amount of inventory is available at the right time, place, and cost. Profitability is a measure of a company's ability to generate profit or financial gain.

The aim and primary objective of this study is to assess the effect, if any, that inventory management has on the profitability of manufacturing enterprises in South Africa. The population that formed part of this study included a poultry abattoir, an animal feed mill, a soya bean processor, and a maize and wheat mill. Qualitative data was collected via interviews with relevant personnel from these entities, and the sampling was done using non-parametric non-probability sampling using convenience sampling techniques.

The literature review explores how inventory management affects profitability in manufacturing enterprises and the factors and challenges involved. The study used qualitative research methods, including interviews, to collect data from manufacturing companies in the agricultural sector. The findings suggest that effective inventory management practices have a significant impact on profitability, and recommendations include improving communication and implementing risk management measures. The study focused on the link between inventory management and profitability and included practical steps to improve profitability through accurate inventory management practices.

KEYWORDS

Inventory, Inventory Management, Profitability, Manufacturing Entities

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1 – NATURE AND SCOPE OF THE STUDY

1.1. INTRODUCTION

The ultimate goal of manufacturing and other companies is to be profitable and to generate an acceptable financial return for the shareholders (Madushanka & Jathurika, 2018:157). Effective inventory management is crucial in any manufacturing environment, as inventory management directly impacts production costs and efficiencies (Adeyemi & Salami, 2010:140). Inefficient and poor inventory management lead to entities losing money, and not reaching their full potential.

Heizer et al. (2020:522) states that inventory is one of the most expensive current assets of many companies and can represent as much as 50% of current assets. The total cost in a manufacturing entity can be reduced by reducing inventory, but reduced inventory can also lead to 'out-of-stock' situations that will negatively affect profitability. A low-cost strategy can never be achieved without good inventory management (Heizer et al, 2020:522).

Effective inventory management is therefore critical to manufacturing entities, for there is said to be a strong relationship between inventory management and the total financial performance of entities. The aim of this study is to assess to what extent inventory management effects the profitability of manufacturing enterprises in South Africa.

1.2. PROBLEM STATEMENT

Inventory constitutes a major segment of total investment in manufacturing enterprises, which makes the management of inventory crucial (Anisere-Hameed & Bodunde, 2021:9). For many of these manufacturing companies, inefficiencies and inaccuracies with regard to inventory management lead to the company not reaching its full financial potential.

Inventory management practices are prevalent in inventory management and control in an organisation (Panigrahi *et al.*, 2021:160). Together with this, inventory is also, for many companies, the single largest current asset on their financial balance sheet (Chan, 2016).

Keeping inventory involves the need to incur costs such as warehousing, transport and handling costs, insurance, possible stock losses, and interest (Gołaś, 2020:234).

Some of the consequences of poor inventory management include, but are not limited to:

- Increased costs (in stock losses, or additional/unnecessary interest charges)
- Employee productivity is not optimal
- Delays in shipping and delivery
- Lost sales due to insufficient supply (and therefore a loss in revenue).

Therefor, poor or inadequate inventory management may therefore lead to a decreases in the profitability figures. This leads us to the following main research question: "To what extent does inventory management have an impact on the profitability of manufacturing enterprises?"

1.3. RESEARCH OBJECTIVES

1.3.1. Primary objective

The main or primary objective of this investigation was to assess the effect, if any, that inventory management has on the profitability of manufacturing enterprises in South Africa.

1.3.2. Secondary objectives

To achieve the primary objective, the following secondary objectives have been identified:

- To determine the key drivers of profitability in a manufacturing enterprise
- To determine how well inventory is managed in manufacturing enterprises
- To determine what can be done to improve inventory management
- To determine the link, if any, between inventory management and profitability.

1.4. SCOPE OF THE STUDY

1.4.1. Field of study

Although inventory management and its possible impact on profitability can be classified under either Operations Management or Financial Management, this study will focus on the factors, influences, fields and principles that is classified under Operations Management.

1.4.2. Industry

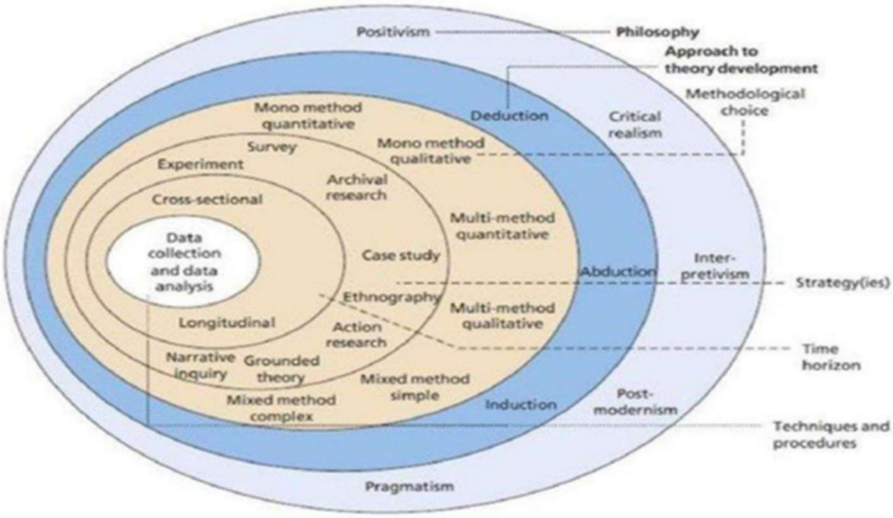
The entities that made up this study are all manufacturing companies and are all part of the wider agricultural sector. The employees of these entities were interviewed about their perception of the possible impact of inventory management on profitability.

1.5. RESEARCH METHODOLOGY

The study was conducted in two phases to achieve the mentioned research objectives. The first phase consists of a literature review on the possible effect that inventory management might have on profitability, and the second phase consists of empirical research.

The researcher was led by the research onion model (Saunders *et al.*, 2019:130), to decide on the appropriate research methodology.

Figure 1: The research onion



Source: (Saunders *et al.*, 2019:130)

1.5.1. Literature review

The cornerstone of all academic research activities is the construction of a research study based on existing literature (Snyder, 2019:333). Regardless of the chosen discipline, authors of academic research start the research by describing and referencing previous research on the topic. This process is called a literature review. The literature review guides the study of the researcher, assesses the research area, motivates the reason for the study, and justifies the research questions (Snyder, 2019:334).

The following sources were used to obtain knowledge on the research title:

- Academic textbooks
- Internet articles
- Publications
- Journals

1.5.2. Empirical study

The researcher followed a qualitative research approach to data collection, using a semi-structured interview guide as a tool. The interviews were conducted using the Microsoft Teams platform. More details on data collection and data analysis, will follow in Chapter 3.

1.6. LAYOUT OF THE STUDY

Chapter 1: Nature and scope

This chapter describes the nature and the scope of the study that was done and why this topic was chosen. Its aim is to give the reader a background of the theoretical foundation. A brief introduction was given and the problem statement was made. This was followed by the objectives of the study and a discussion of what the scope covers. The research methodology was then discussed in some detail.

Chapter 2: Literature review

Making use of current available literature on the research topic, this chapter aims to define the different concepts that form part of the research title, and then to investigate and assess whether profitability is impacted by inventory management.

Chapter 3: Data gathering and analysis

This chapter focuses on the gathering of all the data, using the interview questionnaires, and then the analysis of this data that was gathered.

Chapter 4: Empirical research

This chapter focuses on the results obtained by this study through the interviews conducted. These are analysed and interpreted in this chapter. In this chapter, the questionnaire questions are also discussed.

Chapter 5: Research findings and recommendations

This chapter focuses on the results of the analysis of the data, and these are discussed and deliberated on. Recommendations and conclusions are made regarding the effect of inventory management of profitability. Future research suggestions that can be done in this research field are also made.

1.7. CHAPTER SUMMARY

Inventory is needed for manufacturing to take place. The same inventory needed to manufacture can also affect profitability (negatively or positively). This study focuses on this possible effect and the factors that are driving this effect.

A literature review of the research topic at hand will provide more information as to what extent profitability of manufacturing enterprises is effected by the various aspects contained in the term inventory management.

CHAPTER 2 - LITERATURE REVIEW

2.1. INTRODUCTION

Chapter 1 (Nature and scope of the study) indicated the research question to be answered, as well as the primary and secondary objectives of this research. It also detailed the research methodology that was used, as well as the layout of this study.

Chapter 2 (Literature review) aim at proofing, from current literature, to what extent, if any, inventory management effects the profitability of manufacturing enterprises.

Inefficient and poor inventory management can lead to entities losing money and not reaching their full potential. Total cost in a manufacturing entity can be reduced by reducing inventory, but reduced inventory may also lead to 'out-of-stock' situations, which in turn will negatively affect sales and therefor profitability. A low-cost strategy can also never be achieved without good inventory management (Heizer *et al.*, 2020:522).

Inventory is, for many companies, their single largest current asset on their financial balance sheet. Everyone from shareholders to internal and external auditors, to banks and vendors emphasise the importance of a business's inventory (Chan, 2016). With the main purpose of a business being to generate maximum profit for its shareholders, high standards of inventory management are of utmost importance. According to Bose (2006:1), when a company needs money, it should look at its inventories first before looking at its bankers. Using capital efficiently in a business helps improve customer service and earn better profits in the process.

The objective of this literature review is to investigate current sources and literature on the title and to determine whether inventory management has an effect on profitability. The main object in the research title will also be defined to give the reader a background on this study conducted.

The impact of inventory management on profitability was investigated in various manufacturing industries. All of these entities are part of the broader agricultural sector.

2.2. DEFINING INVENTORY

Inventory is a central management function and serves as the cornerstone of supply chain management and logistics in a material management system (Munyaka & Yadavalli, 2022:1). Depending on the objectives of the organisation, inventories may be needed to meet or fulfil customer or humanitarian demands.

The International Financial Reporting Standards (IAS2 - Inventories) define inventory as:

- assets held for sale in the ordinary course of business (referred to as finished goods)
- assets in the production process for sale in the ordinary course of business (work in process), and
- materials and supplies consumed in production, in order to be held for sale (raw materials).

Heizer *et al.* (2020:522) specifies the following types of inventories that can be held by a company:

- raw material: for example, packaging in a poultry meat abattoir
- work-in-progress (WIP): product produced of manufactured but not ready to be sold yet
- maintenance, repair and other operating (MOR) supplies used to run the operation daily
- finished goods inventory, ready to be sold to customers.

Entities that made up this study conduct business in the following industries:

- Soybean mill (producing soya oil cake and soya oil from soya beans)
- Maize mill (producing maize meal and other by-products from predominantly white maize)
- Flour mill (producing flour and other by-products from wheat)
- Feed mill (producing animal feed from various grains and other ingredients)
- Poultry abattoir (producing fresh and frozen poultry meat products)

All four of these entities have all four categories of inventory. The challenges related to the inventory of each of these entities differ and are defined and discussed below:

- Soybean mill: A key step to utilising soybeans is to separate the soy oil from the protein and fibre (Gaonkar & Rosentrater, 2019:85). This complex process might cause under-use of the soybean, leading to a higher than anticipated inventory cost.
- Maize mill: Maize is the most important grain crop in South Africa, with about 60% of the total crop consisting white maize and the remaining 40% yellow maize (Abu & Kirsten, 2009:354). The availability of the right quality and right levels of raw material (white maize), at the right price, is a constant challenge for the maize mill industry. With maize being seasonal and also largely dependent on weather conditions, pricing and quality can be very volatile.
- Animal feed mill: Multiple high-value micro ingredients cause expensive stockholding, as well as losses in stock write-offs (discussions with management, QPro Feeds (Pty) Ltd).
- Poultry abattoir: The challenges in poultry abattoir inventory are multifaceted, with biological hazards (with emphasis in expiry dates) and food safety being some of the biggest challenges (discussions with management, Grain Field Chickens (Pty) Ltd).

2.3. DEFINING INVENTORY MANAGEMENT

For most businesses, inventory is a critical asset handled extensively on a regular basis (Zhenhua, 2017:375). Inventory management is a process or practice that most companies undertake (Krishnadevarajan *et al.*, 2016:85).

In recent years, many firms in the world have faced several challenges with regard to inventory management and control (Akinlabi, 2021:137). Inventory management is a technique that is widely misinterpreted and it is not receiving the attention it deserves (Shetty & Kamath, 2019:1). Inventory management in a manufacturing enterprise is critical to ensuring optimal resource use and overall efficiency (Akindipe, 2014:97). But what exactly does the term inventory management mean, and what effect does it have on profitability?

With inventory making up a significant part of the total funds employed (Prempeh, 2015:1), inventory must be managed in order to avail the inventories at the right time and in the right quantities. Better management of inventories would stimulate capital flow.

2.4. DEFINING PROFITABILITY

The goal of most organizations is to maximize profit, or maximize profitability (Niresh & Thirunavukkarasu, 2014:57). But what is profit and profitability, and how can it be defined?

Profit refers to money or financial gain that a firm can produce with the resources it has (Anisere-Hameed & Bodunde, 2021:10). Profitability indicates the ability of a firm to generate income or earnings from the use of its assets over a period of time (Margaretha & Supartika, 2016:132). Profitability can be expressed in either accounting profits or economic profits (Anene, 2014:1).

2.5. RELATIONSHIP BETWEEN INVENTORY MANAGEMENT AND PROFITABILITY

The importance of the efficient management of working capital (that includes inventory) is undisputable (Panigrahi, 2013:1). Literature indicates that inventory management has significant effect on profitability ratios like return on assets, return on investment and also a significant effect on net operating margins and net income of manufacturing firms (Anisere-Hameed & Bodunde, 2021:14).

Some of the consequences of bad or inadequate inventory management include a loss of sales because of stockouts (Karim *et al.*, 2018:1), a negatively impacted cashflow (Ali *et al.*, 2022:23) and either overstocking or understocking of inventory items.

From the review of literature in the above paragraphs, it is clear that sufficient inventory management has a positive effect on profitability, and vice versa.

2.6. CHAPTER SUMMARY

A literature review was done on the effect of inventory management on profitability. Definitions and terms were discussed to ensure understanding of the research title as a whole.

There is a definite link between inventory management and profitability, with efficient inventory management leading to higher levels of profitability.

CHAPTER 3 – RESEARCH METHODOLOGY

3.1. INTRODUCTION

In chapter 1 mention was made that the study is a qualitative study, since it explores perceptions on the effect of inventory management on the profitability of a company. Chapter two gave a brief overview of the literature on inventory management and profitability and the possible links between these two concepts. In this chapter, the methodology that was followed is explained in more detail.

3.2. RESEARCH PARADIGM

The research paradigm or philosophy is a belief about how data about a certain topic or phenomenon should be collected, analysed, and used. This forms the basis of any study conducted. The five major research philosophies (or research paradigms), according to Saunders *et al*. (2019:135), applicable to business and management research, are the following:

- Positivism
- Critical realism
- Interpretivism
- Postmodernism
- Pragmatism

The research paradigm that is typically related to a quantitative methodological choice is positivism. With this study following a qualitative methodological research choice, the research paradigm 'interpretivism' is applicable.

3.3. RESEARCH APPROACH

Two research approaches can be followed, namely a deductive approach and an inductive approach (Saunders *et al*., 2019:75).

A deductive approach is where the literature is used to help identify theories that will be tested using data. This study is mainly focused on qualitative data analysis, and therefore an inductive research approach was followed. An inductive approach is typically associated with explorative studies.

3.4. METHODOLOGICAL CHOICE

The three methodological choices available when doing research are quantitative, qualitative and mixed method (Saunders *et al*., 2019:92). Quantitative research focuses on collecting, quantifying and analysis of data and is typically associated with a deductive research approach and a positivist research philosophy. However, this study followed an inductive approach from a pragmatic philosophical basis and therefore used a qualitative method.

For this study, qualitative research methodology was used, operationalised by conducting interviews with knowledgeable people within the organisation to obtain a deeper insight into the issues being researched. The interviews were conducted in a group of manufacturing companies in the agricultural sector. Since the companies in the group are subsidiaries of the same holding company, the participating companies were selected to give the top managers of these companies a view of the impact of inventory management practices on the performance of the companies, so as to benchmark these subsidiaries against each other. What made the study easier is that these companies use a common ERP system, so there is coherent data available.
The information gathered through these interviews was used to help conclude the results of the secondary data.

3.5. RESEARCH STRATEGY

According to Saunders *et al*. (2019:130) the research strategies available to collect and analyse data are:

- Experiment
- Survey
- Archival research
- Case study
- Ethnography
- Action research
- Grounded theory
- Narrative enquiry

This study was essentially a case study, due to the relationship between the companies where the research was carried out. It is a cross-sectional study because the data that collected in a specific point in time and not over a long period.

3.6. STUDY POPULATION AND SAMPLING

A discussion was held with the group financial manager of the holding company, explaining to him what I plan to do, and what the objective of the planned research was. He granted access to the personnel and data that I needed for the research. Formal permission letters were done for each of the companies involved, and the letters were signed by a relevant director.

Although the holding company gave permission to use their name in the study, it was decided not to do so for competitive reasons. The companies that were selected included a poultry abattoir, an animal feed mill, a soya bean processor and a maize and wheat mill. Since the topic is very specific and requires specialist knowledge of the topic, the population was therefore limited to those people in these companies with intimate knowledge of inventory management and its effect on profitability.

Qualitative data was collected via interviews with relevant personnel from these entities through interviews with the financial managers and general managers of these entities. Therefore, the sampling was done using non-parametric non-probability sampling using convenience sampling techniques (Saunders *et al*, 2019:275):

3.7. COLLECTION OF DATA

Qualitative data was originally planned to be collected through in-person interviews with relevant personnel of these entities, held at the head office of the holding company. However, due to availability constraints of the participants, the interviews were eventually held using the Microsoft Teams functionality. Seven interviews were conducted. After five interviews, saturation was achieved, but another two interviews were conducted to ensure that data saturation was indeed achieved.
Appointments were made with the relevant personnel (during working hours, with consent), and an informed consent form was completed for each of them. The interview questions were circulated to those participants that were selected for the interviews so that they could be prepared for the interviews. Permission was obtained from all interviewees to record and transcribe the interviews. The use of MS Teams allowed the researcher, who conducted all the interviews, to use the recording function and the transcription functionality of MS Teams to assist with transcription of the interviews. The recordings were used to verify the transcriptions.

The interview questions were simple, to the point and direct: The following questions were asked:

- What is your experience in the (name the industry) and in (name the company)?
- What are the key drivers of profitability in (name the industry) and more specifically (name the company)?
- What can the (name the industry) industry and more specifically (name the company) do to increase profitability?
- Explain how inventory is currently managed in (your company). How do you measure the success of this?
- What do you think is the link between inventory and profitability?
- What could be done to manage and control inventory better in (your company) to improve profitability?

- Given your experience, do other similar businesses achieve better results? If so, what do they do differently?
- Is there anything else you would like to share with me that might be relevant regarding this topic?
- Is there someone else that you think might shed light on the effect of inventory management on profitability in (your company) and (your industry)?

The first question (What is your experience in the (name the industry) and in (name the company)?) collected any demographic information that the participants would feel necessary to justify their opinions. This question allowed participants to only share that information on themselves that they would be comfortable to share. The questions clearly focused on the two variables in the study: Inventory management and Profitability, and also on the possible link between these variables. The final question was included for the purpose of possible snowball sampling, should the original sample not reach saturation. The first and last questions were excluded from the final data analysis and were considered separately.

After data collection, the transcriptions were "cleaned" by comparing the transcription to the recording and by removing the actual names and questions that were generated by MS Teams from the transcriptions.

After the interviews, the researcher made notes of the themes that stood out from the interviews. After the analysis this list was compared to the themes that were identified during the qualitative analysis and was found to converge well.

3.8. DATA ANALYSIS

Data was analysed using Atlas.ti 23 qualitative research software. The interviews were loaded into Atlas.ti and preliminary coding was done manually. This was followed by the use of the Atlas.ti AI coding function and these codes were found to correspond well with the manually generated codes. As a result, the Atlas.ti AI coding codes were used for the rest of the analysis.

205 codes were originally generated. After duplicate and similar codes were merged, codes that had nothing to do with the research topic were deleted and the number of codes was reduced to 92 codes. These codes were grouped into code groups and then organised into themes.

Four themes were identified through thematic analysis. The first theme addresses the main objective of the study: the link between inventory management and profitability, whilst the other three shed more light on the underlying issues and ways to improve profitability through better inventory management. These themes as discussed in more detail in Chapter 4.

3.9. TRUSTWORTHINESS OF THE DATA

The trustworthiness of the data was established by only including those people from the financial and operations department with in-depth knowledge of the link between inventory management and profitability in the study. Comparing the empirical results with those from the literature study helped with establishing the generalisability of the results, although the fact that the data was collected in a companies in a single group of companies would imply that the results can not necessarily be transferable to other companies, other industries or other countries. A certain level of triangulation was reached, in that the results obtained from the literature review agreed to the results gained from the interviews. The results can therefore be regarded as trustworthy for this specific environment.

3.10. CHAPTER SUMMARY

This chapter gave a brief description of the method that was followed, as well as the reasons for choosing this method. It also accurately describes how the study was conducted in practice. Chapter four will highlight the findings of the study.

CHAPTER 4 – FINDINGS

4.1. INTRODUCTION

In the previous chapter, the methodology used in this research was described based on the research onion (Saunders). The actual execution of the empirical research was described in detail. In this chapter, the findings of the study are described in detail in some themes that were identified during the data collection and during the analysis of the data.

4.2. THEME ONE: INVENTORY MANAGEMENT DOES IMPACT PROFITABILITY

The first main theme that arose from the study addresses the main objective of this project: to identify and analyse the relationship between inventory management practices and profitability in the specific group of companies where the research was conducted. During all the interviews, the common theme that there is a direct linkage between inventory management and the profitability of the organisation showed clearly. The following quotations clearly show this link: "

"I can tell you a story every time when we write off stock, you can see it in the bottom line because you don't really budget for a big stock write-off. So if you can manage your stock then your profitability is very, very easy to manage. So if your stock adjustments and your stock controls run away, the profitability is the first thing that takes a dive. So that's the first casualty of your control that's not in place." Participant 3.

"So balance is necessary. The link I would say that as inventory increases, profit decreases so, the key is having the right level of inventory to still be able to fulfil orders timely and not be overstocked. In our situation we need to turn volumes to produce or to get profit, so we don't want our maze to be stuck in our silos because then we pay interest etcetera holding cost fumigation. So increased stockholding will lead to stock losses as well due to temperatures in Limpopo." Participant 6

"To increase profitability I think keeping the inventory levels as safely low as possible is one of them, and then the second thing is to constantly monitor our yield." Participant 7

The specifics of how this happens were also mentioned in different interviews, but the general view is that the impact of inventory on profitability is because raw material is the largest cost in any organisation. In the agricultural sector raw material costs are often linked to world prices. The one place where you a business can manage its cost of raw materials is by managing its inventory well to minimise stock losses as far as possible.

"That's definitely the first that that's 80/20 that you can look at because your raw material cost is the biggest part of your cost. If you can save on your raw materials then you will off way they to getting better margin and that will also in full suit to your bottom line increasing your profitability." Participant 3

Another inventory issue that affects the profitability of the organisation is carrying off excessive stock. Due to the seasonality of the industry, something which cannot easily be managed, the level of inventory of raw materials and final product is not always within the control of the organisation. However, excessive process material and maintenance material inventory to mitigate out-of-stock risk, seems to be a manageable way of controlling inventory cost.

"It takes up your cash so there is also something if you don't have the cash, you also need to manage your stock levels. So if that that's why your stock levels are also very important." Participant 3

From the Atlas.ti analysis, this link was also clearly visible. Figure XX clearly shows that effective inventory control would enhance efficiency, which in turn will improve efficiency in the workplace, which has a direct impact on profitability.

Quotations to substantiate the above relationships are given below.

"So you can't move products from year to year. Obviously, physically you can, but systematically, it's an electronic system so that makes everything a lot easier and much better to control. And then the traceability of everything is much better to look at when you need to do summaries or try to identify specific things or problems that may occur and the way that we measure the success of it is by doing we do a mass recon, but we do in conjunction with a yield and when we balance everything that was produced." Participant 1

"Obviously, if you lose it, you don't make money. There's nothing to sell. Those are the basic things. But, like I said at at the beginning, the inventory you need to make as much as you can obviously at the correct price, all your production lines need to be streamlined and that is and what I mean by that is, you need to do everything at a specific speed, less waste." Participant 1

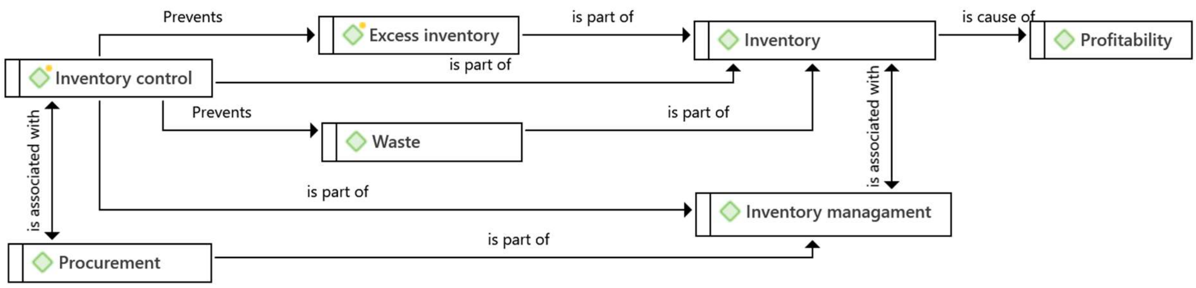
"So if we can take something that we do badly if we take that out of our equation, then also much better off on the bottom line. So if you have big stock write-offs and you can make that sure then your income statement looks much better." Participant 3

"So balance is necessary. The link I would say that as inventory increases, profit decreases so, the key is having the right level of inventory to still be able to fulfil orders timely and not be overstocked. In our situation we need to turn volumes to produce or to get profit, so we don't want our maize to be stuck in our silos because then we pay interest etcetera, holding cost, fumigation. So increased stockholding will lead to stock losses as well due to temperatures in Limpopo." Participant 6

4.3. THEME TWO: DILIGENT MANAGEMENT CAN OPTIMISE INVENTORY MANAGEMENT

The second theme that emerged from the interviews is that inventory management requires basic management principles to be practised: control of inventory, correct ordering of inventory, ensuring systems work well and ensuring that those responsible for inventory management have the required skills. The network diagram shown in figure 2 shows how good inventory management can optimise inventory and eventually lead to better profitability.

Figure 2: Effect of inventory management on profitability



Source: Created by the researcher in Atlas.ti

Across the board, all participants felt that effective management practices will optimize inventory management. These practices that were mentioned refer to better control over inventory, which includes both manual control and control by the electronic information system, as voiced in the following quotation:

" The inventory currently is managed by our old system, which is basically an electronic system where everything that you receive is scaled (weighed). Everything that is scaled is scanned with scanners into a warehouse and then all your documentation for loading in and out also runs with a physical scanner. So, it's an electronic scanning system." Participant 1

" The more you keep your hand on it, the better it is. So you need to get the responsible persons in their warehouse to take responsibility for the stock. So we employed loss controllers and I think our stock differences went from between 200,000 to 300,000 tons to 20,000 tons direct losses a month just due to the fact that somebody takes responsibility and focus what they're learning out." R2

"So, the controls behind that is also daily counts on the raw materials and also the finished products and also , so stock on our side is a very important thing as it is a big part of our balance sheet. So we have to, we can't let it." 3Participant 3l
"Well, I think on our side we have a drive at this point in time to check that we have the correct stock on the floor so that you don't have old stock that you need to write off or sell it at a reduced price. So that is definitely we leave money on the table. We need to have a look and then also wastage. So if you have a waste product that you sell, you also need to know where that comes from and you have to interrogate as to the reason why it is being produced or and then wrong in the production process." Participant 3

One area that was generally perceived as needing attention is the accuracy of forecasting in the organisation, based on the effect of good forecasting on inventory planning and control, as seen from the following quotations.

"I think better forecasting will help you determine, what your need is." Participant 7

"I think controls and procedures on inventory will also for me be a success and if we can know beforehand what is going to happen or where we will have lost. I think for that for me is if we don't have any surprises on the inventory that for me is a success because then we know more of what we are doing." Participant 4

Participants generally felt that this is currently receiving attention in the organisation, but that this effort should be maintained.

"Yes, at this at this point in time, I think we have a big drive in the company to have better controls over the stock, also stock levels." Participant 3.

4.4. THEME THREE: SEVERAL CHALLENGES HINDER EFECTIVE INVENTORY MANAGEMENT

Challenges that were mentioned included external forces, such as the fact that the organisation is dealing with agricultural commodities of which the market demand worldwide determines both the price and the availability of the product, which in turn severely affect costs and inventory management strategies.

" I think the whole poultry industry is, is almost like in the same boat. If there's this, if there's success in the industry, we all feel the success, but also the other way around. If there's this difficult times, you all feel the pain. I think if you want to make a success in in difficult times you need to be more proactive in decision making." Participant 7

"Well, I well, first of all the markets. The crash margin in the market but also the inventory, I think the risk in our industry on inventory is it's quite high because it bulk, so it's easy for them too. Well not we try to make it difficult, but when they it's high value value iInventory, so I think market related and then inventory is also a big player there." Participant 4

A second challenge that is related to the international market and economic situation, is the scale of the operations in the organisation. The organisation where the research was carried out is small in comparison to many of its competitors, which effectively reduces the positive effects that economies of scale can provide.

"I think we have similar challenges, but I think because we're a very small plant, we have additional challenges." Participant 4

"So I think that these are a few points to mention on the year. I think first of all is having a competitive margin, so that you at least make a contribution then also you need to have tonnes that you can reach the economy of scale to justify the plant." Participant 5

This also impacts the cash available to make systemic changes to optimise inventory.

"And then I think because we don't have unlimited capital, it is difficult sometimes to do the necessary changes that that we need to need to do." Participant 4

The feeling was generally that these challenges were outside the control of the organisation, but that their effects need to be managed.

In terms of internal challenges, these mainly boiled down to people issues, specifically generic (“soft”) skills of employees. The most important generic skill that was needed was the ability to communicate clearly. This is described in more detail under Theme four.

Other generic skills were negotiation skills, which has a direct impact on inventory management: “To negotiate with your suppliers to get just in time deliveries and negotiate the shorter lead times with your supplier, get more regular deliveries will help. Definitely with your inventory control and at the end of the day.” Participant 7

Another soft skill was the ability to adapt to changes in the organisation and in the environment: “Specific changes on lines and specific changes on personnel and stuff. Partcipant 1

The ability to make good decisions, specifically being proactive, was also mentioned. “?
" I think if you want to make a success in in difficult times you need to be more proactive in decision making." Participant 7

4.5. THEME FOUR: COMMUNICATION IS A MAJOR OBSTACLE TO EFFECTIVE INVENTORY MANAGEMENT

Almost all participants mentioned that ineffective communication is a problem in the organization, and poor communication leads to ineffective inventory management. The fact that poor communication between departments create a silo effect was also repeatedly mentioned.

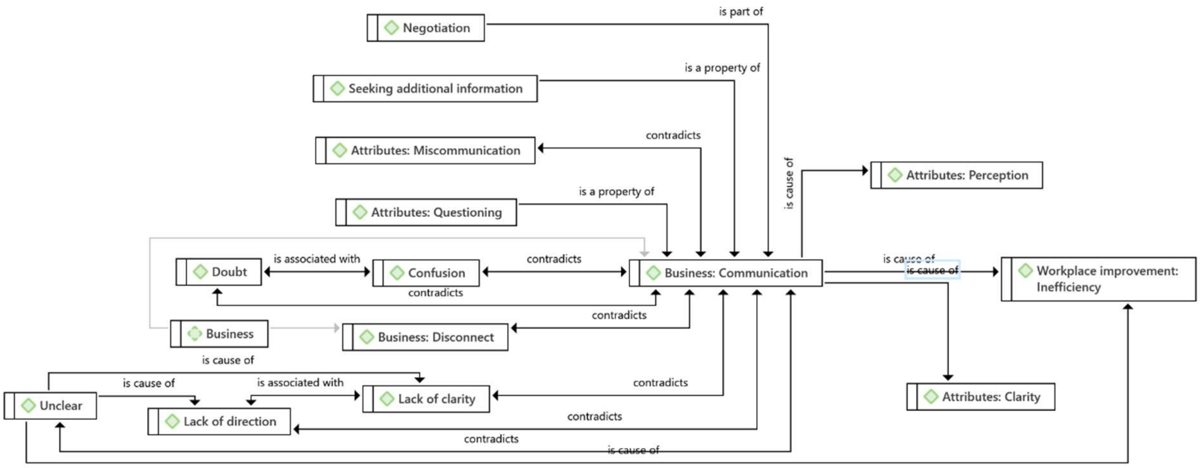
I think especially communication between Operations and Sales, that there isn't too much stock on the floor" Participant 2

The different communication issues that were mentioned are shown in Figure 3 where the impact of poor communication on inventory management is clearly elucidated.
"So communication between Sales and Production is not optimal. So what would happen is Production would pack certain sizes and that's not the sizes that Sales want to sell. And then Sales have to bring out the special to try to get out those sizes. And so basically the communication link." Participant 6

"Yeah, I'd, my experience, especially with similar businesses, I do not think that they do get better results. I think there's a broken link between the finance and operation side and then that's your key link for translating operational and production knowledge into financial knowledge so that you can convert that to" Participant 1

The effect of poor communication was also mentioned regularly: Misinformation, uncertainty, confusion, doubt and needing to ask for information.

Figure 3: Network diagram regarding communication



Source: Created by the researcher in Atlas.ti

"I think there's a broken link between the finance and operation side and then that's your key link for translating operational and production knowledge into financial knowledge so that you can convert that to.results" Participant 1

"I think especially communication between operation and sales, that there isn't too much stock on

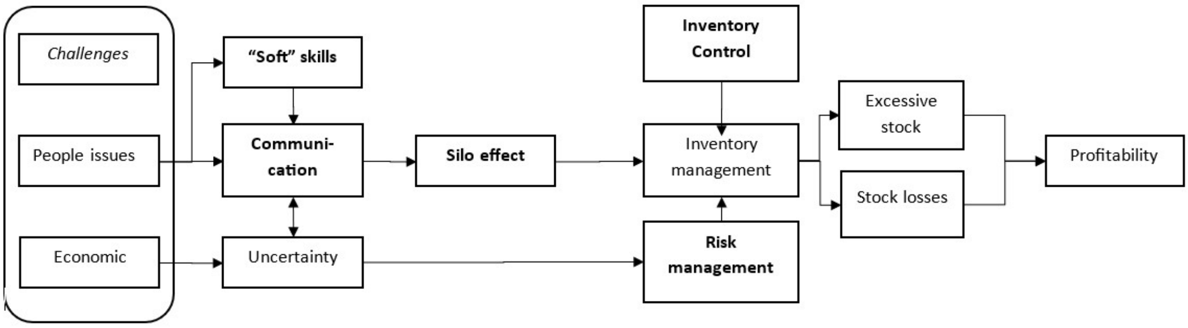
The terms “doubt”, “unclear”, “lack of direction”, “lack of clarity” or “disconnect” appeared in most of the interviews. More direct quotations included words such as “silo effect” or “miscommunication” as major obstacles to proper inventory management.

"How inventory is currently managed in Grainfield chickens (and with inventory we mean sales inventory like chicken as well as maybe for example space or packaging and then how we measure their success of this, is on packaging and engineering side, that's the procurement side we work closely together with the sales department to forecast our packaging needs and do not overstock on that." Participant 7

It must be noted that several participants also mention positive things that happen at the organization in terms of communication.

4.6. CHAPTER SUMMARY

Figure 4: Summary of findings



Source: Created on MS Powerpoint from data created by Atlas TI

This chapter basically described the four main themes that emerged from the empirical research. The link between these findings and the results of the literature study, show that these themes are also prevalent in the literature.

These findings can be summarised in Figure 4. In the diagram, it is clear that the organisation is facing severe challenges effecting profitability. These include economic and market forces, over which the organization has very little control. It also includes certain people issues, which is very much within the control of the organisation. The researcher found it interesting that not one of the participants have mentioned socio-political issues in the South African context as a challenge, but that communication, and an array of generic or "soft" skills were mentioned that are challenges to the organisation. It also shows that uncertainty, which stems from the economic and market circumstances, can be addressed by proper communication and that this uncertainty poses at risk to the organisation, which impacts inventory management. These risks must be addressed by implementing proper risk management measures. The silo effect, which is currently prevalent in the organisation, can be addressed by effective communication, and breaking down these barriers to communication will help to improve inventory management, which includes inventory control. Improved inventory management will reduce excessive stock and stock losses, which will lead to improved profitability.

Those issues that are within the control of the company, are printed in boldface. These will be addressed in the final chapter, when recommendations are made to the organisation.

In the next chapter conclusions will be highlighted, recommendations will be made for implementing these findings and the degree to which the objectives of this study have been met will be discussed.

CHAPTER 5 – RECOMMENDATIONS AND CONCLUSION

5.1. INTRODUCTION

The results and findings from the research done will be discussed in this culminating chapter. The problem statement and accompanying research objectives were evaluated and compared to the findings of the study. A conclusion will be drawn in order to establish to what degree the study reached its objectives and answered the problem statement.

5.2. RECOMMENDATIONS

Four prominent factors, pertaining to inventory management and effecting profitability, arose from the results on the empirical study:

- Inventory management does effect profitability
- Diligent management can optimise inventory management
- Challenges relating to inventory management, outside of control of management
- Communication is a major obstacle to effective inventory management.

Based on the research done, and the results that derived form it, the following recommendations will be relevant, and will make a difference towards better inventory management, which in turn means increased profitability:

5.2.1. Increase ‘soft skills’ with regard to inventory management

These skills will include things like analytical skills, sense of ownership, sound judgement and ability to prioritize. All these, when practised effectively and adequately, will contribute towards better inventory management.

5.2.2. Communication

For many problem areas experienced in business, better communication is often the answer. By thorough communication, those responsible for inventory are informed about all, or more, aspects pertaining to inventory management.

5.2.3. Silo effect

Departments working in silos are detrimental to various management factors, and especially also to inventory management. Departments need to work together, and with inventory, is it of utmost importance that the sales department and production department work together. By being informed, inventory at the right level and right cost, will be at the right location.

5.2.4. Risk management

Risk pertaining to inventory can be split into risk about fraud, and risk with regard to error and management mistake.

Fraud risk should be addressed though the correct procedures and processes in place, preventing possible fraud.

Possible risk pertaining to error and management can be addressed by working together, and not in silos. Through working together, possible error will be picked up timeously and prevented.

5.3. MEETING OF OBJECTIVES

The primary objective of this research, being to assess the effect, if any, that inventory management has on the profitability of manufacturing enterprises in South Africa, was met.

The primary objective was addressed by the information gathered from mainly question 5.

The secondary objectives was answered satisfactorily from data gathered through questions 2, 4, 5 and 6.

5.4. LIMITATIONS OF THE STUDY

Research was done on manufacturing enterprises in the Free State only. A wider selection of entities, with a national footprint, might result in a different result.

Having said that, I do believe that the results gained form this research, can be extrapolated through all manufacturing enterprises in South Africa, as the results obtained are generic and applicable to most manaufacturing enterprises.

5.5. CONCLUDING REMARKS

Insights gained from the literature review confirmed that there is a definite correlation between inventory management and profitability. The aspects effecting inventory management negatively included a lack of soft skills, a lack of systems in place to optimise inventory management, and a lack of communication.

This was also identified in the empirical research done, supporting the validity of the data and information gained form the research done through interviews.

From the data and findings gathered through both the literature review and empirical research, the researcher conclude that inventory management does have an effect on the profitability of manufacturing enterprises in South Africa.

REFERENCE LIST

Abu, O. & Kirsten, J.F. 2009. Profit efficiency of small- and medium-scale maize milling enterprises in South Africa. *Development Southern Africa*, 26:353 - 368.

Adeyemi, S.L. & Salami, A.O. 2010. Inventory Management: A Tool of Optimizing Resources in a Manufacturing Industry A Case Study of Coca-Cola Bottling Company, Ilorin Plant. *Journal of Social Sciences*, 23:135 - 142.

Akindipe, O.S. 2014. Inventory Management - A Tool for Optimal Use of Resources and Overall Efficiency in Manufacturing SMEs. *Journal of Entrepreneurship, Management and Innovation*, 10:93-113.

Akinlabi, B. 2021. Effect of inventory management practices on operational performance of flour milling companies in Nigeria. *International Academy Journal of Management, Marketing and Entrepreneurial Studies*, 8(2):137-174.

Ali, K., Showkat, N. & Chisti, K.A. 2022. Impact of Inventory Management on Operating Profits: Evidence from India. *Journal of Economics, Management and Trade*.

Anene, E. 2014. What difference does inventory control make in typical small-scale farms, profitability? *International Journal of Management Sciences and Business Research*, 3(10):1-4.

Anisere-Hameed, R.A. & Bodunde, T.D. 2021. The impact of inventory management on the profitability of manufacturing companies in Nigeria. *International Journal of Innovative Research and Advanced Studies (IJIRAS)*, 8(1):9-15.

Bose, D.C. 2006. *Inventory management*. PHI Learning Pvt. Ltd.

Chan, M. 2016. *How stock management directly impacts on business performance and profitability*. https://www.unleashedsoftware.com/blog/stock-management-directly-impacts-business-performance-profitability Date of access: 5 April 2022.

Gaonkar, V. & Rosentrater, K.A. 2019. Soybean. In. *Integrated processing technologies for food and agricultural by-products*: Elsevier. pp. 73-104.

Gołaś, Z. 2020. The effect of inventory management on profitability: Evidence from the Polish food industry: Case study. *Agricultural Economics*, 66(5):234-242.

Heizer, J., Render, B. & Munson, C. 2020. *Operations Management: Sustainability and Supply Chain Management*. 13th Edition. Pearson Education Limited.

Karim, N.A., Nawawi, A. & Salin, A.S.A.P. 2018. Inventory management effectiveness of a manufacturing company – Malaysian evidence. *International Journal of Law and Management*.

Krishnadevarajan, P.K., Balasubramanian, S., Nadu-India, T. & Kannan, N. 2016. A MULTI-CRITERIA DECISION FRAMEWORK FOR INVENTORY MANAGEMENT. In. pp. 85-93.

Madushanka, K.H.I. & Jathurika, M. 2018. The Impact of Liquidity Ratios on Profitability (With special reference to Listed Manufacturing Companies in Sri Lanka). In. pp. 157-161.

Margaretha, F. & Supartika, N. 2016. Factors affecting profitability of small medium enterprises (SMEs) firm listed in Indonesia Stock Exchange. *Journal of Economics, Business and Management*, 4(2):132-137.

Munyaka, J.-C.B. & Yadavalli, S. 2022. INVENTORY MANAGEMENT CONCEPTS AND IMPLEMENTATIONS: A SYSTEMATIC REVIEW. *South African Journal of Industrial Engineering*.

Niresh, A. & Thirunavukkarasu, V. 2014. Firm size and profitability: A study of listed manufacturing firms in Sri Lanka. *International journal of business and management*, 9(4).

Panigrahi, C. 2013. Relationship between inventory management and profitability: An empirical analysis of Indian cement companies. *Asia Pacific Journal of Marketing & Management Review*, 2(7).

Panigrahi, R.R., Jena, D., Tandon, D., Meher, J.R., Mishra, P.C. & Sahoo, A. 2021. Inventory management and performance of manufacturing firms. *International Journal of Value Chain Management*, 12(2):149-170.

Prempeh, K.B. 2015. The impact of efficient inventory management on profitability: evidence from selected manufacturing firms in Ghana. In.

Saunders, M., Lewis, P. & Thornhill, A. 2019. Research methods for business students eight edition. *QualitativeMarket Research: An International Journal*.

Shetty, P.K. & Kamath, R.C. 2019. A study of inventory management at manufacturing Industries in rural India. In.

Snyder, H. 2019. Literature review as a research methodology: An overview and guidelines. *Journal of business research*, 104:333-339.

Zhenhua, L. 2017. Design and application of inventory management system for manufacturing enterprises. In. pp. 375-384.

APPENDICES

APPENDIX A: SEMI-STRUCTURED INTERVIEW PROTOCOL

Assessing the effect of inventory management on the profitability of manufacturing enterprises in South Africa.

The questions asked focused on two variables in the study: Inventory Management and Profitability, and on the possible link between these two variables. Questions were simple, to the point and direct.

Question 1
What is your experience in the (name the industry) and in (name the company)?

Question 2
What are the key drivers of profitability in (name the industry) and more specifically (name the company)?

Question 3
What can the (name the industry) industry and more specifically (name the company) do to increase profitability?

Question 4
Explain how inventory is currently managed in (your company). How do you measure the success of this?

Question 5
What do you think is the link between inventory and profitability?

Question 6
What could be done to manage and control inventory better in (your company) to improve profitability?

Question 7

Given your experience, do other similar businesses achieve better results? If so, what do they do differently?

Question 8

Is there anything else you would like to share with me that might be relevant regarding this topic?

Question 9

Is there someone else that you think might shed light on the effect of inventory management on profitability in (your company) and (your industry)?

APPENDIX B: COMPANY PERMISSION LETTER

FREE STATE OIL (PTY) LTD
1 Arbeids Road/Arbeidsweg, VILLIERS, 9840
PO Box/Posbus 5, VILLIERS, 9840
Tel: +27 (0)87 358 8800
vkb@vkb.co.za
www.vkb.co.za

FSoil

28 February 2023

To whom it may concern

Re: Company Consent to research

I, Philip Labuschagne, as Executive Director of Free State Oil (Pty) Ltd, which is part of the VKB Group, herewith give my full consent to CJ Vermaak, MBA II student of the North-West University, to compile a study in and on the activities of inventory management and inventory control and any other field that might be applicable in that regard – included but not limited to all financial reports of Free State Oil (Pty) Ltd.

The main source of data and information will be through interviews with relevant personnel at Free State Oil, and these interviews will be with the consent of the employees, and at a time convenient to them and to Free State Oil.

Upon completion of the study conducted, a copy will be made available to Free State Oil.

Kind Regards

Philip Labuschagne
Executive Director: Free State Oil

Registration Number/Registrasienommer: 2009/010822/07
VAT/BTW: 4860257882

lid van die vkb member of the

GRAIN FIELD CHICKENS (PTY) LTD
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glc@vkb.co.za
www.grainfieldchickens.co.za

GRAIN FIELD
CHICKENS

28 February 2023

To whom it may concern

Re: Company Consent to research

I, Theo van Strijp, as Executive Director of Grain Field Chickens (Pty) Ltd, which is part of the VKB Group, herewith give my full consent to CJ Vermaak, MBA II student of the North-West University, to compile a study in and on the activities of inventory management and inventory control and any other field that might be applicable in that regard – included but not limited to all financial reports of Grain Field Chickens (Pty) Ltd.

The main source of data and information will be through interviews with relevant personnel at Grain Field Chickens, and these interviews will be with the consent of the employees, and at a time convenient to them and to Grain Field Chickens.

Upon completion of the study conducted, a copy will be made available to Grain Field Chickens.

Kind Regards

Theo van Strijp
Executive Director: Grain Field Chickens

Registration Number/Registrasienommer: 2009/019339/07
VAT/BTW: 4160256501

Lid van die vkb member of the

QPRO FEEDS (PTY) LTD
Smithfield Building/Gebou, Joubert Street/Straat, BETHLEHEM, 9700
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28 February 2023

To whom it may concern

Re: Company Consent to research

I, Theo van Strijp, as Executive Director of QPro Feeds (Pty) Ltd, which is part of the VKB Group, herewith give my full consent to CJ Vermaak, MBA II student of the North-West University, to compile a study in and on the activities of inventory management and inventory control and any other field that might be applicable in that regard – included but not limited to all financial reports of QPro Feeds (Pty) Ltd.

The main source of data and information will be through interviews with relevant personnel at QPro Feeds, and these interviews will be with the consent of the employees, and at a time convenient to them and to QPro Feeds.

Upon completion of the study conducted, a copy will be made available to QPro Feeds.

Kind Regards

Theo van Strijp
Executive Director: QPro Feeds

Registration Number/Registrasienommer: 2008/010829/07
VAT/BTW: 4230247324

lid van die vkb member of the

VKB MILLING (PTY) LTD
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vkb MILLING

28 February 2023

To whom it may concern

Re: Company Consent to research

I, Philip Labuschagne, as Executive Director of VKB Milling (Pty) Ltd, which is part of the VKB Group, herewith give my full consent to CJ Vermaak, MBA II student of the North-West University, to compile a study in and on the activities of inventory management and inventory control and any other field that might be applicable in that regard – included but not limited to all financial reports of VKB Milling (Pty) Ltd.

The main source of data and information will be through interviews with relevant personnel at VKB Milling, and these interviews will be with the consent of the employees, and at a time convenient to them and to VKB Milling.

Upon completion of the study conducted, a copy will be made available to VKB Milling.

Kind Regards

Philip Labuschagne
Executive Director: VKB Milling

Registration Number/Registrasienommer: 2012/219905/07
VAT/BTW: 4570109365

lid van die vkb member of the

APPENDIX C: NWU CONSENT FORM

NWU | BUSINESS SCHOOL BESIGHEIDSKOOL SEKOLO SA KGWEBO   AMBA ACCREDITED

INFORMED CONSENT FORM

NORTH-WEST UNIVERSITY: MBA RESEARCH STUDY
RESEARCHER: CORNé VERMAAK
CELLPHONE NUMBER: 084 581 2137
E-MAIL: cornevermaak06@gmail.com

DEAR PARTICIPANT,

This Informed Consent Statement serves to confirm the following information as it relates to the academic business science MBA Research Module and subsequent research on the impact that inventory management can have on the profitability of manufacturing entities in South Africa:

1. This study aims to obtain information from relevant employees in manufacturing entities about the impact of inventory management on the entities that they work for.
2. The procedure to be followed is a qualitative research design, using a semi-structured interview guide that will utilise pre-determined, open-ended questions whereby participants are allowed to communicate their views on the noted topic. In addition, essential background information such as age, gender and management level will be asked as part of the questionnaire.
3. The estimated completion time for the interview is 30 minutes.
4. If, at any point during the interview, the participant should feel uncomfortable, the participant will have the opportunity to make their discomfort known and immediately end his/her participation.
5. It should also be emphasized that participation in this study is voluntary and with the participant's consent without any form of coercion.
6. The confidentiality, anonymity, and privacy of participants are guaranteed.
7. A summarised copy of the final report will be made available to the participants on request.

I, therefore, confirm that I have read and comprehended the Informed Consent Form and give my unqualified consent to Corné Vermaak to utilize the information from the questionnaire in his MBA project and future research.

As a result of this, I grant consent to the processing of certain personal information in terms of section 18 of the POPI Act.

Name and designation	Signature	Date
Researcher:		23/10/2023
Participant:		23/10/2023

APPENDIX D: ETHICAL CLEARANCE

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

Private Bag X1290, Potchefstroom
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Tel: 018 299-1111/2222
Fax: 018 299-4910
Web: http://www.nwu.ac.za

Senate Committee for Research Ethics
Tel: 018 299-484
Feziwe.Mseleni@nwu.ac.za

31 May 2023

ETHICS APPROVAL LETTER OF STUDY

Based on approval by the **Economic and Management Sciences Research Ethics Committee (EMS-REC)** on, 23/05/2023 the Economic and Management Sciences Research Ethics Committee hereby **approves** your study as indicated below. This implies that the North-West University Senate Committee for Research Ethics (NWU-REC) grants its permission that, provided the special conditions specified below are met and pending any other authorisation that may be necessary, the study may be initiated, using the ethics number below.

Study title: Assessing the effect of inventory management on the profitability of manufacturing enterprises in South Africa

Study Leader/Supervisor (Principal Investigator)/Researcher): Dr J Jordaan

Student: C Vermaak (44566522)

N	W	U	-	0	0	5	9	4	-	2	3	-	A	4

Institution Study Number Year Status

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Application Type:
Commencement date: 31/05/2023 **Risk:** Minimal
Expiry date: 31/05/2024

Approval of the study is initially provided for a year, after which continuation of the study is dependent on receipt and review of the annual (or as otherwise stipulated) monitoring report and the concomitant issuing of a letter of continuation.

Special in process conditions of the research for approval (if applicable):

-

General conditions:

While this ethics approval is subject to all declarations, undertakings and agreements incorporated and signed in the application form, the following general terms and conditions will apply:

- *The study leader/supervisor (principle investigator)/researcher must report in the prescribed format to the EMS-REC:*
  - *annually (or as otherwise requested) on the monitoring of the study, whereby a letter of continuation will be provided, and upon completion of the study; and*
  - *without any delay in case of any adverse event or incident (or any matter that interrupts sound ethical principles) during the course of the study.*
- *The approval applies strictly to the proposal as stipulated in the application form. Should any amendments to the proposal be deemed necessary during the course of the study, the study leader/researcher must apply for approval of these amendments at the EMS-REC, prior to implementation. Should there be any deviations from the study proposal without the necessary approval of such amendments, the ethics approval is immediately and automatically forfeited.*

1

- *Annually a number of studies may be randomly selected for an external audit.*
- *The date of approval indicates the first date that the study may be started.*

n the interest of ethical responsibility, the NWU-SCRE and EMS-REC reserves the right to:

- *request access to any information or data at any time during the course or after completion of the study;*
- *to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process;*
- *withdraw or postpone approval if:*
  - *any unethical principles or practices of the study are revealed or suspected;*
  - *it becomes apparent that any relevant information was withheld from the EMS-REC or that information has been false or misrepresented;*
  - *submission of the annual (or otherwise stipulated) monitoring report, the required amendments, or reporting of adverse events or incidents was not done in a timely manner and accurately; and / or*
  - *new institutional rules, national legislation or international conventions deem it necessary.*

The EMS-REC would like to remain at your service as scientist and researcher, and wishes you well with your study. Please do not hesitate to contact the EMS-REC or the NWU-SCRE for any further enquiries or requests for assistance.

Yours sincerely,

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: 2023.06.01 06:36:09 +02'00'

Prof Mark Rathbone
Chairperson: NWU Economic and Management Sciences Research Ethics Committee