# The Role of Entrepreneurial Orientation in the South African Food Manufacturing Sector

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# ABSTRACT

This study set out to evaluate and assess the relationship between Entrepreneurial Orientation (EO), manufacturing capabilities and organizational performance in the South African Food Manufacturing industry (SAFM). The SAFM industry is a highly concentrated sector that is key to the growth of the South African economy. This study suggests that EO is the mechanism through which manufacturing capabilities are linked to market needs. Entrepreneurial Orientation (EO) represents the processes and practices that provide a basis for entrepreneurial decisions and actions in an organisation. The related dimensions of EO are: innovativeness, risk taking, proactivity, competitive aggressiveness, and autonomy. Manufacturing capabilities are measured with reference to the cost, flexibility, quality, and delivery of production goals, while organisational performance is measured in reference to market and financial goals.

EO and manufacturing capabilities are well established concepts in entrepreneurship and operations management literature. Both constructs along with their impacts on organizational performance, have historically been studied independently, and little research has been performed to bridge the knowledge gap between operations management and entrepreneurship research. Further knowledge gaps exist around understanding how EO is manifested in concentrated markets as well as, insights on research techniques for highly concentrated industries. The majority of current studies that focus on the South African food manufacturing sector are either technical government strategy reports, or reports that focus on food as a commodity and not on the manufacturing of food. Limited empirical research is characteristic of highly concentrated environments as they are usually closed and secretive environments. Furthermore, there are limited empirical studies that focus on the manufacturing in South Africa let alone the African continent. This study has contributed in addressing these gaps.

The conceptual framework in this study has been tested using quantitative research methods (survey) based on a positivist approach. 75 senior, middle and executive managers from the top ten revenue generating companies in the SAFM

industry were surveyed. Secondary data on industry performance collected from Statistic South Africa online repository. The hypotheses were tested by performing Exploratory Factor Analysis (EFA).The reliability and validity of the survey results assessed using Cronbach's alpha coefficient. Multiple regression analysis - ordinary least square (OLS) and correlation analysis were used to test the hypothesized relationships. This study has three key findings.

Firstly, this study found that the manufacturing capabilities of quality and cost are entry conditions for market participation in the South African food manufacturing industry, and that the capabilities of delivery and flexibility have a negative correlation on financial performance. Secondly, the study found that entrepreneurial orientation as a multidimensional construct had a moderate positive relationship with financial performance in the South African food manufacturing industry. Thirdly, it found that a negative co-relationship correlation exists between manufacturing capabilities and the dimensions of entrepreneurial orientation.

The findings of this study, suggest that the food manufacturing industry in South Africa lacks competitiveness and that the drivers of performance in the entire industry are subsector specific. When investigating the specific subdivisions of the food manufacturing industry, descriptive analysis offered different insights i.e. firms that perform well in quality and delivery, perform poorly in flexibility and cost. Due to limited data, these relationships were not analysed further.

Research on entrepreneurial orientation and manufacturing capabilities in the SAFM, could be improved through studies focusing on particular subdivisions e.g. milk, grain etc., using non-linear regression techniques.

**Keywords:** Entrepreneurial orientation, manufacturing capability, South African food manufacturing industry, organizational performance, concentrated markets and industries.

# DECLARATION

I, Mosiuoa Sole, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in Entrepreneurship and New Venture Creation in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Mosiuoa Michael Sole

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Signed at Johannesburg

On the **3rd** day of **May 2018**

# DEDICATION

I would like to thank God, for providing me with the strength and wisdom to complete my studies.

# ACKNOWLEDGEMENTS

I would like to thank Nampak Products (LTD), for sponsoring my studies and allowing me to take time off work to complete my studies. I would like to thank my supervisor who provided me with guidance throughout this research and encouraged me to continue when I was having data collection challenges. I would like to thank the champions that assisted with survey circulations through the ten respective companies. I would like to thank all the participants that responded in this research, as without their responses it would not have been possible to have any form of empirical analysis.

I would like to thank Agbiz SA and the Manufacturing Circle for assisting with the collection of data from their respective members.

Most importantly I would like to thank my family and friends who supported and encouraged me through this journey.

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# CHAPTER 1. INTRODUCTION

This section provides the background to the study. It begins by explaining the purpose of the study. This is followed by the context in which the study takes place, the problem statement, objectives and, sub problems the study will address. The chapter ends off by describing the significance of the study, the delimitations of the study, assumptions made in the study and key definitions.

## 1.1 Purpose of the study

The purpose of this research is to assess and evaluate the relationship between entrepreneurial orientation, manufacturing capability and organisational performance in the South African food manufacturing sector. The study will focus on a subsection of the food and beverages subdivision as per the Standard Industrial Classification of Activities (SIC), Fifth edition, and report No. 009/90/02 created in 1993 by Statistics South Africa. The SIC is based on the 1990 International Standard Industrial Classification of all Economic Activities (ISIC) with suitable adaptations for local conditions. The study will focus on the set of companies in the food and beverage subdivision that contribute to more than 80% of the employment and revenue in the sector.

## 1.2 Context of the study

### 1.2.1 *The South African food manufacturing sector performance*

A key sector in the South African economy, the food manufacturing subdivision contributes over R49 billion in GDP (3.1%), and 30% of the manufacturing income whilst employing 183 502 employees (http://www.thedti.gov.za /industrial development /agroprocessing.jsp). Food production is an important sector in any economy as food sustainability is key to economic performance.

### 1.2.2 *Sector concentration*

The South African food manufacturing industry is highly concentrated, with the top 20 companies in the sector contributing over 80% of the total income (Stats SA, 2016). It is suggested by Mather (2005) that this concentration can be attributed to the pre-apartheid era when companies in this sector enjoyed protectionism. Waste and inefficiency were concealed by the absence of competition. Following the dawn of democracy, trade liberalization and rising operating costs due to labor laws, exposed inefficiencies related to complexity and waste.

### 1.2.3 *Consumer demographics and trends*

Diverse global consumer demographics (young population that drives consumption), urbanization, a growing middle class, changes in consumer tastes, growing health awareness, and customer demand for convenience products have spurred an explosion of new products, brand extensions, and packaging variations, which are consistently putting pressure on the supply chain (https://www.pwc.co.za/en/assets/pdf/retail-in-africa.pdf, 29 June 2017)

Grocery retailers have raised service level requirements, resulting in lower stock holding, shorter delivery lead times, and private grades and standards on produce (Department of Agriculture, Forestry and Fisheries – Agro-processing strategy, 2012). Retail channels such as club stores, discounters and online merchants have different requirements that increase service costs. Manufacturing companies that serve all channels gain higher market share, however in providing a level of service this complex their costs increase, unless new capabilities are built (https://www.strategyand.pwc.com/media/file/Strategyand_Winning-with-complexity.pdf, 06 June 2017).

### 1.2.4 *Manufacturing capabilities*

'Manufacturing capabilities' refers to a firm's proficiency in quality delivery flexibility and cost, to achieve production related goals (Terjesen, Patel and Covin, 2011). It has been argued and proven by various scholars (Peng,

Schroeder and Shah, 2008; Terjesen et al., 2011) that consistent product quality that conforms to specifications, that is produced at low cost with high throughput, combined with the ability to deliver products in a dependable manner is a source of competitive advantage. This leads to high business performance (Terjesen et al., 2011). A core function of the sector under investigation is the ability to manufacture, hence it becomes important to understand the determinants of manufacturing performance.

### 1.2.5 *Entrepreneurial Orientation (EO)*

'Entrepreneurial orientation' represents the processes and practices that provide a basis for entrepreneurial decisions and actions in an organization. It is described as a vital component to organizational success and business performance (Venter, Urban, Beder, Oosthuizen, Reddy, 2015).

Entrepreneurial Orientation (EO) can be described by the dimensions of innovativeness, risk-taking and proactiveness. Lumpkin and Dess, (1996) have argued that competitive aggressiveness and autonomy form additional dimensions. EO can be assessed as a unidimensional construct, the existence of which is premised on all its dimensions being present. Alternatively, EO can be viewed as a multidimensional construct where not all dimensions are required for its existence to be proven. The multidimensional approach to EO, allows one to look for EO through the actions of manufacturing capability.

### 1.2.6 *Organizational performance*

'Organisational performance' refers to a company's ability to attain its market and financial goals. For this study, financial performance will have the dimensions of growth in sales, return on sales, and profit based on indicators developed by Flynn, Huo and Zhao (2010). Market-based performance will be referred to as growth in market share (Swink, Narasimhan & Wang, 2007). Performance and organisational performance will be used interchangeably.

### 1.2.7 *Business problem*

In an ever-changing environment, firms that innovate frequently, anticipate demand, and position new products or service offerings aggressively often achieve stronger performance results (Rauch, Wiklund, Lumpkin and Frese, 2009). Inferences from the statement above may suggest that EO leads to higher performance.

In a manufacturing context, the EO performance relationship cannot be measured without considering the manufacturing capability of the firms in the sector. Chavez, Yu, Jacobs and Feng (2017) have suggested that EO is the mechanism through which manufacturing capabilities are linked to market needs. Consequently, without sufficient levels of EO there are no performance benefits to having strong manufacturing capabilities.

This research paper examines the relationship between EO in a specific industry, and business performance as suggested by Rauch et al. (2009). It investigates the impact of EO on performance in a highly concentrated environment, and the co-relationship between EO and manufacturing capability.

The study seeks to understand assertions by scholars such as Kreiser and Davis (2010), Gupta and Gupta (2015), and Chavez et al. (2017) who suggest that the external environment, industry structure, and networks moderate the relationships between EO, manufacturing capability, and performance.

Further to this, it examines the effects of EO on the sector. The South African food industry has an interwoven value chain where major companies have integrated both vertically and horizontally and hence presents a landscape that is ripe for entrepreneurship.

## 1.3 Problem statement

For firms in the 21st century, low-cost production, consistent quality, production flexibility, and the reliable delivery of goods and services are required factors for market entry, and are no longer regarded as competitive strengths. Entrepreneurial orientation is an important strategic attribute that can be linked to

the financial success of an organisation. Firms that can exploit changing consumer preferences are more sustainable and are able to generate higher profits. The South African food manufacturing sector is a stable and munificent environment, which is abundant with opportunities that require firms to respond in order to generate higher profits.

### 1.3.1 *Main objectives*

The main objective of this research is to evaluate and assess the relationship between EO and performance (financial and market) in the South African food manufacturing sector. Furthermore, the study aims to evaluate and asses the relationship between manufacturing capability and entrepreneurial orientation. As suggested by Chavez et al. (2017), EO is the mechanism through which manufacturing capabilities (MC) are linked to market needs. Ultimately, the paper aims to understand the relationship between manufacturing capability and entrepreneurial orientation. Understanding the drivers of financial performance in the South African food sector can be important in unlocking business performance and growth in the South African economy.

### 1.3.2 *Sub-problems*

**Sub-problem 1**

Identify the dimensions of EO that have influence on a firm's performance in the South African Food Manufacturing Sector (SAFMS).

**Sub-problem 2**

Identify the dimensions of manufacturing capability that influence a firm's performance in the SAFMS.

**Sub-problem 3**

Determine the strength of the correlation (the co-relationship) between the dimensions of manufacturing capability, and the dimensions of EO in the SAFMS.

## 1.4 Significance of the study

This study will provide insights into how EO may complement manufacturing capabilities in order to improve organizational performance in the South African food manufacturing sector. Although EO and manufacturing capabilities have been studied independently, little has been done to bridge the knowledge gap between operations management and entrepreneurship research (Chavez, Yu, Jacobs and Feng, 2017). Furthermore, most studies were found to focus on manufacturing in general, in specific countries or on the African continent. The study will provide further knowledge on the SAFM sector, both from a performance and a strategic view point.

Due to the closed nature of the SAFMS there exists very few empirical studies of performance in the sector, but rather technical reports created or funded by government for the purposes of policy creation. Few companies are open to participation in academic surveys and mostly participate in financial surveys for purposes of creating forecasts, economic indicators, commodity price trading, and raw input availability. There is very little information that focuses on manufacturing competence or entrepreneurship, in the SAFMS, or generally on South African corporates.

Other knowledge gaps that were found to exist were those of how entrepreneurial orientation is manifested in concentrated markets and insights on research techniques for highly concentrated sectors. The study contributed to addressing these gaps. The study may provide an explanation into why manufacturing capability alone cannot explain organizational performance (Chavez et al., 2017).

## 1.5 Delimitations of the study

According to the United Nations' International Standard Industrial Classification (ISIC) the standard classification of agro-industry consists of: i. Food and beverages; ii. Tobacco products; iii. Paper and wood products; iv. Textiles, footwear and apparel; v. Leather products; and vi. Rubber products. For the purposes of this study Agro processing will be limited to food and beverage

manufacturing as per Stats SA, SIC classification (division 30), which excludes alcoholic beverages, furniture, wood, rubber, and paper.

The study will focus on EO and MC and their relation to financial and market performance. It will not consider non-financial indicators such as employee satisfaction. The study will focus on the top 10 (by revenue) listed food manufacturing companies in South Africa as they account for 80% of the revenue generated in the sector, and hence provide a good sector overview (Mather, 2005).

## 1.6 Assumptions

For this study, it will be assumed that all respondents in the questionnaire are honest and truthful. The covering letter insists that respondents participate truthfully at their own prerogative, without fear of bias. It will also be assumed that all data collected from Stats SA on sector performance is accurate and correct. It is further assumed that respondents will have a similar understanding to the survey, hence the selected population sample of executive-, senior-, and middle management. It is assumed that all these managers understand both the survey questions and the performance indicators in the survey in relation to their respective businesses.

## 1.7 Definitions:

**Industry**

An industry consists of a group of enterprises engaged in the same or similar kinds of economic activity and is classified according to Statistics South Africa's *Standard Industrial Classification of all Economic Activities,* (Fifth edition, January 1993).

**Agro-processing**

"Postharvest activities, comprising artisanal, minimally processed and packaged agricultural raw materials, the industrial and technology-intensive processing of

intermediate goods and the fabrication of final products derived from agriculture" (Wilkinson & Rocha, 2009, p.3.)

**Sector concentration**

Industry/market concentration refers to *the extent to which a small number of firms or enterprises account for a large proportion of economic activity such as total sales, assets or employment*" (Organisation for Economic Co-operation and Development, 1993).

**Firm competitiveness**

Firm competitiveness is the capability of a firm to sustainably meet customer requirements at a profit. This capability is realized through offering goods and services at market, which customers value higher than those offered by competitors. Achieving competitiveness requires the firm's continuing adaptation to changing social and economic norms and conditions (Chikan, 2008).

**Munificent environment**

Environmental munificence "*describes the favourability of the firm's task environment in terms of the existence of opportunities and the availability of resources*" (Rosenbusch, Rauch & Bausch, 2013, p.4).

**Hostile environment**

Hostility is "*an unfavourable environmental condition that implies competition for scarce resources and opportunities*" (Rosenbusch et al., 2013, p.4).

**Dynamic environment**

Environmental dynamism refers to "*both the uncertainty and the unpredictability of future market changes and developments*" (Rosenbusch et al., 2013, p.4).

**Complex environment**

Complexity refers to "*the amount and diversity of information, knowledge, resources, and capabilities needed to successfully operate in an environment Complexity can result from environmental heterogeneity or the production and*

*commercialization of complex customized products*" (Rosenbusch et al., 2011, p.5).

**Organic structure**

Organic structures are typified by open channels of communication, decentralized decision-making, a lack of formal planning constraints, loose systems of control, and a high level of organizational flexibility (Kreiser & Davids, 2010).

**Mechanistic structure**

Mechanistic structures are often conceptualized as possessing high levels of bureaucracy, restricted channels of communication, centralized decision-making, a formalized planning system, tight systems of control, and a constrained level of flexibility (Kreiser & Davids, 2010).

# CHAPTER 2. LITERATURE REVIEW

This section examines previous knowledge on the topics of agro-processing, opportunity recognition, entrepreneurial orientation, and organizational performance from previous research work. The literature review will begin by describing the research context. It will then provide a critical review of important theories, concepts, conceptual frameworks, significant findings and major empirical evidence explaining relationships. The hypotheses of this research will be framed during the review and its conclusion.

## 2.1 Economic overview

Income in the South African economy can be classified into nine (9) industries. An industry is made up of enterprises engaged in the same or similar kinds of economic activity. The industries that make a turnover contribution to the South African economy can be seen in Figure 1: South Africa Income (sector segregation) Stats SA (2016). These respective sectors are: “SIC1 – Forestry and Fishing; SIC2 – Mining and Quarrying; SIC3 – Manufacturing; SIC4 – Electricity, gas and water supply; SIC5 – Construction; SIC 6 – Trade; SIC 7 Transport, storage and communication; SIC 8 – Activities auxiliary to financial intermediation, real estate and other business services intermediation, insurance, pension funding and business services not elsewhere classified; and SIC 9 – Community, social and personal services (excluding government and educational institutions)” (Stats SA Annual Financial statistics, 2016).

Figure 1 illustrates that South Africa has a comparative advantage in agriculture, mining, and the manufacture of products in the respective sectors. This is attributed to fertile lands, mineral-rich soils, and the abundance of low-skilled labor. These factors, amongst others, make South Africa more efficient in carrying out these economic activities, relative to the activities of SIC 4, 5, 7, and 8.

Comparative advantage is a macro construct, while competitive advantage is a firm-level construct. The unit of analysis through this research paper is the firm, hence competitive advantage will be analyzed. A competitive advantage refers to the position of superiority within an industry that a firm has developed in

comparison to its competitors (Cerrato & Depperu, 2011). The time series in Figure 2 clearly illustrates that there has been a consistent increase in manufacturing from 2001 – 2017. Competitiveness can be assessed at a firm level, country level or sector level. For the study competitiveness, will refer to firm-level competitiveness.

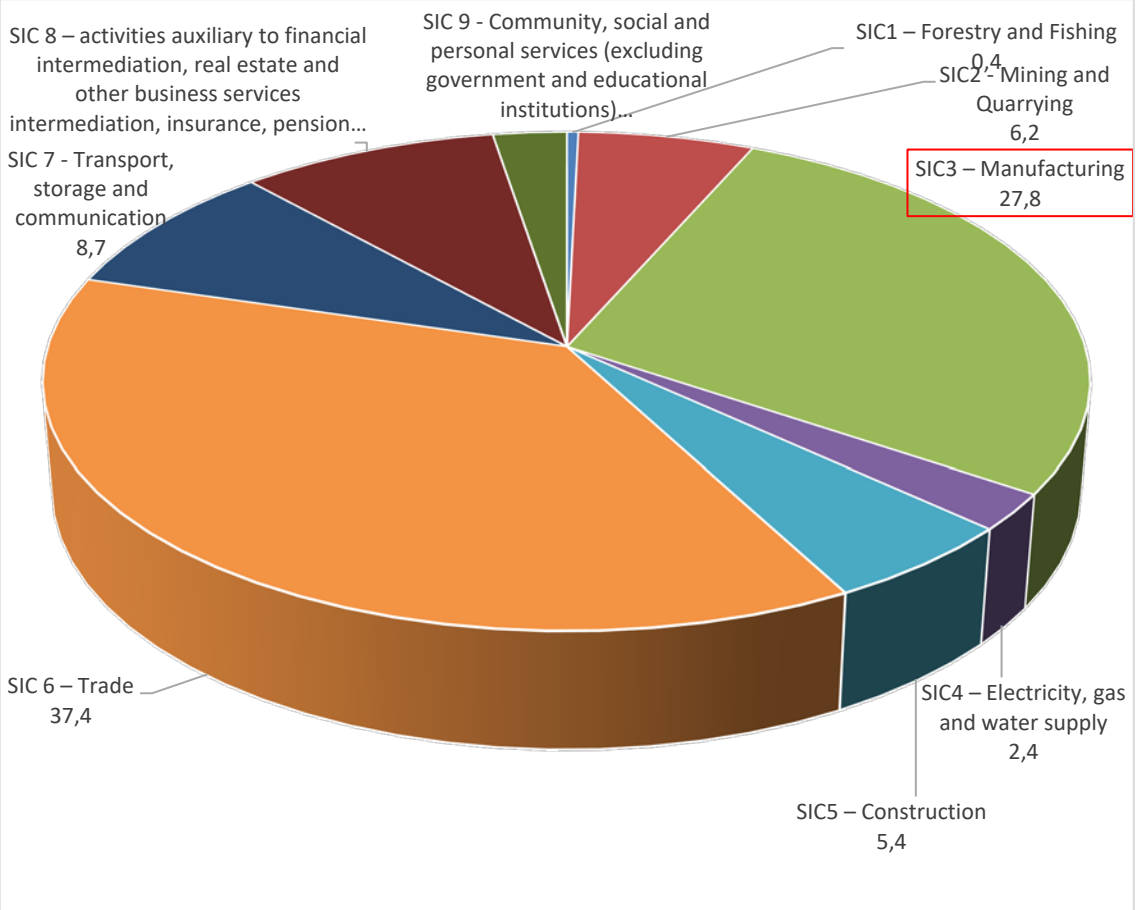



**Figure 1: South Africa Income (sector segregation) Stats SA (2016)**

Figure 2 shows a time-series regression of the various sector contributions, with the highest turnover increases in SIC3 – manufacturing, and SIC 6 – trade.

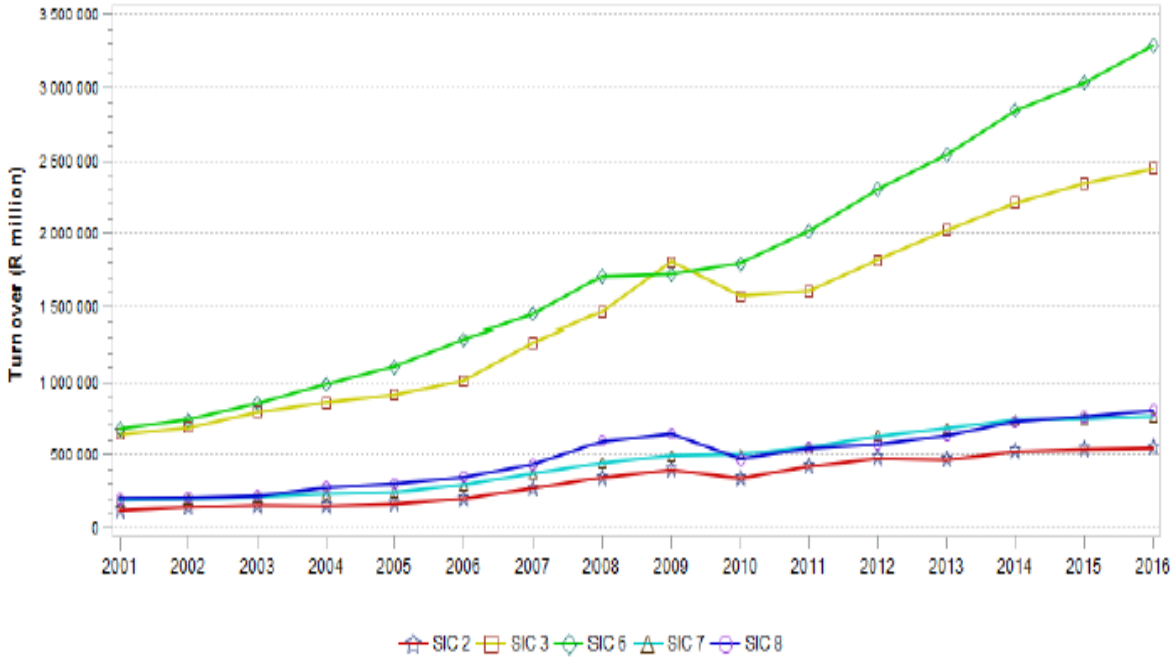



**Figure 2: Time series regression of sector contribution (2001 – 2016) Stats SA (2016)**

## 2.2 Manufacturing sector

The South African manufacturing sector is a key contributor to the South African economy. As evidenced in Figure 1, manufacturing contributed 27.8% in 2016. This industry can be further subdivided into sections, which include food, textiles, coke, glass, metals, telecommunications, and electrical machinery. These subdivisions have been listed in table 1. All divisions and subdivisions are defined as per the Statistics South Africa (Stats SA) Standard Industrial Classifications of Activities. Fifth Edition, Report No. 09-90-02 of January 1993 (SIC). Figure 3 below shows that the highest contributing divisions in South African manufacturing are coke, petroleum, rubber and plastic 33%, followed by the food and beverage division 18%, which contributed a total income of R388 378 million in 2016.

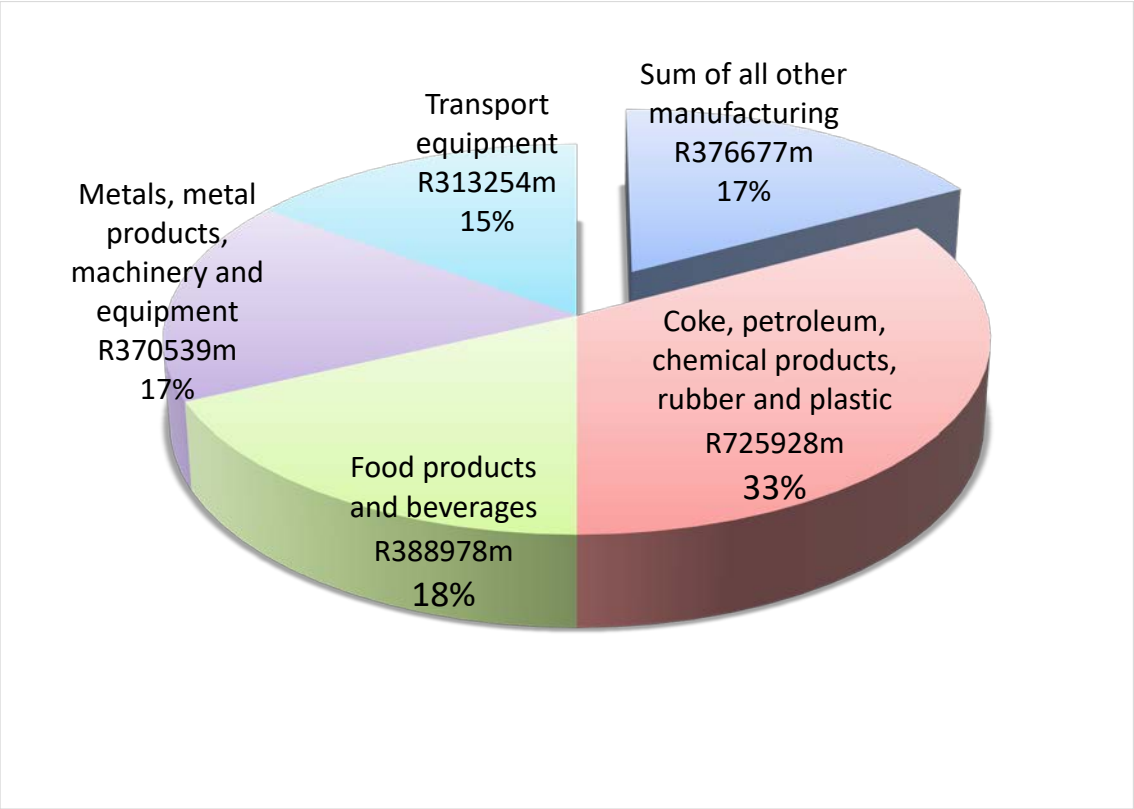



**Figure 3: South Africa Industry Income 2011 – 2014 Stats SA manufacturing release (2014)**

Between 2011 and 2014 the petroleum, rubber and plastic division, and the food and beverage division grew at 14.4% and 10.6% respectively. The income expenditure trend shown in table 1 suggests that there is an equivalent relationship between total income, total expenditure, and inventory. The change in the income – expenditure relationship suggests stagnant profitability.

The value of opening inventory has increased for these sectors in the time from 2011 to 2014 suggesting either, the introduction of higher value goods, or poor management of working capital.

**Table 1: Manufacturing income, expenditure, opening inventory 2011 - 2014 (Stats SA, 2014)**

| Type of manufacturing | Total income | | | Total expenditure | | | Total value of opening inventory | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2011 | 2014 | Annualized % change | 2011 | 2014 | Annualized % change | 2011 | 2014 | Annualized % change |
| | R million | | | R million | | | R million | | |
| Division 30 - Food products and beverages | 287 792 | 388 978 | 10,6 | 268125 | 364444 | 10,8 | 26 525 | 37 774 | 12,5 |
| Division 31 - Textiles, clothing, leather and footwear | 46 511 | 47 649 | 0,8 | 45535 | 46535 | 0,6 | 6 945 | 9 060 | 9,3 |
| Division 32 - Wood, wood products, paper, publishing and printing | 104 354 | 138 447 | 9,9 | 129090 | 129090 | 9,2 | 9 109 | 14 571 | 17 |
| Division 33 - Coke, petroleum, chemical product, rubber and plastic | 484 617 | 725 928 | 14,4 | 671131 | 671131 | 13,9 | 45 795 | 78 662 | 19,8 |
| Division 34 - Glass and other non-metallic mineral products | 53 608 | 71 245 | 9,9 | 60908 | 60908 | 5 | 5 790 | 7 089 | 7 |
| Division 35 - Metals, metal products, machinery and equipment | 336 606 | 370 539 | 3,3 | 368345 | 386345 | 4,9 | 46 583 | 52 276 | 3,9 |
| Division 36 - Electrical machinery and apparatus | 48 851 | 54 875 | 4 | 52829 | 52829 | 5 | 6 971 | 6 911 | -0,3 |
| Division 37 - Telecommunications, medical and optical equipment and watches and clocks | 14 277 | 17 504 | 7 | 17167 | 17167 | 8 | 2 287 | 2 125 | -2,4 |
| Division 38 - Transport | 245 349 | 313 254 | 8,5 | 303731 | 303731 | 9,2 | 30 219 | 40 014 | 9,8 |
| Division 39 - Furniture, other manufacturing and recycling | 56 271 | 46 957 | -5,9 | 45338 | 45338 | -3,7 | 6 319 | 5 229 | -6,1 |

The top three divisions by income (30, 33, and 35) contribute to over 60% of employment in the manufacturing industry. There is a 2:1 income-to-employment ratio, suggesting a high labor efficiency in the divisions or that the divisions are highly mechanized. Food and beverage products (notably food as the largest sub-component thereof) has a higher employment-to-income ratio suggesting a high employment multiplier. Economic employment has a direct impact on economic growth and hence remains a priority to the South African government.

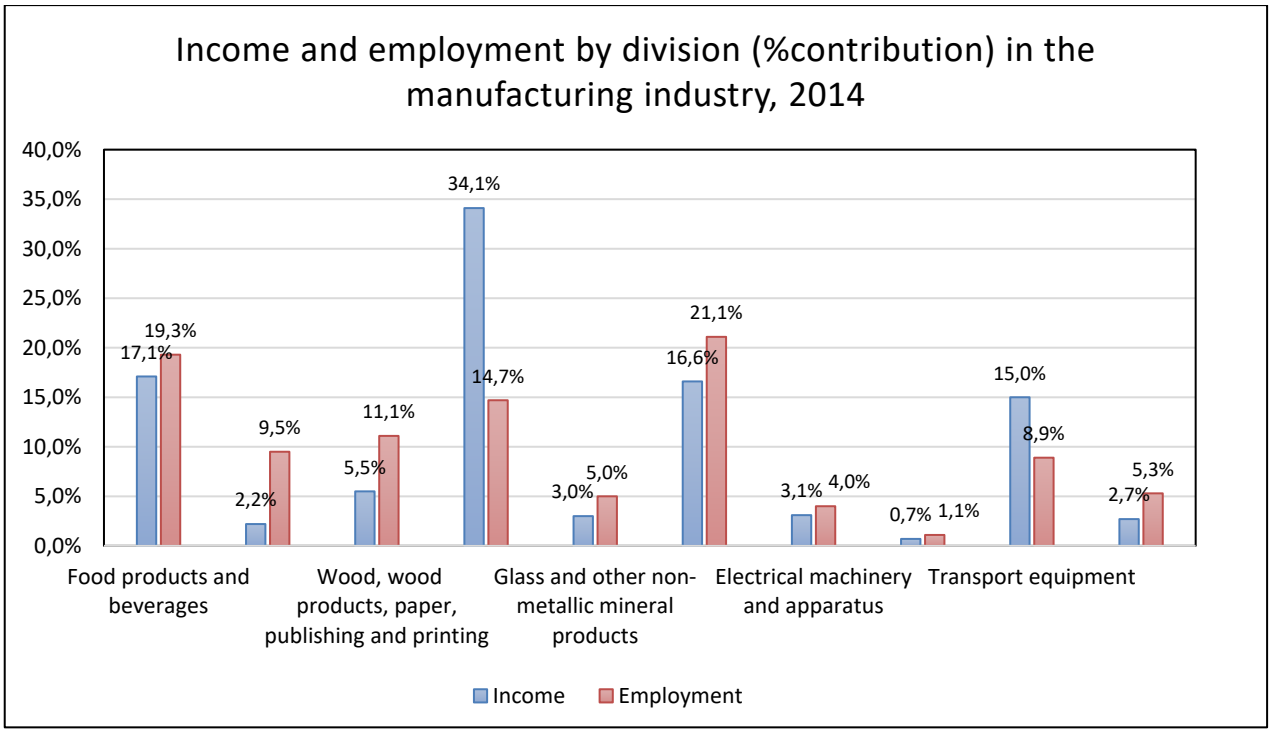



**Figure 4: Statistics South Africa (2014) manufacturing release**

### 2.2.1 *Industry structure*

The South African food manufacturing sector consists of large-, medium-, small- and micro enterprises. According to Stats SA Manufacturing release (2014), size of enterprise is classified according to turnover, with large enterprises > R229 500 000; medium enterprises ≤ R229 500 000; small enterprises < R58 500 000; and micro enterprises < 22 500 000. Large enterprises contribute more that 80% of the income for the manufacturing sector, however their contribution to employment is only 46.4%. In 2014, 53, 6% of the employment in the sector was created by small-, medium- and micro enterprises (as can be seen in Figure 5). This suggests that large enterprises have investment capacity to mechanize, resulting in higher manufacturing efficiency in comparison to medium-, small- and micro enterprises.

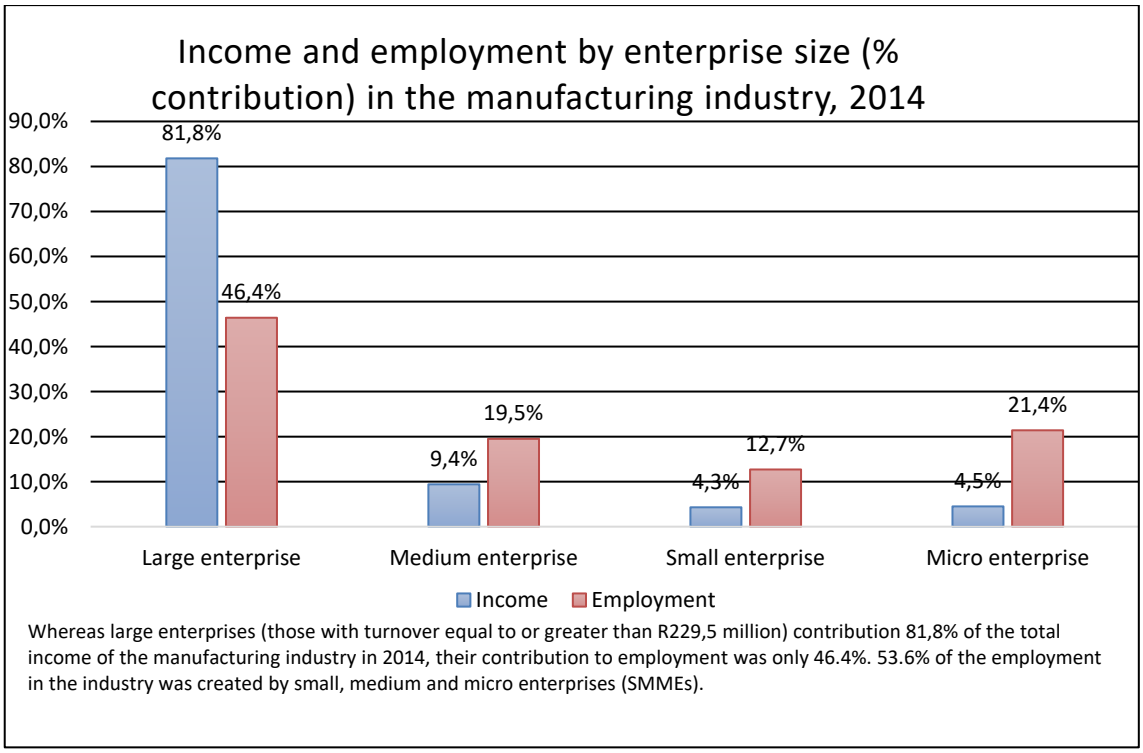



**Figure 5: Income by enterprise size (% contribution) in the manufacturing industry, 2014. Stats SA Manufacturing industry: Financial, Report No. 30-02-03 (2014).**

### 2.2.2 *Sector concentration*

Industry/market concentration refers to "*the extent to which a small number of firms or enterprises account for a large proportion of economic activity. Commonly used indicators include total sales, assets or employment*" (OECD, 1993).

Industry structure has a bearing on the competitiveness of the specific industry, hence, economists have relied on concentration ratios to unpack the structure of a given industry (Fedderke & Simbanegavi, 2008). It is argued that the concentration of a sector is an indicator of the market power of firms and the extent to which they can exercise power. In their study of the South African Manufacturing Industry (SAMI) from 1980 to 2001, they found a high industry concentration, increasing until 1996, and then declining thereafter (Fedderke & Simbanegavi, 2008.).

Concentration ration (CR) in the South African manufacturing sector has been measured using different techniques, based on data availability. Common

techniques include the Gini Index, Rosenbluth Index, the occupancy Gini (Fourie and Smit (1989)); the Gini and Rosenbluth indices, (Fedderke and Szalontai (2009), Fedderke and Naumann (2005)); the Occupancy Count (Leach (1992)); the CRk% Index (Fedderke and Szalontai (2004); Fedderke and Naumann (2005)); and to a lesser extent, the Herfndahl-Hirschman Index(HHI). The four most common ratios being the Rosenbluth Index, the Gini Index, the Herfndahl-Hirschman Index, and the CRk% Index.

The simplest measure of sector concentration is the CRk% index. This ratio, is measured as the ratio of the income of the *n* largest enterprises to the total income. This method assigns the market share of every firm to be of equal weight of Unity (Fedderke, 2008).

The HHI is defined as the sum of the squared market shares of all the firms in the industry. The HHI as a measure of competition, recognizes the importance of the weighted average of both small and large firms in influencing competitiveness of an industry. Schemalensee (1989, p. 966) and Ratnayake (1999, p. 1043) cite the HHI as a superior measure when compared to the CRk% index, however due to the high correlation between the two measures, the choice between the two becomes inconsequential (Fedderke & Szalontai, 2009).

The Rosenbluth Index (RI) is a measure that ranks all firms in a market. The firms are ranked according to market share in descending order with the i-th firm receiving rank i. Ranks of firms are used as weights so that the i-th ranked firm is assigned weight i. Like the HHI, the RI is a summary measure of concentration (it takes all firms into consideration). The RI differs from the HHI in that the Rosenbluth index assigns less weight to larger firms (firms with high rank) and more weight to smaller firms (firms with lower rank). Consequently, the RI is overly sensitive to changes at the tail-end of the firm-size distribution (Fedderke, 2008).

The Gini index is a measure of inequality in the size distribution of firms. It can be used as an industry concentration indicator (Fedderke & Szalontai, 2009). The significance of the Gini coefficient in predicting sector concentration has been challenged by many scholars. Horvath (1972), questioned the importance

accorded to the concept of inequality in discussions of industrial concentration. The use of inequality to measure industry concentration becomes invalid under the so-called Lorenz-curve type problems. This refers to a situation where an industry has firms with equally distributed market share. In this situation this indicator would not be able to show if there was concentration (Leach (1992); Horvath (1972))

### 2.2.3 *Concentration and productivity*

According to Lipzynski, Wilson and Goddard (2005), Caves & Porter, (1977) Pindyck & Rubinfeld (2009), the factors of economies of scale, entry and exit barrier, regulation, sunk costs, industry lifecycle, distinctive capabilities, core competencies and export intensity are the key determinants of seller concentration. Pretorius et al. (2017) found that the CR5 industry concentration in SA manufacturing was determined by product differentiation, value added per worker (productivity & economies of scale) and to a lesser extent exports and imports. They further found that CR10 and CR20 were influenced primarily by economies of scale as opposed to product differentiation.

**Table 2: Concertation ratio per manufacturing division from 2008 – 2014**

| | CR5 | | | CR10 | | | CR20 | | |
|---|---|---|---|---|---|---|---|---|---|
| | 2008 | 2011 | 2014 | 2008 | 2011 | 2014 | 2008 | 2011 | 2014 |
| 30. Food products and beverages | 30 | 29 | 25,8 | 40 | 41 | 36,1 | 56 | 55 | 49,8 |
| 31. Textiles, clothing, leather and footwear | 17 | 13 | 14,2 | 23 | 18 | 21,8 | 31 | 26 | 30,6 |
| 32. Wood, wood products, paper, publishing and printing | 30 | 26 | 29,5 | 41 | 35 | 40,4 | 52 | 44 | 48,4 |
| 33. Coke, petroleum, chemical products, rubber and plastic | 50 | 47 | 47,4 | 69 | 62 | 64,9 | 76 | 70 | 73,7 |
| 34. Glass and other non-metallic mineral products | 38 | 46 | 43,7 | 50 | 57 | 56,4 | 60 | 65 | 64,8 |
| 35. Metals, metal products, machinery and equipment | 27 | 23 | 21,8 | 36 | 31 | 30 | 46 | 39 | 38,6 |
| 36. Electrical machinery and apparatus | 29 | 30 | 38,4 | 43 | 43 | 52,2 | 56 | 58 | 65,7 |
| 37. Telecommunication, medical and optical equipment and watches and clocks | 33 | 27 | 35 | 42 | 38 | 49,4 | 55 | 52 | 66,4 |
| 38. Transport equipment | 53 | 52 | 56,7 | 66 | 66 | 72 | 76 | 76 | 80,3 |
| 39. Furniture, other manufacturing and recycling | 23 | 21 | 39,2 | 26 | 25 | 47,1 | 31 | 29 | 57,3 |
| Source: StatsSA | | | | | | | | | |

Table 2 above, taken from the (Biennial Conference of The Economic Society of South Africa, Rhodes University, Grahamstown, South Africa, 30 August - 1 September 2017 https://2017.essa.org.za/fullpaper/essa_3357.pdf illustrates that manufacturing in South Africa is highly concentrated with the top 20 companies representing more than 50% of the divisional income. This concentration has decreased from 2008 to 2014, with the only sector increase being in transport equipment. This suggests that competitiveness in the sector has increased slightly, with fewer mergers and acquisitions taking place.

The common measure used by Stats SA is the CRk% ratio. Stats SA (2014) found the highest concentration ratio of the top five (5), ten (10), twenty (20), fifty (50) and hundred (100) enterprises since 2005. These enterprises contributed 16, 2%, 26, 0%, 36, 5%, 48, 6% and 58, 1%, respectively to the total income in the manufacturing industry. This illustrates the dominance of the top 100 enterprises in the manufacturing industry, (Stats SA: Manufacturing industry: Financial, Report No. 30-02-03, 2014).

Many scholars assert that industry concentration inhibits competition amongst firms. This is frosted by large market power resulting in supernormal profits, reduced consumer surplus, inefficiencies and collusion. The implications of anticompetitive market structures are much broader than the consumer (Fedderke, 2008).

Fedderke and Szalontai (2004) examined the relationship between industry concentration and productivity using both the Gini and Rosenbluth indices. They found that increased concentration was detrimental to output growth in the South African manufacturing sector, as it lowered labor productivity and raised unit labor costs. These findings were corroborated by (Fedderke and Naumann, 2005).

Aghion, Bloom, Blundell, Griffith and Howitt, (2005) directly examined the effect of competition on productivity growth in South Africa. In their study, they isolated two effects: the ‘Schumpeterian’ effect and the ‘escape competition’ effect. The Schumpeterian effect is described as occurring where an increase in product market competition reduces the rents from innovation. Consequently, firms are not incentivised to innovate leading to a decline in productivity growth.

The escape competition effect is described, as a phenomenon that occurs when firms are 'forced' to innovate to maintain a gap between themselves and their competitors. "*This innovation comes when firms at the technology frontier realize that if they do not invest and innovate, firms immediately below them will catch up causing the former leaders to lose their monopoly rents*" (Aghion el al., 2005, p.10). Consequently, market leaders are incentivized to innovate to escape competition. These investments and R&D initiatives lead to innovation, which ultimately increases productivity (Aghion et al., (2005).

The escape competition effect may partly explain why large firms remain dominant in the manufacturing industry and why small firms have low productivity and high employment. As illustrated in Figure 5, small firms have a 2:1 employment-to-income ratio, while their large counterparts have a 1:2 employment-to-income ratio.

## 2.3 Food manufacturing in South Africa

Wilkinson and Rocha (2009) define agro-processing "*as a summation of postharvest activities, comprising artisanal, minimally processed and packaged agricultural raw materials. It is the industrial and technology-intensive processing of intermediate goods and the fabrication of final products derived from agriculture*" (p.9).

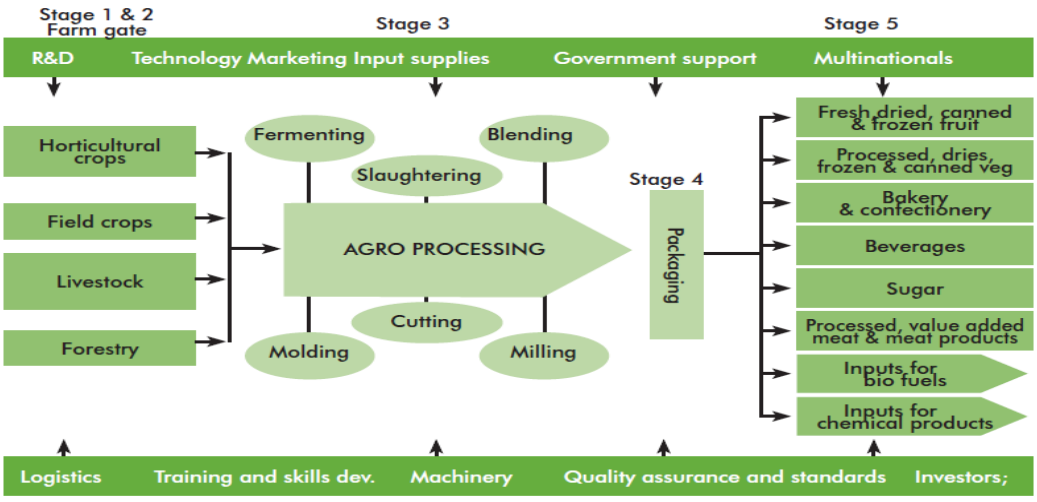



**Figure 6: Agro-processing value chain (http://www.seda.org.za)**

This study will investigate manufacturing companies that perform agro-processing (stage 3 to 5 in the value chain Figure 6) in South Africa. The study will focus specifically on the food and beverage subdivision (including food processing, beverages, aquaculture, horticulture, and medicinal, aromatics and flavourants). The terms agro-processing, agri-processing and food manufacturing will be used interchangeably.

**Agro-processing sector competitiveness**

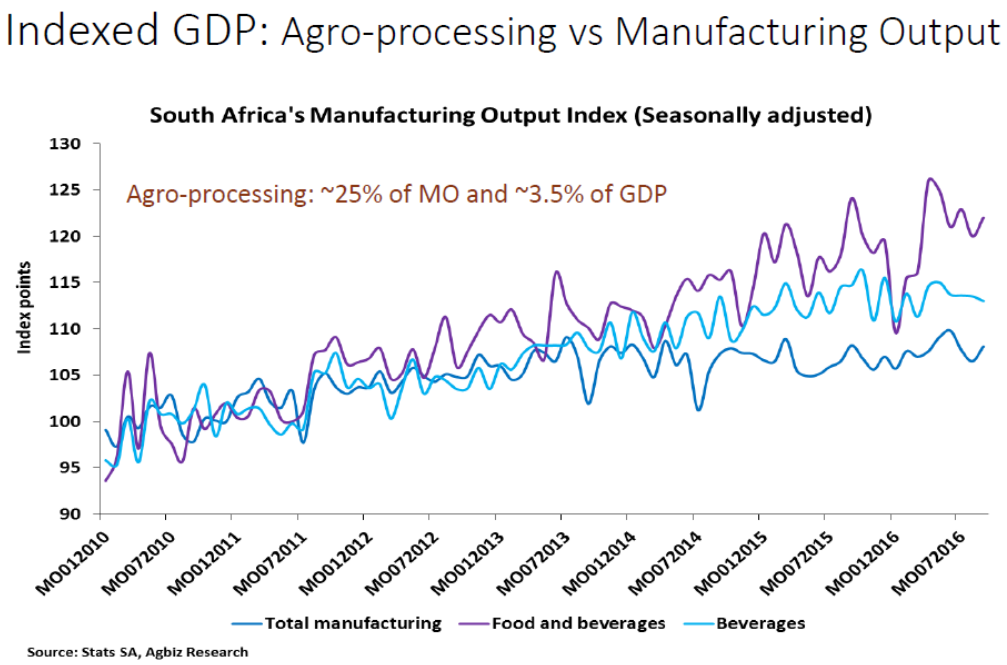



**Figure 7: SA's manufacturing output index (seasonally adjusted) (Agbiz research, 2017)**

Generally, the food production and processing (food and beverages, and tobacco) sub-sectors combined, take the largest share of the agro-processing cake in terms of contribution to the Gross Domestic Product (GDP) in both developed and developing countries. The food processing and beverages sub-sectors account for more than half of the formal agro-processing sector in lower-income countries. A study from Agbiz research (2017) reveals that from 2010 – 2016, agro-processing accounted for 25% of manufacturing output and 3.5% to National GDP (see Figure 7).

A common characteristic of markets with high degrees of market concentration, is a lack of market access combined with limited value addition by smallholders.

Market concentration is a universal phenomenon, sometimes referred to as agro-industrialization, associated with a recent structural change in the global food system (DAFF 2012).

Market concentration occurs mostly in low to middle-income countries. This effect can be attributed to the domination of supermarkets at the downstream end of the supply chain, which put pressure on upstream food processors to compete for valuable retail shelf space. Consequently, processors are forced to either merge or acquire other processors to meet volume demands and become listed supplies. (DAFF 2012).

Table 3 below illustrates the income concentration ratios of food and beverage manufacturers in South Africa in 2014. The top 10 companies in the sector contribute an average of 70% of the income.

There is limited participation of small and medium scale enterprises in the South African agro-food value chain. Small and medium scale enterprises have a combined turnover of 15% in the value chain (see Figure 5) The Department of Agriculture Forestry and Fisheries (DAFF) has attributed limited participation of small and medium-scale agro-processing enterprises in agro-food value chains, due to historic legislation, supply side constraints, inadequate incentives, raw material supply challenges and the proliferation of private standards (DAFF Agro-processing strategy, 2012). These challenges are clearly explained in Figure 8.

**Table 3: Concentration ratios for the total income in the manufacturing industry, (Stats SA Manufacturing report, 2014)**

| Type of manufacturer | Total income | Income of 5 largest enterprises[3] | Relative contribution of 5 largest enterprises[4] | Income of 10 largest enterprises[3] | Relative contribution of 10 largest enterprises[4] | Income of 20 largest enterprises[3] | Relative contribution of 20 largest enterprises[4] |
|---|---|---|---|---|---|---|---|
| | R million | | % | R million | % | R million | % |
| Division 30 - Food products and beverages | 375 637 | 96 735 | 25,8% | 135 554 | 36,1% | 187 130 | 49,8% |
| Production, processing and preserving of meat and meat products | 37 054 | 9 816 | 26,5% | 14 651 | 39,5% | 19 894 | 53,7% |
| Processing and preserving of fruit and vegetables | 14 591 | 6 746 | 46,2% | 8 732 | 59,8% | 10 818 | 74,1% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Manufacture of vegetable and animal oils and fats | 25 078 | 17 827 | 71,1% | 22 873 | 91,2% | 24 967 | 99,6% |
| Manufacture of dairy products | 27 114 | 16 863 | 62,2% | 19 997 | 73,8% | 23 473 | 86,6% |
| Manufacture of grail mill products, starches and starch products | 42 391 | 28 863 | 68,1% | 32 284 | 76,2% | 36 505 | 86,1% |
| Manufacture of prepared animal feeds | 21 412 | 11 470 | 53,6% | 13 673 | 63,9% | 16680 | 77,9% |
| Manufacture of bakery products | 24 807 | 18 754 | 75,6% | 19 803 | 79,8% | 21 160 | 85,3% |
| Manufacture of sugar, cocoa, chocolate, and sugar confectionery | 40 918 | 32 089 | 78,4% | 38 660 | 94,5% | 40 370 | 98,7% |
| Manufacture of macaroni, noodles, couscous and similar farinaceous and other food products n.e.c. | 39 287 | 19 267 | 49,0% | 23 848 | 60,7% | 27 281 | 69,4% |
| Manufacture of alcoholic and non-alcoholic beverages | 102 986 | 77 721 | 75,5% | 86 363 | 83,9% | 92 534 | 89,9% |

[3]These figures reflect the income of the 5, 10 and 20 largest enterprises respectively and not the column totals

[4]Relative contribution = income of the largest enterprises divided by the total income multiplied by 100

Due to the concentrated nature of the food processing sector it is often difficult to secure appropriate volumes that match SME capacity. It is also generally difficult for SME processors to match their demand for raw materials with raw material supplies from farmers whose products often depend on factors beyond their control (e.g. weather, diseases, etc.) (Louw, Troskie & Geyser, 2013).

Another important phenomenon experienced by smallholder farmers, which is a direct result of market access challenges, is that of post-harvest losses. Many smallholders are often not able to store or market their produce after harvest, resulting in tons of on-field wastage. This is due to certain structural supply-side constraints that smallholders often face, which are embodied in high transaction costs (Delgado, 1999; Louw, Troskie & Geyser, 2013).

A recent study conducted among millers and bakers in South Africa Louw, Geyser, and Troskie (2011) found that inadequate infrastructure and limited incentives hindered development of SME processors. Respondents in this study expressed frustration over the length of time it took to access certain government grants, for example, in some cases where grants were approved it took up to several years before the funds were made available.

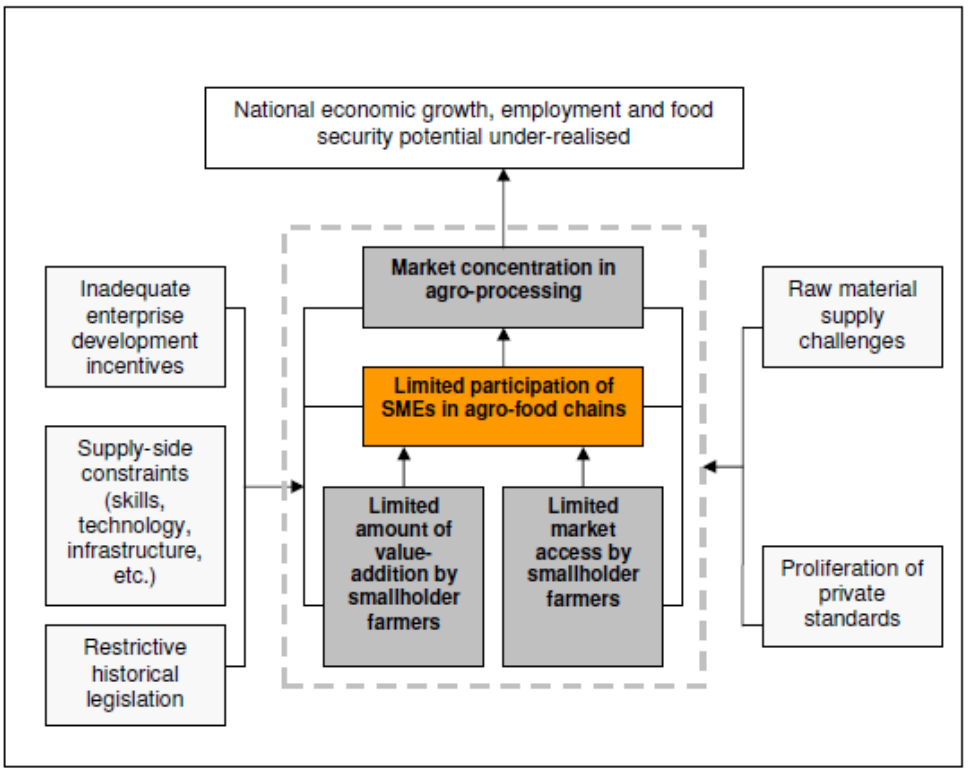



**Figure 8: Bottlenecks to agro processing SMME growth in South Africa (DAFF, Agro-processing strategy, 2012)**

The emergence of private grades and standards can be further attributed to increased market concentration. According to Mather (2005) who is further supported by Crush and Frayne (2011), supermarket chains have established private grades and standards for commodities produced by food processors and primary producers, to ensure that the food products on their shelves are safe and meet high quality standards. Compliance with these standard's often requires firms to invest significantly in plant improvements and other associated expenses. Consequently, small producers become financially excluded as they may not be able to afford these investments (DAFF Agro-processing strategy, 2012). This further concentrates the industry to a majority of large firms.

Roberts, (2009), attributes concentration back to the advent of market deregulation in South Africa during the mid-1990s. In his competition commission report on the wheat, baking and milling, and poultry and inputs (fertilizer) sectors Roberts (2009) together with Louw et al. (2013), found a common trend across these sectors. Following market deregulation and the abolition of single-channel marketing, many of the formerly state-controlled cooperatives became private

companies and underwent horizontal and vertical integration. In the grain manufacturing industry there are only four firms controlling 90% of the milling of maize and wheat in South Africa (Pioneer, Tiger Brands, Premier and Ruto/Foodcorp), which are further vertically integrated into the baking activities. On the other hand, the remaining 10% of industry players are small millers that are not vertically integrated.

The view of Roberts (2009) is supported by that of Mather (2005); Bernstein (2013) and Louw et al. (2013), who attribute concentration to two factors, namely, historical agricultural marketing legislation, and the technological barriers to entry, which are inherent in food processing. The Agricultural Marketing Act (Act 37 of 1937) empowered control boards to issue food processing licenses in a restrictive manner. The milk industry seems to have been the most affected by implementation of licensing restrictions, which has led to a situation where a handful of very large milk processors are able to create regional monopolies on both the procurement and supply of milk. Chabane, Rakhudu and Roberts (2008), note that in many provinces there is a single processing company dominating the procurement of milk.

As part of its Manufacturing Surveys 2005 and 2008, Stats SA collected data on concentration ratios in the manufacturing industry. An analysis of concentration ratios in the agro-industry is presented below to illustrate the point made in the above paragraph.

Figure 9 shows that in terms of CR5, the three most concentrated sectors/sub-sectors in 2008 in descending order were beverages, dairy, and rubber products. In terms of CR10 the beverages sector was the most concentrated sector, followed by grain milling and dairy products manufacturing. Beverages and dairy products were tied as the most concentrated sectors with a CR20 of 0.9 each in 2008, followed by grain milling and rubber product manufacturing.

In other words, the five largest dairy processing companies contributed almost 70% of all income earned in the dairy manufacturing sector in 2005, while the ten largest dairy processors contributed 81% in the same year. Food and beverages

along with furniture manufacturing, were the least concentrated food subsectors in terms of income in 2008.

In cases where protectionist legislation did not play a significant role in causing high concentration in the food processing sector, notably poultry and some fruit and vegetable processing, technological barriers had much more of a role to play (Mather, 2005; Bernstein, 2013).

When measuring CR in terms of the book value of assets of the largest companies, dairy products manufacturing remained the most concentrated sub-sector among the selected agro-industrial sectors in 2005 (see Figure 9).

Figure 10 shows that the asset book value of the five largest dairy products manufacturing companies amounted to 72% of the total sub-sector asset book value in 2008. Concentration in this sub-sector intensifies further when it is measured in terms of CR10 because the ten largest dairy products manufacturing companies controlled 83% of the total asset book value in 2005.

Food and beverages along with furniture manufacturing were again the least concentrated sub-sector in terms of the book value of assets of the five largest companies (CR5). The high concentration in terms of net book value of assets illustrates the contribution of technological barriers to concentration in the South African agro-processing sector.

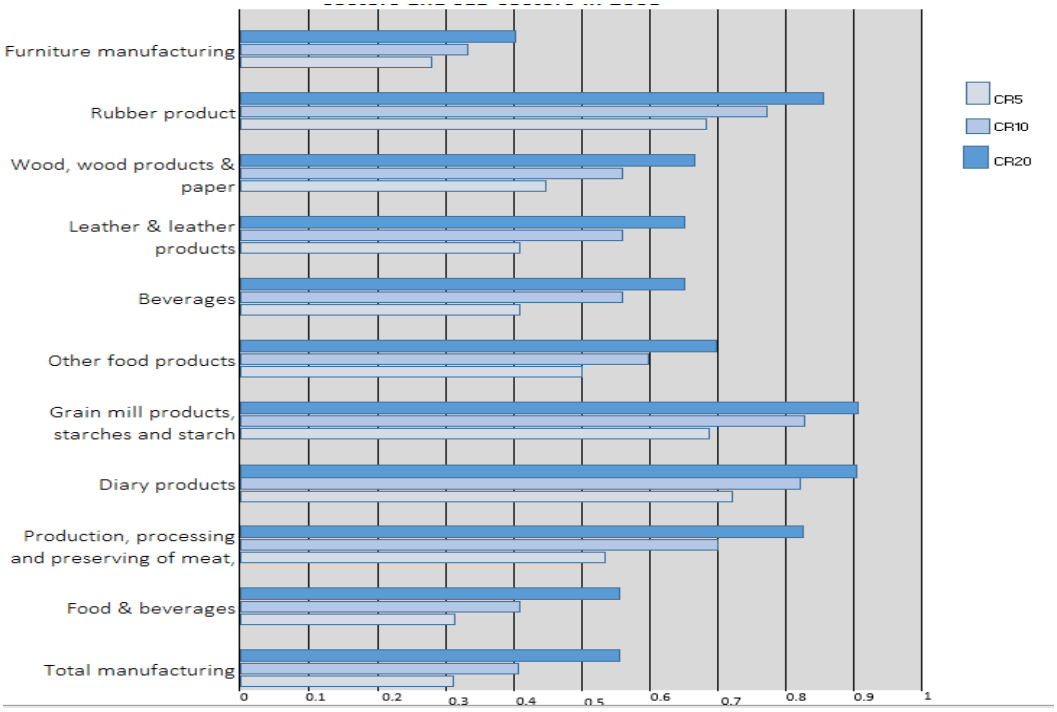



**Figure 9: CR5, CR10, CR20 in terms of income in selected agro- industrial sectors and subsectors in 2008 (DAFF Agro-processing strategy, 2012)**

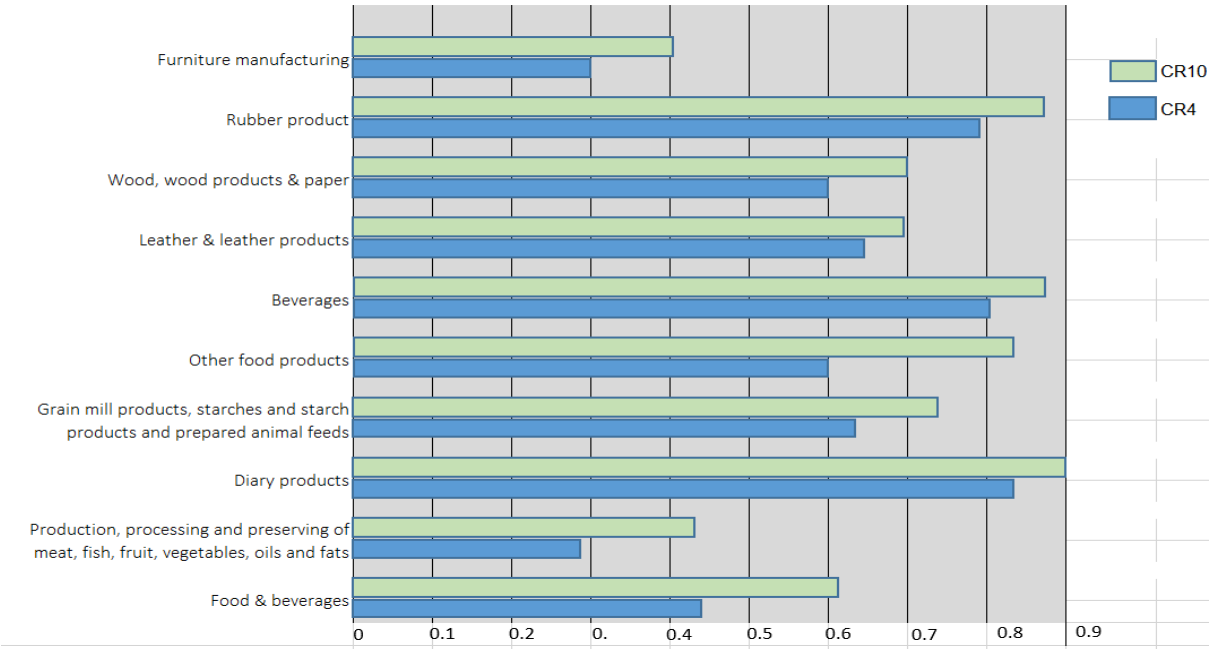



**Figure 10: CR4 & CR10 in terms of book value of assets in selected agro–industrial sectors and sub-sectors in 2005 (DAFF Agro-processing strategy, 2012)**

## 2.4 Manufacturing capability and performance relationship

Manufacturing capabilities refers to a firm's proficiency in quality, delivery, flexibility, and cost to achieve production related goals (Terjesen et al., 2011). It has been argued by White (1996); Narasimhan and Jayaram, (1998); Wong et al., (2011); Schoenherr and Swink, (2012); Swink et al., (2007); Li, (2000) and Lu, Ding, Asian and Paul, (2018) that the dimensions of quality, delivery, flexibility and cost form the core of manufacturing capability. There have been several studies that offer supportive (Li, 2000; Fawcett et al., 2000; Tracey et al., 2005; Yu et al., 2014 ; Lu et al. 2018); non-supportive (Antonio, Yam & Tang, 2007; Swink, Narasimhan & Kim, 2005, 2007; Prajogo, Oke and Olhager, 2016) and a mixed association between manufacturing capabilities and organizational performance (Antonio et al., 2007; Swink et al., 2007 ;).

Antonio et al. (2007) found only delivery and flexibility to be positively associated with organizational performance while Fiegenbaum and Karnani (1991), Prajogo et al. (2016) and Swink et al. (2005) found no support for the association between process flexibility and financial performance. Lu et al. (2018) found a non-linear relationship between manufacturing capability and operational performance.

To test the manufacturing capability–performance link in the South African Food Manufacturing (SAFM) sector it is important to determine the relevant dimensions and their respective interrelations. This may provide an insight into the type of environment, the industry structure, and the potential opportunity types present in the SAFM sector.

### 2.4.1 *Manufacturing capability, environment, performance*

Environmental factors affecting the capability–performance link that have been explored include innovation in industries (Nadkarni and Narayanan, 2007; Lu et al., 2018) environmental dynamism (Terjesen et al., 2011) and technological turbulence (Chavez et al., 2015).

Priem and Butler, (2001) observed that resources are differentially valuable across environments. They found that low operating costs and quality have the most significant performance relationships based on the type of environment. Terjesen et al. (2011) suggest two environmental dimensions, which moderate the manufacturing capability–venture

performance relationship: environmental dynamism and environmental munificence (Terjesen et al., 2011).

The manufacturing capabilities of flexibility, quality and delivery contribute to overall product cost. Manufacturing capabilities contributing to low operating costs are especially effective under munificent environments due to the ease of profitability in the absence of competitors. Munificent environments tolerate marginally strong competitors. When firms exhibit product superiority in munificent markets and make it a basis for competitive advantage they are rewarded with high performance (Terjesen et al., 2011). On this premise, it is hypothesized that:

*H1: Manufacturing capabilities are positively associated with organizational performance in the South African food manufacturing sector.*

### 2.4.2 *Dimensions of manufacturing capability*

*Quality* is a construct focused on the extent to which products meet manufacturing specifications and dimensional conformance (Antonio et al., 2007; Slack et al., 2009).

The importance of quality lies in after-sales service or technical support, which often have an important effect on the number of units sold (Lau Antonio, et al., 2007; Chavez et al., 2017).

In stable environments Terjesen et al., (2011) found the capability of quality conducive to high venture performance. This view was supported by that of O'Neill, Sohal, and Teng (2016). They argue that stability causes the bases of competition to shift from innovation and technological superiority to one of differentiation of established products manifested in incremental product improvements. Quality is one such attribute that can be used for product differentiation when technological change is slow and product attributes are generally well known/established (Miles, Covin and Heeley, 2000). The South African food manufacturing industry is symptomatic of stability and munificence hence it is hypothesized that:

- *H1a: Quality is positively associated with organizational performance in the South African food manufacturing sector.*

*Delivery* is a construct focused on the ability to deliver the committed number of products at the specified time i.e. On Time In Full (OTIF) (Ward, McCreery, Ritzman, & Sharma, 1998). Delivery has dimensions of speed and dependability (Chan, 2003; Droge et al., 2012; Antonio et al., 2007). Winning orders can be largely attributed to the ability to deliver goods faster than competitors (Ward et al., 1998). Rosenzweig et al. (2003) found that delivery reliability and process flexibility led to negative financial performance.

Due to the perishable nature of most products, customer returns imply major costs to processors, as do raw material costs to processors, and raw material inventories that expire or are damaged prior to processing. Similarly, the ability to achieve fast turnaround times on production processes via assembly line and/or equipment changeovers is again linked to the short lifespan of most food consumables (http://www.dti.gov.za/food/presentation2.pdf - Prof. Justin Barnes B&M Analysis).

Quick delivery is often attained through process enhancements directed at reducing cycle time (Holweg and Pil, 2005). Setup time reductions or a reduction in work-in-process inventory and an increase in manufacturing speed can contribute to cycle-time reduction. Furthermore, quick delivery can be obtained through integration with trading partners to facilitate timely adjustments to production, leading to meeting customer demands (Flynn et al., 2010; Jacobs, Droge, Vickery & Calantone, 2011; Prajogo et al. 2016).

It has been empirically found that delivery speed and dependability positively influence financial performance and customer satisfaction (Antonio et al., 2007; Swink et al., 2007). The concentrated nature of the SAFM, the perishable nature of its products, combined with its integration with supply chain partners (vertically and horizontally) leads to the hypothesis that;

- *H1b: Delivery is positively associated with organizational performance in the South African Food manufacturing sector.*

*Flexibility* is described as "*the ability to adapt and respond to changes in production volume or mix to give customers individual treatment or to introduce new products/services*" (Chavez el al., 2017, P.8) Flexibility may extend beyond product variations to the ability to respond to disruptions such as machine breakdowns and the late arrival of raw materials (Chan, 2003; Chavez, Yu, Jacobs, Fynes, Wiengarten, Lecuna, 2015).

The association of flexibility with market-based performance in previous research has often been insignificant or inconsistent. (Feigenbaum & Karnani, 1991; Vickery, Droge, & Markland, 1997; Narasimhan & Jayaram, 1998). For example, Rosenzweig et al. (2003) found that process flexibility was associated with customer satisfaction, but not with sales growth. Flexibility was found to be negatively associated with customer satisfaction by Swink et al., (2007).

There are two types of flexibility that exist, namely, process flexibility and new product flexibility. Change in a plant's operation is stimulated either by the addition of new products or by changes in demand for existing products. Manufacturing flexibility grows market share by offering greater responsiveness to the specific product, or delivery service needs of distinct customer groups (Swink et al., 2005). The research results further indicated that new product flexibility has a much stronger relationship to market-based performance than process flexibility does. Integration of supply chain partners into new product development programs helps reduce costs and speeds time-to-market for highly desirable consumer products (Frohlich and Westbrook, 2001).

Swink (2007) found that new product introduction capabilities were much stronger in predicting market-based performance than process flexibility. Cost-efficient and lean approaches are suited to producing a narrow set of products in stable and homogeneous operating and market environments, whereas new product flexibility is suited to producing customized products and service solutions in unstable, un-certain markets (Swink and Schoenherr, 2015).

Roth (1996) contends that the development of process flexibility requires a closeness to supply chain entities. Likewise, Ettlie and Reza (1992) conclude that tight integration with customers positively affects new system flexibility. However, according to Evans and Wurster (2000), the sheer size of a large organization may inhibit its ability to develop close relationships with supply chain partners.

The flexibility–performance link is informed by different structural and infrastructural choices, as well as marketing strategies. Flexibility exists in environments where there are improved problem-solving capabilities, along with technical and cross-training elements to workforce development programs. These offer an attempt to increase worker flexibility in terms of how

worker capacity is allocated, what range of activities can be done and how quickly new activities can be learned (Ataseven, Nair 2017).

The SAFM is characterized by large firms with closeness to supply chain entities. The introduction of new products is low. Large firms invest in technological, process efficiency and flexibility. These serve as barriers to market entry, protect market share and create cost leadership with the objective of increasing profitability. On this premise it is hypothesized that:

- *H1c: Flexibility is positively associated with organizational performance in the South African food manufacturing sector.*

*Cost* is defined as *"doing things cheaply, producing goods and services at a cost that enables them to be priced appropriately for the market while still allowing a return to the organization"* (Slack et al., 2009, p. 40). Cost efficiency can influence profitability and market share by allowing the manufacturer to adjust prices to respond to market and competition (Swink et al., 2005). Rosenzweig et al. (2003) found that there was no significant association between cost and customer satisfaction. Sousa and Voss, (2008) found that cost efficiency was marginally significant but negatively associated with financial performance. Swink et al. 2007 found that cost leadership was associated with sales growth, but not with customer satisfaction. These mixed findings can be attributed to differences in organizational and environmental factors, considering that the majority of foods are not price elastic.

Stable environments, allow firms to peruse price base competition. Low cost structures are found to confer competitive advantage when environments uncertainties are few and there are multiple participants in the industry (Terjesen et al., 2011). Miller, (1988, p. 285), further argues "*environments* that are unpredictable or subject to much change will create severe diseconomies for firms trying to pursue cost leadership. The many alterations needed to cope with external challenges would reduce efficiency, the sine qua non of cost leadership. Also, stability and an exclusive focus on price and price-conscious customers increase predictability—market responses become much easier to forecast when only price matters". The sentiments of Miller (1988) are echoed by Graham and Potter (2015) who suggest that cost performance ultimately leads to organizational performance. The SAFM is a stable environment, with high concentration hence it is hypothesized that

- *H1d: Low cost is positively associated with organizational performance with organizational performance in the South African food manufacturing sector.*

## 2.5 Opportunity recognition and entrepreneurship

Entrepreneurship consists of two related processes that can be categorized as discovery of opportunity and exploitation of opportunity (Shane and Venkataraman, 2000; Shane, 2012; Venkataraman, Sarasvarthy, Dew, and Forster, 2012). The two dominant perspectives on the formation of opportunities are either that opportunities are discovered or that opportunities are created. These schools of thought are referred to as 'Discovery Theory' and 'Creation Theory', respectively.

Discovery and creation theories converge on the notion that the goal of entrepreneurs is to form and exploit opportunities (Shane and Venkatraman, 2000, p. 211; Shane, 2003, p. 4). Both theories *"recognize that opportunities exist when competitive imperfections exist in a market or industry. However, these two theories diverge in their analysis of the origin of these competitive imperfections*" (Alvarez and Barney, 2013)

In discovery theory, opportunities are assumed to arise exogenously, from changes in technology, consumer preferences, or some other attributes of the context within which an industry or market exists (Alvares and Barney, 2013).

According to Shane (2003, p.23) "*technological changes, political and regulatory changes, and social and demographic changes are examples of the kinds of events that can disrupt the competitive equilibrium that exists in a market or industry, thereby forming opportunities*". The political (democracy), social (growing black middle class) and technological (information systems & internet access) changes in South Africa over the past 30 years suggests the existence of a disequilibrium.

Discovery theory suggests that opportunities exist as real and objective phenomena, independent of the actions or perceptions of entrepreneurs, just waiting to be discovered and exploited (McKelvey, 1999; Alvares and Barney,2013).

Discovery theory is fundamentally concerned with systematically scanning the environment with the objective of discovering opportunities to produce new products or services. The search process entails focusing the direction and duration of the search. The searcher must

search globally, and not locally as more substantial opportunities exist in the global sphere (Alvarez and Barney, 2013).

In creation theory opportunities are created, endogenously, by the actions, reactions, and enactment of entrepreneurs exploring ways to produce new products or services (Baker and Nelson, 2005; Gartner, 1985; Sarasvathy, 2001). In creation theory, entrepreneurs do not search but rather act, and observe how consumers and markets respond to their actions.

The ability to recognize novel opportunities in the volatile external environment, evaluate and prioritize these opportunities and then translate these opportunities into viable and profitable businesses lies at the heart of the entrepreneurial process (Goodale, Kuratko, Hornsby & Covin, 2011).

### 2.5.1 *Opportunity in large firms*

Radical or 'breakthrough' inventions lie at the core of entrepreneurial activity and wealth creation (Kirchhoff, 1991; Schumpeter, 1975). There have been multiple studies focusing on the role of new firms in destroying competence by creating breakthroughs. These studies present empirical evidence that inventions are often likely to originate with entrants rather than incumbents (Cooper and Schendel, 1976; Foster, 1986; Khanna, Guler and Nerkar, 2016).

There have also been multiple studies that focus on breakthroughs created by large firms. Empirical evidence has shown that some large firms are able to establish routines that enable them to generate significant technological breakthroughs, thereby reinventing themselves and retaining technological leadership in their industry (Ahuja & Lampert, 2001).

Ahuja and Lampert (2001) suggest that by experimenting with novel (i.e. technologies in which the firm lacks prior experience), emerging (technologies that are recent or newly developed in the industry) and pioneering (technologies that do not build on any in existence) technologies, firms can create breakthrough inventions. This view is supported by that of Khanna, Guler and Nerkar (2016), who found that the number, importance, and timing of small failures are associated with a decrease in R&D output (patent count) but an increase in the quality of the R&D output (forward citations to patents).

## 2.6 Entrepreneurial orientation and performance

Entrepreneurial Orientation represents the processes and practices that provide a basis for entrepreneurial decisions and actions in an organization. It is described as a vital component to organizational success and business performance (Venter et al., 2015).

Entrepreneurial Orientation can be viewed as a one-dimensional or multidimensional construct. Early scholars argued that EO was a single factor (Covin & Slevin, 1989; Knight, 1997) however, recent theories suggest that the dimensions of EO may occur in different combinations (e.g. Covin, Green, & Slevin, 2006; Lumpkin & Dess, 2001), each representing a different and independent aspect of the multidimensional concept of EO (George, 2006). The one-dimensional construct suggests that for EO to be present, there must be a strong relationship between the variable being investigated and the three constructs. The two most recent meta-analyses of EO (Rauch et al., 2009; Rosenbusch, Rauch, and Bausch, 2013), indicate that the most dominant perspective of EO literature is that of the Miller / Covin and Slevin conceptualization (Anderson, Kreiser, Kuratko, Hornsby and Eshima, 2015).

Entrepreneurial Orientation (EO) can be described by the dimensions of innovativeness, risk taking, and proactiveness (unidimensional). Lumpkin and Dess, (1996) have argued that competitive aggressiveness and autonomy form additional dimensions (multidimensional). Anderson et al. (2015), re-conceptualize EO, as a second-order, firm-level construct comprised of two lower-order dimensions: entrepreneurial behaviors (encompassing innovativeness and proactiveness), and managerial attitude towards risk (risk taking).

The multidimensional view conceptualizes innovativeness, risk taking, autonomy, proactiveness, and competitive aggressiveness as independent dimensions. In this school of thought not all dimensions have to be present and have strong correlations for EO to be viably claimed. This research will consider EO from a multidimensional perspective, as different insights can be drawn from assessing the various factors independently

The multi-dimensional approach suggests that the factors of autonomy, innovativeness, risk-taking, proactiveness, and competitive aggressiveness—may be present when a firm engages in new entry. Lumpkin and Dess (1996), suggest that considerations such as the organizational and environmental context of a firm will determine the dimensions of EO that will contribute to new entry. Controversies surrounding the Lumpkin and Dess (1996),

dimensionality of EO, include conversations of whether EO should be measured formatively or reflectively (Covin and Wales, 2012); whether EO is an attitudinal construct, a behavioural construct, or both (Anderson et al. 2015)

The food manufacturing industry is very context specific, as the firms have vertically and horizontally integrated the food manufacturing value chain, and the source of newness is primarily through vertical integration i.e. blended products, better packaged products, mergers and acquisitions.

The five (5) dimensions of EO lie on a continuum and in every organization, and there will be varying amounts of each. As such, a more entrepreneurial firm will be positioned more toward the entrepreneurial end of, presumably, at least one of the five EO dimensions (although Lumpkin and Dess (1996) are clear that entrepreneurial firms need not be “high” on any particular dimension). This characterization of EO is similar to that of others’ conceptualizations of multidimensional constructs (i.e. Khandwalla’s (1976/1977) conceptualization of the construct of top management style, Hofstede’s (1984) conceptualization of the construct of cultural values, or Barrick and Mount’s (1991) conceptualization of the construct of personality) (Covin and Wales, 2012). The Lumpkin and Dess’s (1996) conceptualization, is domain focused and gives guidance on where to look for EO, which is different to the Miller (1983) conceptualization of EO which specifies what EO looks like (Covin and Wales, 2012).

## 2.7 The EO-performance relationship

The EO – performance relationship has been studied by various authors who have come to different conclusions (Wales, Gupta, & Mousa, 2013). Wiklund & Shepherd (2003), suggest a strong correlation between EO and performance; Dimitratos, Lioukas & Carter, (2004); Lumpkin and Dess, (2001) report a lower correlation while George, Wood, & Khan, (2001) could not find a significant relationship. Xie, (2011) proposed that the conflicting findings could be due to the EO performance relationship being U- shaped.

Rauch et al. (2009) recommended investigating the role of moderators for further research to better understand the EO- performance relationship. Kreiser and Davids (2011) suggest that the EO – performance relationship will be moderated by the environment. Rauch et al. (2009) found that national culture, business size and technological intensity of the industry

had strong moderating effects on the EO – performance relationship. Lechner and Gudmundsson, (2014), found that innovativeness was related most highly to differentiation strategy, while risk-taking and competitive aggressiveness were negatively associated with both differentiation and cost leadership strategies. Both differentiation and cost leadership strategies were found to be positively related to performance (Lechner and Gudmundsson, 2014).

### 2.7.1 *EO, external environment, performance*

The external environment is an important factor in any firm, as companies are highly dependent thereon for resources, information, and opportunities. The complex, firm – environment exchange involves firms extracting resources from the environment and turning them into products and services through the exploration and exploitation of opportunities. Rosenbauch et al. (2013) suggest that EO is a critical factor in the firm's environmental integration as it influences strategic decisions and resource allocations. It can be inferred from this statement the EO will exist in all firms. Furthermore, Rosenbauch et al. (2013) highlight the importance of resources, legitimacies, and role formation. They suggest that firms should match EO to supporting resources and organizational structure, as in the absence of this EO may hurt performance.

Gupta and Gupta (2015), found that in environments where there was low competitive intensity, the first-mover advantage gained by pioneering firms was likely to remain for some time, along with the associated performance effects. In the absence of strong competition, customers will remain with the entrepreneurial firm extending the benefits of being a first mover. The SAFM is a highly concentrated sector, and it is hence hypothesized that:

- *H2: EO is positively associated with organizational performance in the South African food manufacturing sector.*

### 2.7.2 *EO, industry structure, leadership, performance*

Rauch et al. (2009) found that businesses operating in dynamic industries where there is rapid change in customer preferences and/or technology are likely to benefit from entrepreneurial benefits. Covin and Slevin (1989) suggested that organic structures allowed firms to seize environmental opportunities, while mechanistic structures were better suited

for companies in environments where rapid organizational responses were not required. This behaviour is likely exhibited in highly concentrated industries.

**Table 4 : Configurations of EO and structure by environment (Kreiser & Davids, 2011)**

| Appropriate configurations of EO and structure by environment | | |
|---|---|---|
| | Dynamic | Stable |
| Munificent | Innovativeness: Very High<br>Proactiveness: Very High<br>Risk-taking: Moderate to High<br>Organizational Structure: Organic | Innovativeness: Moderate to High<br>Proactiveness: Moderate to High<br>Risk-taking: Moderate<br>Organizational Structure: Combination |
| Hostile | Innovativeness: Moderate to High<br>Proactiveness: Moderate to High<br>Risk-taking: Moderate<br>Organizational Structure: Combination | Innovativeness: Low<br>Proactiveness: Low<br>Risk-taking: Low<br>Organizational Structure: Mechanistic |

Kreiser and Davids, (2011) propose different configurations of EO, structure and environment that optimize organizational performance (Table 4). Covin and Slevin (1991, p. 18) argued that the appropriate structure for an entrepreneurial organization to increase performance will "*include decentralization of decision-making authority, minimal hierarchical level or structural levels, free-flowing communication channels, and closely integrated R&D, manufacturing, and marketing functions*".

## 2.8 Dimensions of EO

### 2.8.1 *Innovativeness*

A firm's tendency to engage in and support new ideas, novelty, experimentation, and creative processes that may result in new products, services or technological processes (Lumpkin and Dess, 1996; Rauch et al., 2009). Lunmkin and Dess (2005) describe three types of innovation, technological, product market, and administrative innovation. Innovation provides a competitive advantage and is fundamental in growth strategies for entering new markets, and increasing existing market share (Gunday, Ulusoy, and Kilic & Alpkan 2011). Innovativeness in stable environments is typically not effective due to a lack of changing market demand and customer preferences. In the SAFM context, although the environment is stable, trade liberalization and easy mobility of goods and services due to information technology is leading to changing consumer preferences.

Mechanistic organizations with bureaucratic actions decrease the efficacy of innovativeness within organizations, as these actions inhibit the autonomy and creativity required for innovative behaviors (Kreiser et al., 2011). Zahra (1996: 189) contends that innovative behaviors are critical to firm survival, arguing “success in today’s competitive environment requires a company to pursue a coherent technology strategy to articulate its plans to develop, acquire, and deploy technological resources to achieve superior financial performance.” The South African agro-processing industry comprises primarily of large firms that use technological innovation as a barrier to entry, hence it is hypothesized that:

- *H2a: Higher levels of innovation and the development of new products in the South African food manufacturing sector is positively associated* with *increased financial and market performance*

### 2.8.2 *Risk taking*

“*The degree to which managers are willing taking action without certain knowledge of probable outcomes; some undertakings may also involve making substantial resource commitments in the process of venturing forward*” (Lumpkin and Dess, 2005, p7). Central to the concept of risk taking is a tendency toward engaging in high-risk activities with chances of high returns, and also in bold actions in uncertain environments (Covin & Slevin, 1989; Rosenbusch et al., 2013)

Lumpkin and Dess (2005) have suggested researching, assessing risk factors and using learnings and practices that have worked in other domains to strengthen competitive position through risk taking.

Tang, Tang, Marino and Zhang (2008) caution that high levels of risk taking may be counterproductive to organizations, and that risk has a curvilinear relationship to performance. In stable environments, high risk may have negative performance impacts as competitors have less risky alternatives (Kreiser et al., 2011). Furthermore, risk taking enables managers to seize opportunities and make resource commitments without understanding the actions that need to be taken. This decision-making ability can only occur in flexible structural environments. Large firms traditionally have high resource endowments with allowances for risky investments in R&D that have limitations due to their semi-bureaucratic structures. Khanna et al. (2016) found that the number, importance, and timing

of small failures are associated with a decrease in R&D output (patent count) but an increase in the quality of the R&D output (forward citations to patents), hence it is hypothesized that:

- *H2b: Risk taking has a positive impact on organizational* performance in the South African food manufacturing sector.

### 2.8.3 *Proactiveness*

Venkatraman((1989, p. 949), suggested that proactiveness refers to processes aimed at anticipating and acting on future needs by "*seeking new opportunities which may or may not be related to the present line of operations, introduction of new products and brands ahead of competition, strategically eliminating operations which are in the mature or declining stages of life cycle*".

It refers to an opportunity-seeking, forward-looking behavior that incorporates acting on future needs and trends ahead of competitors, thereby actively entering new product/market spaces, creating first-mover advantages, and seeking market leadership positions (Anderson et al., 2015; Lumpkin & Dess, 2005; Wiklund & Shepherd, 2003).

According to Lumpkin and Dess (2005), first movers in an industry are advantaged by the ability to capture unusually high profits in the absence of competitors as they become price setters and not price takers. Kreiser et al. (2011) suggest that the first-mover advantage can be manifested in the form of technological leadership and increased buyer switching costs. First-mover advantage is only sustainable in the long term in concentrated environments with few competitors. In the absence of competition, rivals will not likely match the firm's innovations and bring them to the market place quickly. Hence, on this premise it is hypothesized that:

- *H2c: Proactiveness has a positive impact on* organizational *performance in the South African food manufacturing sector.*

### 2.8.1 *Autonomy*

A tendency towards independent and autonomous action. Encouragement of independent thought and action can help managers and employees to set aside their usual routines. This can be used to encourage creative thinking and brainstorming about new ventures and ideas

(Lumpkin and Dess, 2005) leading to innovation. The dimension of autonomy is highly correlated to that of innovativeness. It is this very autonomy that allows for the ambidextrous process that leads to innovation (Martin, Javalgi, Cavusgil, 2017), hence, it can be inferred that:

- *H2d: Autonomy has a positive impact on* organizational *performance in the South African food manufacturing sector.*

### 2.8.2 *Competitive aggressiveness*

The type of intensity and head-to-head posturing new entrants need to compete with existing rivals. 'Beating competitors to the punch' (Lumpkin and Dess, 2001). It may involve being very assertive in leveraging the results of other entrepreneurial activities such as innovativeness or proactiveness and can be used to combat industry trends that threaten survival or market position (Lumpkind and Dess, 2005). Lechner and Gudmundsson (2014), found that competitive aggressiveness was negatively associated with both a differentiation strategy and a cost leadership strategy. Cost leadership creates greater market share, which does not imply profitability. The SAFMS is a monopolistic environment which guarantees market share without having to lower costs. The underlying strengths of competitive aggressiveness are innovativeness and proactiveness; hence, it can be inferred that:

- *H2e:* Competitive aggressiveness has a positive impact on organizational *performance in the South African food manufacturing sector.*

## 2.9 EO – manufacturing capability relationship

The theoretical constructs presented in the literature review suggest a high co-relationship between the dimensions of manufacturing capability and entrepreneurial orientation. Rosenbusch et al. (2013); Terjesen et al. (2011) found that in munificent environments superior product quality was a source of competitive advantage. Product quality can be related to the EO dimension of innovativeness. High or low EO can stimulate firm-specific strategies such as a quality focus and provide the means to develop matching capabilities to pursue those strategies (Rosenbusch et al., 2013; Terjesen et al., 2011).

In environments where there are constant changes in technology, demand and competition, quick responses to market demands are required for performance (Chi et al., 2009). These environments require proactive and innovative capabilities embodying focus on facts, reaction speed and the ability to change resource combinations (Rosenbausch et al., 2013). However, in environments that are stable, with low product variation and long product lifecycle, first-mover advantage becomes more effective than rapid response. This incorporates the EO dimensions of proactiveness, and the manufacturing capabilities of low cost, delivery efficiency and speed to performance improvement. Hence, both EO and MC will exist with varying levels (Chavez et al., 2017).

According to Nadkarni and Narayanan, (2007) the link between flexibility and organizational performance is moderated by the rate of innovativeness. Environments characterized by market uncertainty and unpredictability prompt risky, proactive, and explorative styles that are supportive of a flexibility capability (Rosenbusch et al., 2013). In stable environments, flexibility may or may not be a competitive asset. Continuous improvement and improved line efficiency may improve process flexibility leading to improved cost and performance.

Cost leadership strategies are commonly found in hostile environments. Cost leadership involves efforts to reduce inventory, improve productivity and the creation of lean/streamlined operations (Rosenbusch et al., 2013). Chavez et al. (2015) found that these strategies are moderated by technological turbulence. Technological turbulence suggests a high degree of competitiveness, risk and uncertainty and can thus reflect risk-taking entrepreneurial behavior (Khandwalla, 1987). Covin et al. (2000) found that in munificent environments, capabilities other than cost form the bases of competitiveness (quality, new product flexibility, R&D). Inherent in these bases of competitiveness are the EO dimensions of risk and competitive aggressiveness. These interrelations lead to the hypothesis that:

H3: *There is a strong co-relationship between EO and manufacturing capability in the South African food manufacturing sector.*

## 2.10 Conceptual framework

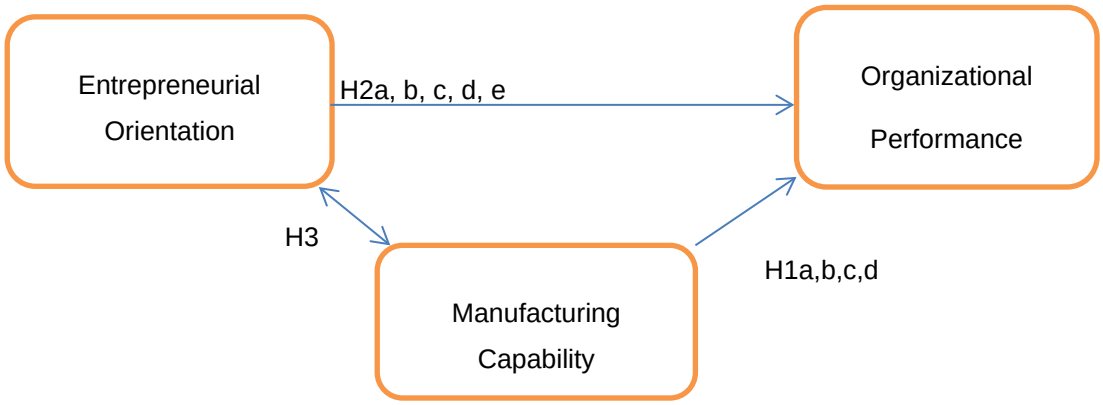



**Figure 11: Conceptual Framework (Rosenbusch et al., 2013; Chavez et al., 2017)**

The conceptual framework presented in Figure 11, investigates the notion that manufacturing capabilities (quality, flexibility, cost, delivery) will lead to improved performance in the SAFM sector (H1a, b, c, d). This hypothesis is important as due to the nature of the industry the ability to manufacture is a necessary entry criteria. The second hypothesis investigates the notion that EO will lead to improved organization performance. Lumpkin and Dess (1996) suggest that every firm in the market will have all or any of the dimensions of EO, and their strength will be on a continuum from high to low. Rosenbauch et al. (2013) suggest that EO is a critical factor in the firm's environmental integration as it influences strategic decisions and resource allocations. It can be inferred from this statement the EO will exist in all firms. Hence H2a, b, c, d, e, investigate the relationship of EO and performance.

In the context of manufacturing, firm performance has largely been attributed to manufacturing capability, with research rooted in Skinners, (1969) publication of *Manufacturing – Missing Link in Corporate Strategy*. Entrepreneurial traits of risk tolerance, innovativeness, and proactiveness, can be pivotal in assisting firms to leverage their manufacturing competencies and develop capabilities such as flexibility, agility, quality and efficiency, allowing firms to respond to market opportunities and meet rapidly changing needs (Handfield et al., 2009; Hsu et al., 2011; Giunipero et al., 2005). This suggests a co-relationship between manufacturing capability and EO. This research will investigate the validity and strength of this co-relationship

## 2.11 Conclusion of literature review

The food manufacturing sector is characterized by indications of monopolistic competition (high sector concentration) and has opportunities for profits (munificent environment), however due to globalization, profits for local firms are diminishing through low competitiveness. Environments with these characteristics will need to focus on manufacturing capabilities that will allow them to compete in the market as it moves from munificent and stable, to dynamic and hostile and will need to understand that respective dimensions of EO that will help enhance these capabilities. From the Literature it is clear that the different dimensions of both manufacturing capability and EO can and have led to increased performance in both small and large organizations and can be influenced by environmental factors. Below is a summary of the hypotheses:

H1: Manufacturing capabilities are positively associated with organizational performance in South African food manufacturing sector.

- H1a: Quality is positively associated with organizational performance in the South African food manufacturing sector.
- H1c: Flexibility is positively associated with organizational performance in the South African food manufacturing sector.
- H1d: Cost is positively associated with organizational performance in the South African food manufacturing sector.

H2: EO is positively associated with organisational performance in the South African food manufacturing sector

- H2a :Higher levels of innovation and the development of new products in the South African food manufacturing sector is positively associated to increased financial and market performance
- H2b: Risk taking has a positive impact on organisational performance in the South African food manufacturing sector
- H2c : Proactiveness has a positive impact on organisational performance in the South African food manufacturing sector
- H2d : Autonomy has a positive impact on organisational performance in the South African food manufacturing sector

- H2e : Competitive aggressiveness has a positive impact on organisational performance in the South African food manufacturing sector

H3: There is a strong co-relationship between EO and manufacturing capability in the South African food manufacturing sector.

# CHAPTER 3. RESEARCH METHODOLOGY

The purpose of this section is to describe the methodology that will be used to test and investigate the hypothesized relationships as put forward by literature review. The section will begin by describing the research paradigm and methodology. This will be followed by the research design, sampling, instruments and procedures for data collection. The section will be concluded with limitations on the methodology, proposed validity and reliability testing as well the demographic profile of the respondents.

## 3.1 Research methodology /paradigm

The research paradigm that will be followed in this research will be that of Positivism. Positivism is a philosophical realism which contends that there is only one true reality, which is apprehendable, identifiable, and measurable (Cacioppo, Semin, & Berntson, 2004; McGrath & Johnson, 2003; Sciarra, 1999).

Epistemologically, positivism emphasizes the independence of the researcher, the research participant and the topic from each other (dualism). This can be achieved objectively by following rigorous, standard procedures and objectivism (Ponterotto, 2005). Any study which is influenced by the values and biases of the researcher is flawed. Replicated findings are considered 'true' and enhance theory verification evidence. (Ponterotto, 2005).

Quantitative research is "supported by the positivist or scientific paradigm, which leads us to regard the world as made up of observable, measurable facts" (Glesne & Peshkin, 1992, p. 6) through their assumption that "social facts have an objective reality" and "variables can be identified and relationships measured" (p. 7).

Similar to research by Wiklund & Shepherd (2003); Lumpkin and Dess, (2001) Covin & Slevin,(1989); Kreiser and Davids (2011); Hughes and Morgan (2007); Rauch et al. (2009) Chavez et al. (2017) ; Lechner and Gudmundsson (2014) ; Gupta and Gupta (2015) this study will use quantitative methods to uncover the relationship between EO and performance, manufacturing capability (MC) and performance, as well as the co-relationship between EO and MC. This research will incorporate large-scale sampling and the use of statistical procedures in examining these relationships and determining correlations.

## 3.2 Research design

The methodological approach adopted was that of a survey and historical records obtained from Stats SA. A survey represents a cross-sectional study and is a source of collecting primary data (De Vaus, 2016). The data on Manufacturing Capability and EO was collected at a single point in time. This method has limitations as there is no way of telling the amount of thought that the respondents will give to the survey. Furthermore, people may have their own interpretations of the questions and hence, respond differently based on their personal understanding.

## 3.3 Population and sample

### 3.3.1 *Population*

The unit of analysis used in this study was the firm. To survey the firm, executive -, senior-, and middle managers were questioned. The population for the research consisted of senior and executive managers working in the top 10 (by income) food manufacturing companies in South Africa. The companies were restricted to meat, fruits and vegetables, oils and fats, grains, food and beverages, dairy, bakery, sugar, cocoa, chocolate, macaroni, noodles and other food manufacturing, as per the categories described in the literature review, and Division 30 of the Stats SA SIC with the exception of animal feeds. For purposes of anonymity the companies will not be explicitly stated in this paper. Due to the highly concentrated nature of the sector, the top 10 manufacturing companies in these divisions represent over 60% of the income, expenditure and value of assets in the divisions (Stats SA, 2014 manufacturing release),( see figure 3).

### 3.3.2 *Sample and sampling method*

The survey was circulated to 10 people in each of the 10 respective businesses. All business can be defined as large enterprises as per the definition in the literature review. Manufacturing capabilities often develop through organizational routines over a long time (years) and are based on complex resource interactions. The resource limitations often preclude young firms from the acquisition of process technologies and the other tangible assets upon which manufacturing capabilities are founded (Terjesen et al., 2011). The

survey was limited to 10 people in senior and executive positions as these businesses are an amalgamation of businesses (conglomerate), which typically have business unit heads that become functional specialists and factory managers (see Figure 5). Hence, only a few people in these organizations will understand the manufacturing capabilities as well as company performance. A typical organogram of these business can be seen in Figure 12 below.

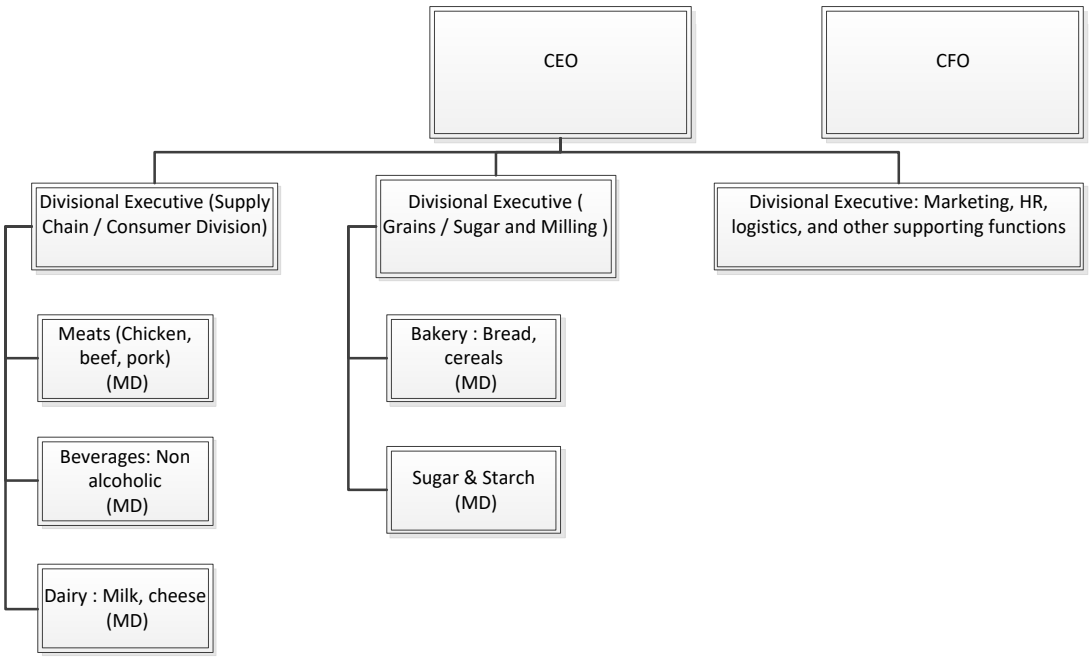



**Figure 12: Agro-processing conglomerate company structure (www.tigerbrands.co.za)**

The divisional executives (executive management), the respective business unit managing directors (senior management), factory managers and technical specialists within the divisions will have a clear understanding of the manufacturing capability and performance indicators. Thus, although a company may hire over 15 000 people, it is estimated that at most 50 people in the organization will have a clear understanding of the company's overall performance. The total population sample was limited to 100 people. These companies are traditionally closed companies that restrict information flow to protect against intellectual property infringement as this intellectual property is what allows them to retain their monopoly. Getting information out of these companies is particularly challenging. Elliot et al. (1994) suggests that large public firms are often skeptical of information disclosure in situations where competitors develop the ability to impose significantly greater disadvantages with the use of the information or litigation costs become too perverse. As

would be the case, in environments where companies rely on first-mover advantage as a competitive strength.

Based on a population sample of 100 people the minimum sample size that was needed was calculated using Cochran's (1997) formula for sample sizes that exceed 5% of the population ( $n = \frac{n_0}{(1+\frac{n_0}{population})}$ Equation 1 & Where $n_0 = \frac{(t^2)x(s^2)}{(d^2)}$ Equation 2)

$$\boldsymbol{n = \frac{n_0}{(1+\frac{n_0}{population})}} \quad \textbf{Equation 1}$$

$$\textbf{Where } \boldsymbol{n_0 = \frac{(t^2)x(s^2)}{(d^2)}} \quad \textbf{Equation 2}$$

t = t value for an alpha level of 0.05 and a sample size between 60 and 120 people. For an alpha level on 0.05 the t value is found to be 2, as opposed to the usual alpha value of 1.96 for a sample size greater than 120

s = the estimate of standard deviation in the sample. This is found by using equation 3 and gives a value of (7)/(6) = 1.167

$$\frac{estimate\ of\ variance\ deviation\ for\ a\ 7\ point\ scale(inclusive\ of\ scale\ of\ range)}{number\ of\ standard\ deiviations\ that\ include\ almost\ all\ (98\%) of\ the\ possible\ values\ in\ the\ range} \quad \textbf{Equation 3}$$

d = the acceptable margin of error for the mean. According to Krejcie & Morgan (1970) for continuous data the acceptable margin of error must be 3%, hence d = 0.03 x 7 = 0.21

$$n_0 = \frac{(2^2)x(1.167^2)}{(0.21^2)} \cong 106$$

$$n = \frac{106}{(1+\frac{106}{100})} \cong 52$$

Based on the calculation, a minimum sample size of 52 people was found to be acceptable. However, given the additional requirement of performing a multiple regression analysis, Hair, Anderson, Tatham and Black (1995), suggest that the ratio of observations to independent variables should not fall below 10: 1, hence the maximum number of regressors that can exist in my model was found to be 5 (Bartlett, Kotrlik & Higgins, 2001). Due to the limited population sample the study will require a response rate of more than 55%. To achieve such a high response rate, repetitive email, sms and telephonic reminders to the

population were required. Similar studies based on email surveys where the unit of analysis is an organization have achieved a response rate of 28% Bhaskaran, (2006) and 26.8% Chavez et al. (2017).

According to Mitchell and Carson, 1989, mail surveys have been prone to errors because of non-response. Due to the small population size, the data was further tested for non-response bias. Linder et al. (2001) suggest comparing early and late respondents. The respondents were grouped as early respondents (first 20%) and late respondents (last 20%). The two groups were compared on their responses to the Likert scale using t tests.

### 3.3.3 *The research instrument*

EO was measured using the Hughes and Morgan (2007) scale, which incorporated the dimensions of Covin and Slevin, (1989) as well as those of Lumpkin and Dess (2005). This approach recognizes the multidimensionality of EO and does not define EO as a linear sum of the five dimensions. Instead EO is treated as a disaggregated set of constructs that allows for the study of the independent effects of the EO dimensions on firm performance (Covin & Wales 2011).

Organizational performance was measured using scales on market and financial performance based on those developed by Flynn et al. (2010). This scale is consistent with Melnyk, Stewart and Swink. (2004), who suggest the use of performance outcomes that are closer to operational activities, in order to reflect operational effectiveness. The following measures of financial performance were used: Sales Growth, Return on Sales (ROS) and Return on Assets (ROA), Growth in Profit, and Return on Investment (ROI). The scale for market performance assessed plant sales, market share and profitability relative to competitors. This was done through the measurement of the perceptions of managers. Similar measurements have been used by Swamidass and Newell, (1987); Vickery et al. (1993); Boyer, (1999); Rosenzweig et al. (2003) in their studies of manufacturing business level performance (Swink el al., 2007).

Manufacturing capability dimensions (i.e. quality, delivery, flexibility and cost) were measured with scales based on Wong et al. (2011); Swink et al. (2007). The theoretical underpinnings of manufacturing competitive capabilities and business performance emanate from research performed by Hayes and Wheelwright, (1984); Wheelwright,

(1984); and Giffi et al. (1990). The purpose of the scales used in this research was to address the following capability areas: cost, quality, delivery, and flexibility. These scales are similar to those used by Ferdows and DeMeyer, (1990); Miller and Roth, (1994); White, (1996); Safizadeh et al. (1996); Boyer and Lewis, (2002); Rosenzweig et al. (2003); Ward et al. (1998), Swink et al. (2007).

The measurement of manufacturing competitive capabilities and performance through perceptual means is considered a reliable indicator of actual values (Dess and Robinson, 1984; Vickery et al., 1997; Ward et al., 1994; Ketokivi and Schroeder, 2004). This is supported by Swink et al. (2007) who found that a high correlation ($p < .05$) between perceptual business performance measures and managers' estimates of business performance. Due to the anonymous nature of this survey it would not be possible to test perceptions against actual company performance, as the survey did not allow managers to specify the name of their company.

All respective dimensions that were measured using a 7-point Likert scale can be found in APPENDIX A. Subdivisions within food manufacturing were used as control variables, to compare types of subdivisions. (Flynn et al., 2010).

## 3.4 Procedure for data collection

The primary data was collected using an online survey though Qualtrics. The survey was accompanied by a covering letter explaining the reasons for the research and data confidentiality. Access to these companies was facilitated through organizations that the food manufacturing sector subscribes to such as the Manufacturing Circle and the South African Association for Food Science and Technology and Agbiz South Africa. Due to the Protection of Personal Information Act, these institutions were not able to provide access to their mailing lists, hence individuals in the companies were approached via personal networks. A champion was identified in each organization to assist with survey circulation.

Identified champions were board members (executive and non-executive) and divisional executives. There was a high reliance on the champion with regards to response follow up. The use of WhatsApp for responses was not effective as it did not yield any replies. The champions were contacted telephonically on a weekly basis. Only 53 responses were

received prior to the December 2017 holiday break, however a further 25 responses were received between mid-January and mid-February 2018.

Secondary data, focusing on divisional performance was collected from the Statistics South Africa online repository.

## 3.5 Data analysis and interpretation

The hypothesized relationships between the various constructs were analyzed using ordinary least square analysis (OLS). The variables were tested for normality, linearity and multicollinearity. The cut of value that was used for multicollinearity was 0.70 (Anderson et al., 2002). This regression analysis was done with the EO and MC dimensions as the independent variables and organizational performance as the dependent variable.

To test hypothesis 1 and 2 stepwise multiple regression was performed. The stepwise regression checked for significance using the null hypothesis, prior to the creation of the model. The model was only created based on significance. Model creation based on significance does not necessarily imply the importance of the independent variable Sullivan and Feinn (2012), suggest that the low P and F values for significance can exist when independent variable has a precise estimate, low variability or a large sample size, hence may not necessarily constitute importance. Large sample sizes will always constitute significance unless effect size is zero. This research has a low population sample hence significance, although important, was not used to determine importance but rather correlation analysis was found to be a more insightful unit of analysis.

Correlation analysis was performed between the dimensions of EO, and those of manufacturing capability, with the respective Pearson correlation (r) or Spearman ($r_s$) representing the strength of the relationship.

To tests for normality, the Kolmogorov-Smirnov test and the Shapiro-Wilk test were used. Further to this, histograms and box plots were used to supplement data normality tests and determine outliers. The Kolmogorov-Smirnov test is an empirical distribution function in which the theoretical cumulative distribution function of the test distribution is contrasted with the empirical distribution function of the data (Ghasemi & Zahediasl, 2012). The test is less powerful for testing normality than Shapiro-Wilk. The Shapiro-Wilk test is based on the

correlation between the data and the corresponding normal scores (Ghasemi & Zahediasl, 2012). The Shapiro-Wilk test has been found to be more appropriate for small sample sizes (< 50 samples),

## 3.6 Limitations of the study

The limitations of the study are that it is limited to South African food manufacturing companies and will be limited to food and beverage manufacturing as per Stats SA, SIC classification (division 30), which excludes alcoholic beverages, furniture, wood, rubber, and paper. Secondly, the study is cross-sectional, and hence can only give a view at a particular instance.

## 3.7 Validity and reliability

There are many types of validity that include internal, external, content, criterion and construct validity. Content validity represents the degree to which a measure's items reflect a given theoretical content domain (Kerlinger, 1986). Structural validity assesses how well a measure can operationalize a concept or concepts (Nunnally and Bernstein, 1979) and can be measured through Exploratory Factor Analysis (EFA).

The chosen surveys on EO, manufacturing capability and performance have been subjected to both construct and structural validity by Chavez (2017) and Hugh's and Morgan (2007) respectively with confirmatory results. The tools employed were those of Exploratory Factor Analysis (EFA) and CFA. Factor analysis can give an indication of content validity however it does not necessarily mean that these items measure the same theoretical construct or come from the same content domain when items load on the same factor (Nunnally, 1978).

According to Leandre et al. (2011, P.11) "Factor analysis is used to determine the number of distinct constructs accessed by a set of measures." Field (2016, p.666) has identified three main uses of Factor Analysis as the following: (1) to apprehend the structure of a set of variables, (2) to create a questionnaire to measure an underlying variable, (3) to decrease a data set to a more manageable size while retaining as much of the original information as possible.

There is a scholarly debate as to the number of samples required to perform Factor analysis. The two dominant schools of thought are, those who suggest an absolute number of samples, and those who advocate a subject-to-variable ratio. Those who advocate for absolute sample numbers include MacCallum, Widaman, Zhang & Hong, (1999) who suggest a minimum sample size of 100, while Hutcheson and Sofroniou (1999), Guilford (1954, p. 533), and Norusis, 2005: 400, all suggest sample size values of between 150 and 300. Others such as Hair, Anderson, Tatham, and Black (1995); Hogarty, Hines, Kromrey, Ferron, & Mumford, 2005) advocate a subject-to-variable ratio ranging from 20:1 to a ratio of 3:1.

MacCallum, Widaman, Zhang, & Hong, (1999); Preacher & MacCallum, (2002) ) suggest that there is no general rule of thumb for a minimum sample size but rather that the sample size is dependent on design aspects such as communality of the variables, degree of over determination of the factors, and size of loading

Communalities are considered the most important as they measure the % variance jointly explained by the factors and can also be used as reliability indicators. MacCallum, Widaman, Zhang, and Hong (1999) suggested communalities should be greater than .6, or the mean level of communality to be at least .7 (p. 96).

Degree of over determination is the number of factors ÷ number of variables. It is suggested by McDonald & Krane, (1977, 1979), and Velicer, & Fava, (1998, p. 243), that three variables per factor is critical. Costello & Osborne, (2005) suggest that a factor with fewer than three items is generally weak and unstable.

Hair, Anderson, Tatham, and Black (1995) suggested that factor loadings greater than .30 meet the minimal level; loadings of greater than .40 are more important, and loadings of .50 or greater are practically significant. Comrey and Lee (1992) suggest that loadings over .71 are excellent, .63 very good, .55 good, .45 fair, and .32 poor. Tabachnick and Fidell (2007) took a contextual approach and recommended that the choice of the cut-off size of loadings should be the preference of the researcher.

To check data validity, EFA was performed on a sample size of 53 respondents and again on a sample of 76 respondents, as more people responded to the study over time. The cut-off for data collection was 75 respondents.

### 3.7.1 *Reliability*

Reliability measures whether an instrument can be understood consistently across different situations (Field, A., 2009); p.11).The use of Conbach's alpha coefficient will be used to assess the empirical reliability of the study (Carmines and Zeller, 1979).

Cronbach's Alpha Coefficient provides a measure of the internal consistency of the scale – expressed as a number between 0 and 1. If the items in a test are correlated to each other, the value of alpha is increased. Internal consistency describes the extent to which all the items measure the same concept or construct. This measure adds validity and accuracy to the interpretation of the data (Tavakol, M. & Dennick, R., 2011).

To determine the factors that are to be kept and discarded Field (2009), suggests the following criteria:

- if Cronbach Alpha < 0.5 => Disregard
- if Cronbach Alpha >= 0.5 => keep the factor

## 3.8 Demographic profile of respondents

The required demographic profile will be that of respondents with sufficient knowledge of their respective businesses. In each of the 10 companies, 10 surveys (10 x 10 = 100) will be sent to executive-, senior-, and middle managers.

The criterion for participation will be five-years' experience in either the specific role or in the South African food manufacturing sector. These informants could offer deep insights into the functional activities and be knowledgeable about the content of the company. These will be used as control variables, to demonstrate industry concentration and knowledgeability about the information requested.

# CHAPTER 4. PRESENTATION OF RESULTS

## 4.1 Introduction

This chapter will present the findings of the research, based on the methodology that was outlined in Chapter 3. The data was analyzed using SPSS edition 24 software for the statistical analysis. The first part of the research presents the descriptive profiles of the respondents. The second part presents the exploratory factor analysis, the reliability of the data and how factors were created. The final part of this chapter presents the multiple regression analysis and the correlation analysis of the hypothesized relationships.

## 4.2 Descriptive profiles of the respondents

The descriptive statistics that were used in this research were those of age, sector experience, and geographic location within South Africa, management level, divisional sector participation, and duration with current firm in the current position. Descriptive analysis was performed to understand the simple features of the data. The frequencies of these descriptives were analyzed to test assumptions. Prior to descriptive analysis, the data was assessed for missing values and outliers to ensure data completeness.

### 4.2.1 *Checking for data completeness*

The raw data was downloaded from the Qualtrics portal and imported directly into SPSS as a .sav file. This was done to prevent having to recode the data. The coded data was checked for accuracy, i.e. 1 = strongly disagree, 7 = strongly agree on Likert scale (see Figure 13). The data was imported with html metadata. This metadata was removed from the data set prior to analysis.


**Figure 13: SPSS Likert scale coding**

**Table 5: Demographic statistics**

| Descriptive Statistics | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| How old are you (in years)? | 53 | 2 | 6 | 3,75 | 0,853 | 0,310 | 0,327 | -0,218 | 0,644 |
| | 75 | 2 | 6 | 3,72 | 0,815 | 0,254 | 0,277 | -0,114 | 0,548 |
| Which Sector do you work for? | 53 | 3 | 10 | 7,17 | 2,351 | -0,590 | 0,327 | -0,820 | 0,644 |
| | 75 | 3 | 10 | 7,16 | 2,319 | -0,520 | 0,277 | -0,870 | 0,548 |
| Which Province are you located in / do you report to work? | 53 | 2 | 8 | 4,49 | 2,216 | -0,136 | 0,327 | -1,800 | 0,644 |
| | 75 | 2 | 8 | 4,24 | 2,241 | 0,083 | 0,277 | -1,855 | 0,548 |
| How long have you worked in the manufacturing industry (in years)? | 53 | 1 | 5 | 3,62 | 1,348 | -0,590 | 0,327 | -0,857 | 0,644 |
| | 75 | 1 | 5 | 3,57 | 1,337 | -0,527 | 0,277 | -0,926 | 0,548 |
| What is your management level? | 52 | 1 | 3 | 1,81 | 0,658 | 0,222 | 0,330 | -0,664 | 0,650 |
| | 74 | 1 | 3 | 1,77 | 0,693 | 0,341 | 0,279 | -0,868 | 0,552 |
| Duration with current firm, in current position (in years)? | 52 | 1 | 5 | 2,00 | 1,103 | 0,730 | 0,330 | -0,469 | 0,650 |
| | 74 | 1 | 5 | 1,89 | 1,130 | 1,156 | 0,279 | 0,551 | 0,552 |
| Valid N (listwise) | 51 | | | | | | | | |
| | 73 | | | | | | | | |

From Table 5, the data demonstrated one missing number in the firm duration and management level descriptive, two missing numbers in the age and geographical area descriptive and three missing numbers in the sector descriptive. These missing numbers were substituted for the means of the variables. The data was assessed for frequency distribution using the null hypothesis. Both the skewness and kurtosis were found to be between 2 and -2 (George & Mallery, 2010), showing that the data is normally distributed. As the sample size increased from 53 to 75 respondents, the standard deviation improved insignificantly, however the standard error for kurtosis and skewness improved significantly, suggesting that an increase in sample size improves the normality of the data. The remainder of the analysis was performed on both data sample sizes (53 & 75), with the higher sample size considered to be more conclusive.

### 4.2.2 *Non-response bias*

To test for non-response bias, the respondents were grouped as early respondents (first 20%) and late respondents (last 20%). The two groups were compared on their response to the Likert scale using the t- tests. The results showed no significant differences in the means

on the questions from both groups of respondents. All p- values were above 0.05, not supporting the null hypothesis that there is a significant difference. The full comparative table can be seen in APPENDIX D. Table 6 below shows a sample check for non-response bias.

**Table 6: Independent sample T- Test for non-response bias**

| Independent Sample test | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Quality_1 | Equal variances assumed | 0,456 | 0,505 | -0,520 | 30 | 0,607 | -0,250 | 0,480 | -1,231 | 0,731 |
| | Equal variances not assumed | | | -0,520 | 26,070 | 0,607 | -0,250 | 0,480 | -1,237 | 0,737 |

### 4.2.3 *Age*

The demographic age of respondents was such that 77.3% of the sampled population was found to be between the ages of 30 and 60. Outliers in the data were found to be for the ages 60-70 as evidenced by the box plot in Figure 16.

**Table 7: Frequency distribution of respondents by age**

| How old are you (in years)? | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | |
| Valid | 20-30 | 2 | 3 | 3,8 | 4,0 | 3,8 | 4,0 | 3,8 | 4,0 |
| | 30-40 | 20 | 28 | 37,7 | 37,3 | 37,7 | 37,3 | 41,5 | 41,3 |
| | 40-50 | 21 | 32 | 39,6 | 42,7 | 39,6 | 42,7 | 81,1 | 84,0 |
| | 50-60 | 9 | 11 | 17,0 | 14,7 | 17,0 | 14,7 | 98,1 | 98,7 |
| | 60-70 | 1 | 1 | 1,9 | 1,3 | 1,9 | 1,3 | 100,0 | 100,0 |
| | Total | 53 | 75 | 100,0 | 100,0 | 100,0 | 100,0 | | |

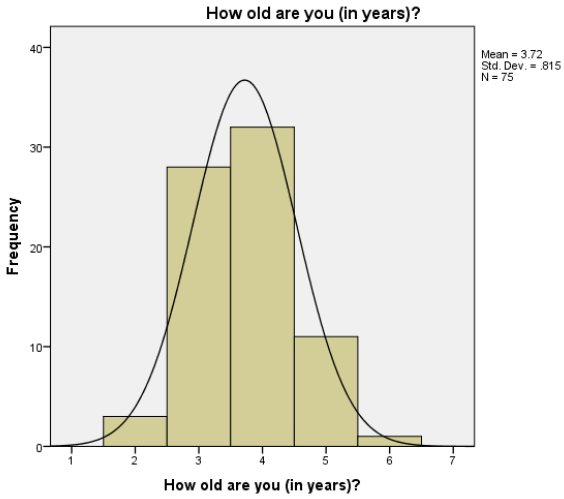



**Figure 14: Age histogram**

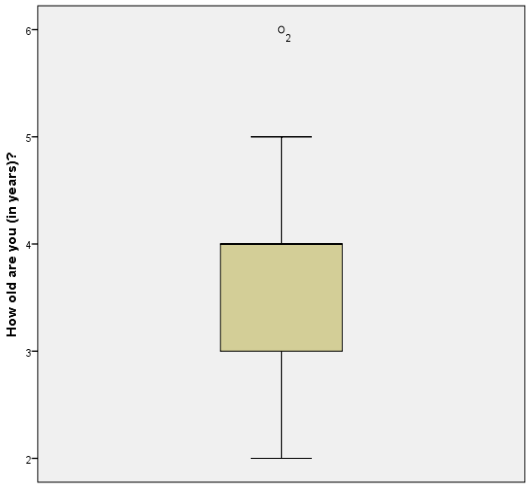



**Figure 15: Age box plot**

Figure 14 and Figure 15 show that age was normally distributed with a maximum deviation from the mean of 0.4075. As the data sample size increased no additional outliers were found.

### 4.2.4 *Sector*

**Table 8: Frequency distribution of respondents by subdivisions**

| Which Sector do you work for? | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | |
| Valid | Processing and preserving of fruit and vegetables | 8 | 10 | 15,1 | 13,3 | 15,1 | 13,3 | 15,1 | 13,3 |
| | Manufacture of vegetable and animal oils and fats | 0 | 1 | 0 | 1,3 | 0 | 1,3 | 0 | 14,7 |
| | Manufacture of dairy products | 8 | 12 | 15,1 | 16,0 | 15,1 | 16,0 | 30,2 | 30,7 |
| | Manufacture of bakery products, sugar, cocoa, chocolate and sugar confectionery | 5 | 9 | 9,4 | 12,0 | 9,4 | 12,0 | 39,6 | 42,7 |
| | Manufacture of other food products | 18 | 23 | 34,0 | 30,7 | 34,0 | 30,7 | 73,6 | 73,3 |
| | Manufacture of grain mill products | 3 | 4 | 5,7 | 5,3 | 5,7 | 5,3 | 79,2 | 78,7 |
| | Manufacture of Beverages (Juice, water & non-alcoholic beverages) | 11 | 16 | 20,8 | 21,3 | 20,8 | 21,3 | 100,0 | 100,0 |
| | Total | 53 | 75 | 100,0 | 100,0 | 100,0 | 100,0 | | |

Table 8 shows that respondents were predominantly from ‘other’ food manufacturing, however beverages, bakery, dairy, and preserving fruit and vegetables were almost equally represented. Grain mill products and oils and fats were poorly represented, as well as the remaining subdivisions of meat products, fish products, vegetable and animal oils and

animal feeds (Table 8). As the sample size increased there was no significant change in the proportion of representation of the subdivisions with the exceptions of the introduction of the oils and fat sector. This could suggest that sample size increased due to more participants from the same organizations and that some organizations did not participate at all.

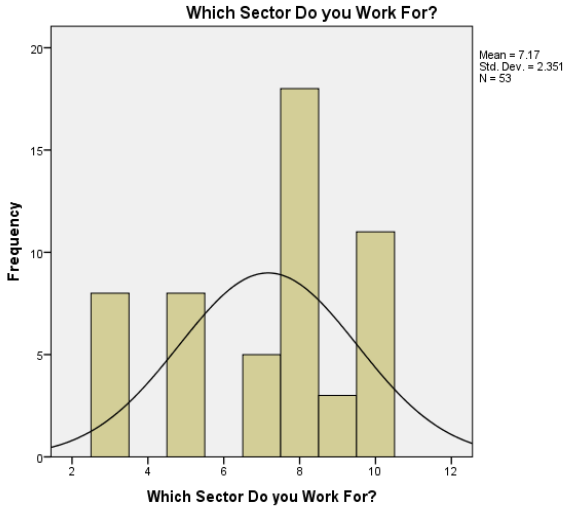



**Figure 16: Sector histogram**

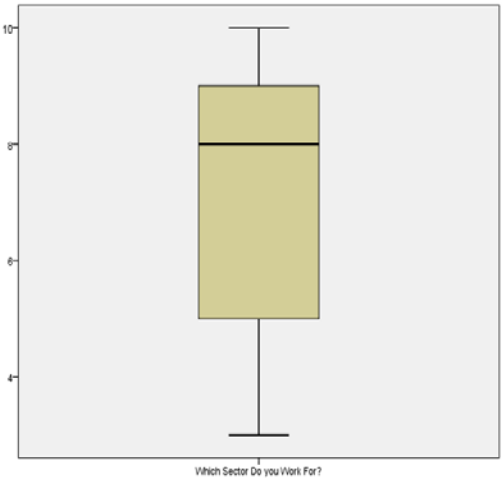



**Figure 17: Sector box plot**

Figure 16 shows that sector representation was slightly skewed to the right, with a deviation of 1.15 from the mean. The box plot shows that there were no outliers.

### 4.2.5 *Geographic location*

**Table 9: Frequency distribution of respondents by geographic region**

| Which Province are you located in / do you report to work? | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | |
| Valid | Gauteng | 22 | 36 | 41,5 | 48,0 | 41,5 | 48,0 | 41,5 | 48,0 |
| | Limpopo | 1 | 1 | 1,9 | 1,3 | 1,9 | 1,3 | 43,4 | 49,3 |
| | Western Cape | 21 | 25 | 39,6 | 33,3 | 39,6 | 33,3 | 83,0 | 82,7 |
| | Kwazulu Natal | 7 | 11 | 13,2 | 14,7 | 13,2 | 14,7 | 96,2 | 97,3 |
| | Eastern Cape | 2 | 2 | 3,8 | 2,7 | 3,8 | 2,7 | 100,0 | 100,0 |
| | Total | 53 | 75 | 100,0 | 100,0 | 100,0 | 100,0 | | |

Most of the respondents were from Gauteng and the Western Cape, followed by KwaZulu-Natal, Eastern Cape and Limpopo respectively. Provinces that were not represented were the Free State, Mpumalanga, Northern Cape and the North Western provinces (Table 9). Additional respondents emerged from Gauteng, Western Cape and KwaZulu-Natal with the majority of the late respondents emerging form Gauteng.

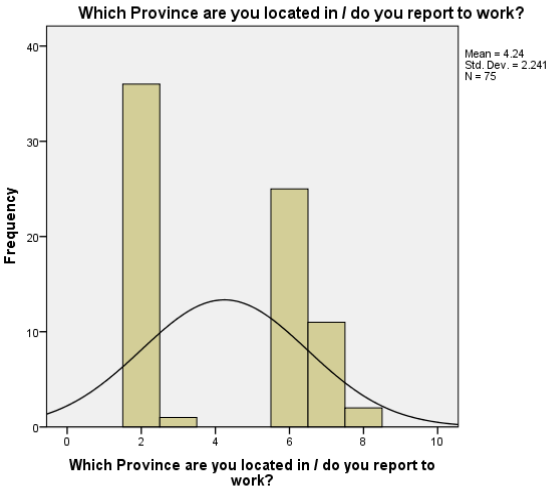



**Figure 18: Location histogram**

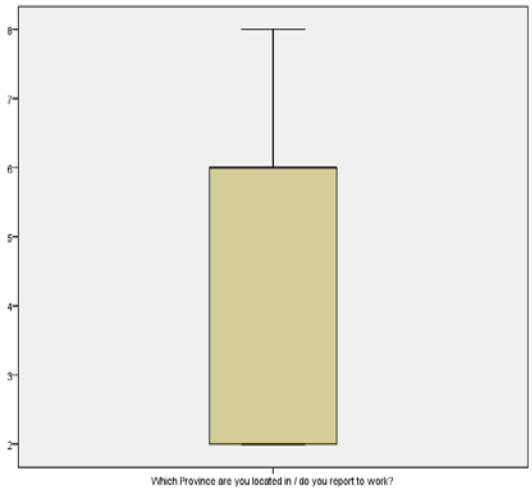



**Figure 19: Location box plot**

Figure 18 and Figure 19 show that geographic representation is slightly skewed to the right, with a deviation of 1.12 from the mean. The box plot shows that there were no outliers.

### 4.2.6 *Experience*

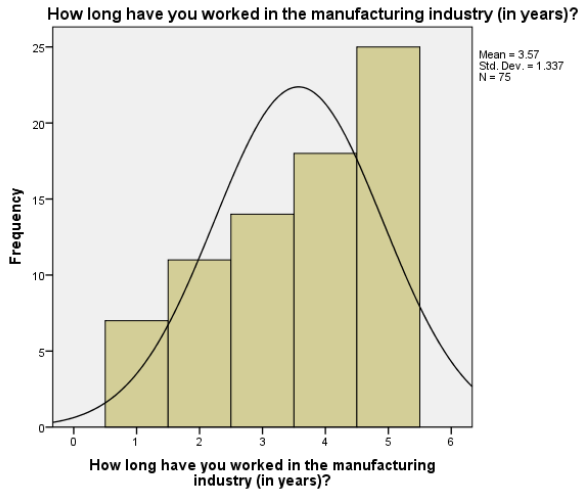
**Table 10: Frequency distribution of respondents by experience in the manufacturing industry**

| How long have you worked in the manufacturing industry (in years)? | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | |
| Valid | 0-5 | 5 | 7 | 9,4 | 9,3 | 9,4 | 9,3 | 9,4 | 9,3 |
| | 5-10 | 7 | 11 | 13,2 | 14,7 | 13,2 | 14,7 | 22,6 | 24,0 |
| | 10-15 | 10 | 14 | 18,9 | 18,7 | 18,9 | 18,7 | 41,5 | 42,7 |
| | 15-20 | 12 | 18 | 22,6 | 24,0 | 22,6 | 24,0 | 64,2 | 66,7 |
| | 20+ | 19 | 25 | 35,8 | 33,3 | 35,8 | 33,3 | 100,0 | 100,0 |
| | Total | 53 | 75 | 100,0 | 100,0 | 100,0 | 100,0 | | |

Table 10 illustrates that most of the respondents have over 20-years' experience in the manufacturing industry. 77.4% of the respondents have an experience range of 10 – 20+ years, suggesting that most of the respondents are highly experienced in the manufacturing sector.

Figure 20 and Figure 21 show that manufacturing experience is skewed to the right, and that the data was not normally distributed. Most candidates have high levels of experience.

The response trend was similar when the sample size increased, showing minimal changes. No outliers were found with manufacturing experience.



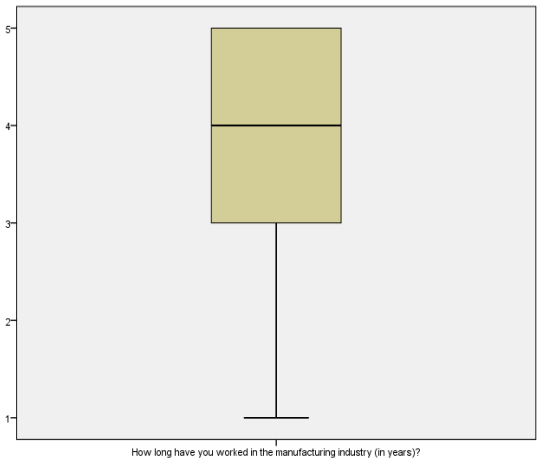




**Figure 20: Manufacturing experience**

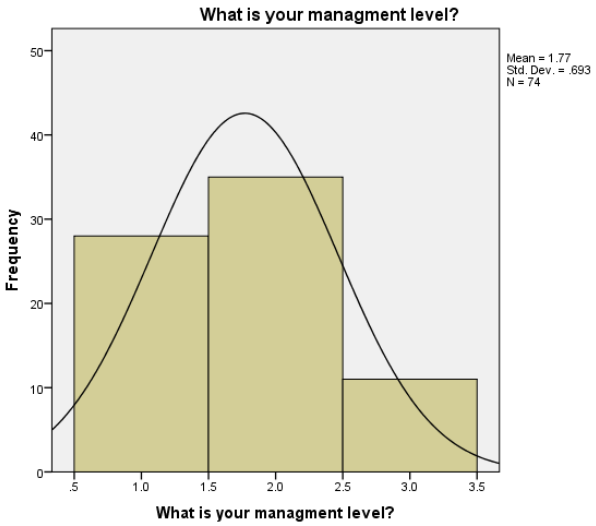
**Figure 21: Manufacturing experience box plot**

### 4.2.7 *Management Level*

**Table 11: Frequency distribution of respondents by management level**

| What is your management level? | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | |
| Valid | Middle Management (P8-6) | 17 | 28 | 32,1 | 37,3 | 32,7 | 37,8 | 32,7 | 37,8 |
| | Senior Management (P5-3) | 28 | 35 | 52,8 | 46,7 | 53,8 | 47,3 | 86,5 | 85,1 |
| | Executive Management (P3 -1) | 7 | 11 | 13,2 | 14,7 | 13,5 | 14,9 | 100,0 | 100,0 |
| | Total | 52 | 74 | 98,1 | 98,7 | 100,0 | 100,0 | | |
| Missing | System | 1 | 1 | 1,9 | 1,3 | | | | |
| Total | | 53 | 75 | 100,0 | 100,0 | | | | |

Table 11 shows that most respondents were senior managers followed by middle managers and executive managers respectively. A combined majority representation of senior and executive managers is important for the study, as both senior and executive managers are likely to possess the relevant information regarding business performance. Middle managers are more likely to have good insight into operational performance and manufacturing capabilities, hence this is a fair distribution of respondents.



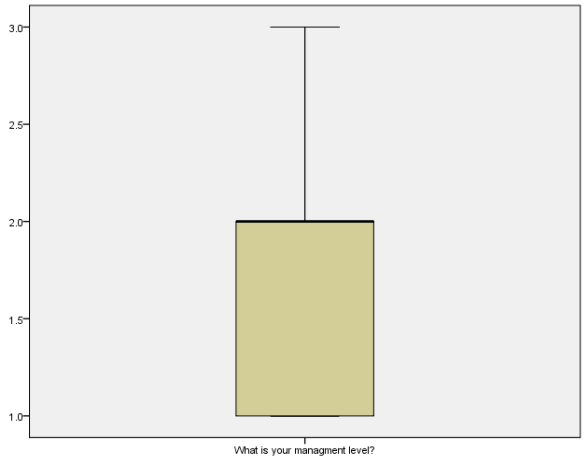




**Figure 22: Management level histogram**

**Figure 23: Management level box plot**

Figure 22 and Figure 23 show an even distribution of data relating to management level without outliers.

### 4.2.8 *Duration with current firm*

**Table 12: Frequency distribution of respondents by duration with current firm**

| Duration with current firm, in current position (in years)? | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Frequency | | Percent | | Valid Percent | | Cumulative Percent | |
| Valid | 0-5 | 24 | 38 | 45,3 | 50,7 | 46,2 | 51,4 | 46,2 | 51,4 |
| | 5-10 | 10 | 16 | 18,9 | 21,3 | 19,2 | 21,6 | 65,4 | 73,0 |
| | 10-15 | 13 | 13 | 24,5 | 17,3 | 25,0 | 17,6 | 90,4 | 90,5 |
| | 15-20 | 4 | 4 | 7,5 | 5,3 | 7,7 | 5,4 | 98,1 | 95,9 |
| | 20+ | 1 | 3 | 1,9 | 4,0 | 1,9 | 4,1 | 100,0 | 100,0 |
| | Total | 52 | 74 | 98,1 | 98,7 | 100,0 | 100,0 | | |
| Missing | System | 1 | 1 | 1,9 | 1,3 | | | | |
| Total | | 53 | 75 | 100,0 | 100,0 | | | | |

Most respondents have 0 – 5 years' experience in their roles with their respective firms. This remained the same when the sample size grew. Role changes in this industry show that there is a constant introduction of new perspectives, alternatively this could indicate high staff turnover.

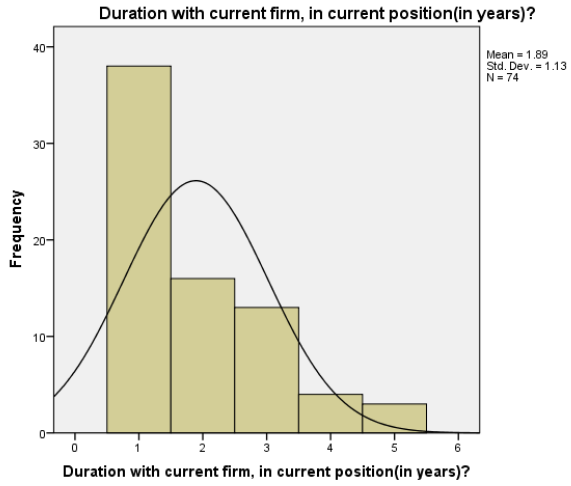



**Figure 24: Histogram of duration with current firm**

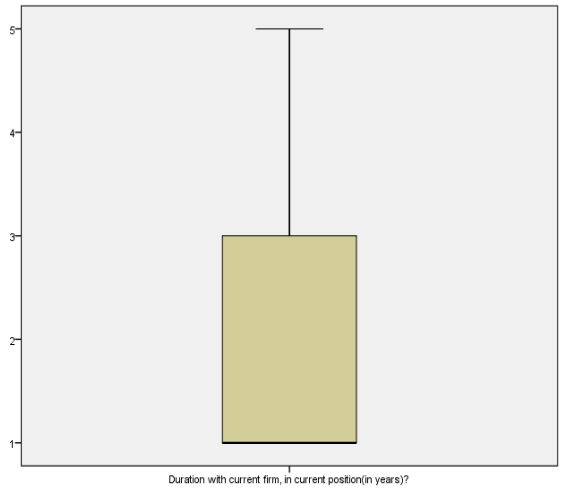



**Figure 25: Duration with firm box plot**

Figure 24 shows that firm duration has a left-side distribution, suggesting that the respondents do not have exceptionally high levels of experience in their roles. On average, respondents have between 0 – 5 years' experience in their roles. No outliers were identified as can be seen from the box plot in Figure 25.

### 4.2.9 *Demographic cross-tabulations*

The cross-tabulations performed in Table 13, Table 14 and Table 15 suggest reasonable positional turnover at all levels, with the exception of two executives who have retained the same role for more than 20 years. In this instance, it is clear that these organizations do retain some institutional memory, as manufacturing capabilities are often developed over long periods of time. The majority of people occupying new positions (0 – 5 years) are between the ages of 30 and 50 years of age, which shows the entrance of individuals with diverse views. The majority of senior and executive managers are between the ages of 30 and 50, which does not reflect an aged management population.

**Table 13: Position duration and management level cross-tabulation**

| Duration with current firm, in current position (in years)? * What is your management level? Cross-tabulation | | | | | |
|---|---|---|---|---|---|
| Count | | | | | |
| | | What is your management level? | | | |
| | | Middle Management (P8-6) | Senior Management (P5-3) | Executive Management (P3 -1) | Total |
| Duration with current firm, in current position (in years)? | 0-5 | 15 | 17 | 5 | 37 |
| | 5-10 | 8 | 7 | 1 | 16 |
| | 10-15 | 3 | 7 | 3 | 13 |
| | 15-20 | 2 | 2 | 0 | 4 |
| | 20+ | 0 | 1 | 2 | 3 |
| Total | | 28 | 34 | 11 | 73 |

**Table 14: Position duration and age cross-tabulation**

| Duration with current firm, in current position (in years)? * How old are you (in years)? Cross-tabulation | | | | | | | |
|---|---|---|---|---|---|---|---|
| Count | | | | | | | |
| | | How old are you (in years)? | | | | | |
| | | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | Total |
| Duration with current firm, in current position (in years)? | 0-5 | 3 | 14 | 17 | 4 | 0 | 38 |
| | 5-10 | 0 | 8 | 5 | 2 | 1 | 16 |
| | 10-15 | 0 | 6 | 5 | 2 | 0 | 13 |
| | 15-20 | 0 | 0 | 3 | 1 | 0 | 4 |
| | 20+ | 0 | 0 | 1 | 2 | 0 | 3 |
| Total | | 3 | 28 | 31 | 11 | 1 | 74 |

**Table 15: Management level and age cross-tabulations**

| What is your management level? * How old are you (in years)? Cross-tabulation | | | | | | | |
|---|---|---|---|---|---|---|---|
| Count | | | | | | | |
| | | How old are you (in years)? | | | | | |
| | | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | Total |
| What is your management level? | Middle Management (P8-6) | 2 | 15 | 10 | 0 | 1 | 28 |
| | Senior Management (P5-3) | 0 | 13 | 14 | 8 | 0 | 35 |
| | Executive Management (P3 -1) | 0 | 0 | 8 | 3 | 0 | 11 |
| Total | | 2 | 28 | 32 | 11 | 1 | 74 |

**Table 16: Leadership and experience cross-tabulation**

| How long have you worked in the manufacturing industry (in years)? * What is your management level? Cross-tabulation | | | | | |
|---|---|---|---|---|---|
| | | What is your management level? | | | |
| | | Middle Management (P8-6) | Senior Management (P5-3) | Executive Management (P3 -1) | Total |
| How long have you worked in the manufacturing industry (in years)? | 0-5 | 3 | 3 | 0 | 6 |
| | 5-10 | 9 | 2 | 0 | 11 |
| | 10-15 | 8 | 5 | 1 | 14 |
| | 15-20 | 4 | 13 | 1 | 18 |
| | 20+ | 4 | 12 | 9 | 25 |
| Total | | 28 | 35 | 11 | 74 |

**Table 17: Sector - Management level cross-tabulation**

| Which Sector Do you Work For? * What is your management level? Cross-tabulation | | | | | |
|---|---|---|---|---|---|
| Count | | | | | |
| | | What is your management level? | | | |
| | | Middle Management (P8-6) | Senior Management (P5-3) | Executive Management (P3 - 1) | Total |
| Which Sector Do you Work For? | Processing and preserving of fruit and vegetables | 0 | 6 | 4 | 10 |
| | Manufacture of vegetable and animal oils and fats | 1 | 0 | 0 | 1 |
| | Manufacture of dairy products | 5 | 6 | 0 | 11 |
| | Manufacture of bakery products, sugar, cocoa, chocolate and sugar confectionery | 6 | 3 | 0 | 9 |
| | Manufacture of other food products | 12 | 8 | 3 | 23 |
| | Manufacture of grain mill products | 1 | 1 | 2 | 4 |
| | Manufacture of Beverages (Juice, water & non-alcoholic beverages) | 3 | 11 | 2 | 16 |
| Total | | 28 | 35 | 11 | 74 |

## 4.3 Exploratory Factor Analysis (EFA)

Although the employed survey had previously tested for construct validity by Chavez et al. (2017) it was important to assess that all variables loaded to the hypothesized variable. To perform factor analysis, the data was checked for the following:

- Outliers and missing number. This was measured through checking frequencies per response
- Adequate sample size. This was measured using the Keiser-Meyer-Ollkin (KMO) measure of sampling adequacy. The boundaries of the KMO measure were such that

KMO ≥ 9 is marvelous, 0.8 ≤ KMO < 0.9 is Meritorious, 0.7 ≤ KMO < 0.8 is middling, 0.6 ≤ KMO < 0.7 mediocre, 0.5 ≤ KMO < 0.6 miserable and KMO < 0.4 is unacceptable (Field, 2009).

- All EFA, multiple regression, and correlation analyses were repeated using the bigger sample size of 75 respondents. Results were similar to those obtained using 53 respondents. Results and analysis for the 53-respondents sample can be found in APPENDIX D.

### 4.3.1 *Data Integrity*

**Missing Numbers**

Table 18 shows that six respondents did not complete the survey accurately. Respondents 23 and 66 had extreme responses, whilst respondent number 5 did not complete the majority of the survey. Regression was performed with missing numbers substituted by the mean

**Table 18: EFA test for missing numbers**

| Case | # Missing | % Missing | Missing Patterns (cases with missing values) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Delivery_2 | Autonomy_2 | Cost_1 | Cost_2 | Cost_3 | Cost_4 | Risk_1 | Risk_3 | Innovativeness_1 | Innovativeness_2 | Innovativeness_3 | Proactiveness_1 | Proactiveness_2 | Proactiveness_3 | Competitive_Aggressiveness_1 | Competitive_Aggressiveness_2 | Competitive_Aggressiveness_3 | Autonomy_1 | Autonomy_3 | Autonomy_5 | Autonomy_6 | Business_Perfromance_1 | Business_Perfromance_2 | Business_Perfromance_4 | Business_Perfromance_3 | Business_Perfromance_5 | Business_Perfromance_6 | Business_Perfromance_7 | Business_Perfromance_8 | Business_Perfromance_9 | Autonomy_4 | Risk_2 | Flexibility_3 | Flexibility_2 | Flexibilty_1 | Flexibility_4 |
| 6 | 1 | 2, 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | S | | | | | |
| 23 | 1 | 2, 3 | | + | | | | | | | | + | | | | | | | | + | + | | | | | | S | | | | | | + | | | | - | |
| 66 | 1 | 2, 3 | | + | | | | | | | | | | | | | | | | + | + | | | | | | | | | | | | + | S | | | | |
| 61 | 2 | 4, 5 | S | S | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | 4 | 9, 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | S | S | S | S |
| 29 | 5 | 11 ,4 | | | | | | | | | | | | | | | | | | | | | | | | | S | S | S | S | S | | | | | | | |
| 75 | 9 | 20 ,5 | | | | | | | | | | | | | | | | | | | | | | S | S | S | S | S | S | S | S | | | | | | | |
| 5 | 31 | 70 ,5 | | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | S | | | | | |
| | - indicates an extreme low value, while + indicates an extreme high value. The range used is (Q1 - 1.5*IQR, Q3 + 1.5*IQR). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

### 4.3.2 *KMO and Bartlett sphericity test*

The KMO tests to determine adequacy of data sample size to perform EFA were run for the constructs of EO, performance and manufacturing capability. As can be seen in the tables 19, 20 and 21 below all KMO values were above 0.7 indicating that the sample size was adequate. The KMO had a slight improvement when sample size was increased from 53 to 75 respondents.

## EO

**Table 19: KMO test for entrepreneurial orientation (EO)**

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | 0,876 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1138,127 |
| | df | 153 |
| | Sig. | 0,000 |

## Performance

**Table 20: KMO test for performance**

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | 0,866 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 562,784 |
| | df | 36 |
| | Sig. | 0,000 |

## Manufacturing capability

**Table 21: KMO test for manufacturing capability**

| KMO and Bartlett's Test | |
|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | 0,752 |

| | | |
|---|---|---|
| Bartlett's Test of Sphericity | Approx. Chi-Square | 773,451 |
| | df | 136 |
| | Sig. | 0,000 |

### 4.3.3 *EFA and reliability*

After correcting the data, the factors were created based on the EFA results. EFA involves the study of order and structure in the multivariate data. It is meant to give rise to the observed phenomena and attempts to reveal the constructs and dynamics of the observed data. EFA was explored through dimension reduction. This was done using varimax rotation with the Kaiser normalization. The purpose of this was to test for clusters of variables or measures. EFA, explains the maximum amount of 'common variance' in a correlation matrix using the least number of constructs (Field, A., 2009). EFA loading relationships suggested by Field, (2009) are as follows:

- < 0.4 Weak relationship
- 0.4-0.6 Moderate relationship
- > 0.6 Strong relationship

The rotated component matrix that resulted from the above was analyzed, focusing on questions which had high multiple factor loadings.

In this study, the convergent validity of the measures was tested to ascertain the degree to which multiple attempts to measure the same concept would be in agreement.

The factor loadings and composite reliability were used to assess convergent validity as suggested by Hair et al. (2010). This was done using Cronbach's alpha coefficient. The following criteria, as per Field, A. (2009), was used to decide whether to discard or keep the factor:

- if Cronbach Alpha < 0.5 => Disregard
- if Cronbach Alpha >= 0.5 => keep the factor

The mean of the variables for specific factors found by the EFA was calculated to create the separate or new factors. The test for normality was then done on these factors to determine

the type of correlation which could be used. The data was found to be nonparametric and Spearman's ranking of coefficients was generated.

For performance, the variables of growth in sales and growth in market share were removed, in order to perform reliability analysis.

**EO – Promax rotation**

From the literature review it is not clear if the dimensions of EO are independent or dependent, and so the initial rotation on the data was a promax rotation. This was done to assess the correlations between the dimensions as well as to determine the number of factors.

To estimate the initial number for factors, EFA was run and the scree plot was assessed to identify a point of inflection. The factors at the point of inflection according to the scree plot below (Figure: 26) was found to be five (5).

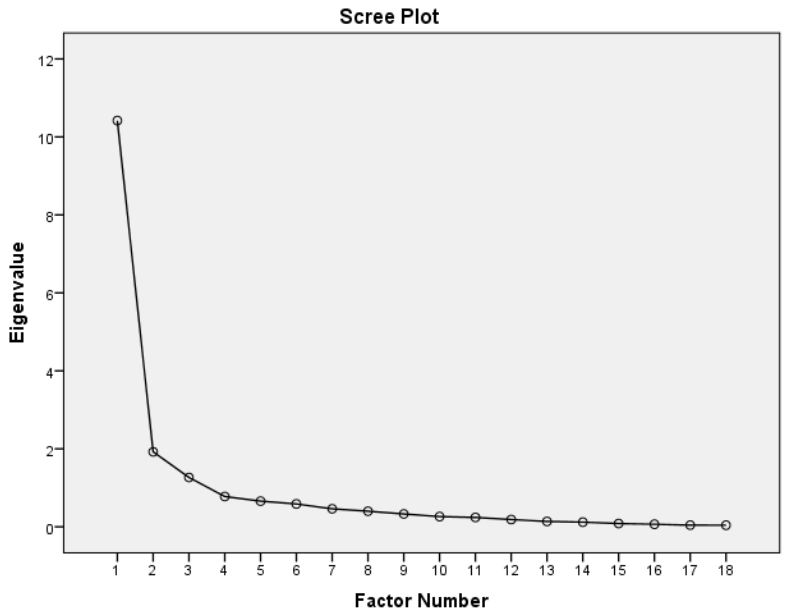



**Figure: 26 EO, scree plot**

The number of factors from the scree plot were then compared to the variance table (Table 22) to determine how much of the data variance they explained. It was found that the five factors explained 80% of the variance. It was decided to use the five factors although factors 4 and 5 had an Eigen value of less than 1. The decision was supported by the point of inflection between factors 4 and 6 in the scree plot (Figure: 26). This decision was further

guided by the literature review. When the data sample size changed from 53 to 75 respondents the variance explained decreased from 83% to 81%.

**Table 22: EO – variance table**

| Total Variance Explained | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
| Factor | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 9,937 | 55,205 | 55,205 | 9,694 | 53,854 | 53,854 | 4,054 | 22,525 | 22,525 |
| 2 | 1,948 | 10,822 | 66,027 | 1,731 | 9,614 | 63,469 | 2,630 | 14,612 | 37,136 |
| 3 | 1,143 | 6,348 | 72,375 | 0,885 | 4,916 | 68,385 | 2,384 | 13,242 | 50,378 |
| 4 | 0,901 | 5,006 | 77,381 | 0,687 | 3,817 | 72,202 | 2,240 | 12,446 | 62,824 |
| 5 | 0,663 | 3,683 | 81,063 | 0,442 | 2,453 | 74,655 | 2,130 | 11,832 | 74,655 |
| 6 | 0,613 | 3,407 | 84,470 | | | | | | |
| 7 | 0,538 | 2,987 | 87,457 | | | | | | |
| 8 | 0,411 | 2,282 | 89,740 | | | | | | |
| 9 | 0,339 | 1,882 | 91,622 | | | | | | |
| 10 | 0,315 | 1,752 | 93,374 | | | | | | |
| 11 | 0,255 | 1,416 | 94,790 | | | | | | |
| 12 | 0,232 | 1,287 | 96,077 | | | | | | |
| 13 | 0,184 | 1,021 | 97,099 | | | | | | |
| 14 | 0,151 | 0,841 | 97,940 | | | | | | |
| 15 | 0,130 | 0,724 | 98,664 | | | | | | |
| 16 | 0,103 | 0,572 | 99,236 | | | | | | |
| 17 | 0,074 | 0,413 | 99,649 | | | | | | |
| 18 | 0,063 | 0,351 | 100,000 | | | | | | |
| Extraction Method: Principal Axis Factoring. | | | | | | | | | |

Due to EO being an inter-correlated construct, communalities were checked to establish the variables that were likely to either cross load or to not form part of any factor. Low communalities were found with Autonomy_5, Autonomy_6 and Competitive Aggressiveness_3. The high loadings on most of the variables suggested orthogonality. Based on Table 23 below, factor extraction was computed using varimax rotation (orthogonal rotation)

**Table 23 - EO – communalities table**

| Communalities | | |
|---|---|---|
| | Initial | Extraction |
| Risk_1 | 0,752 | 0,762 |
| Risk_2 | 0,765 | 0,804 |
| Risk_3 | 0,784 | 0,730 |
| Innovativeness_1 | 0,779 | 0,735 |
| Innovativeness_2 | 0,814 | 0,869 |

| | | |
|---|---|---|
| Innovativeness_3 | 0,796 | 0,758 |
| Proactiveness_1 | 0,805 | 0,794 |
| Proactiveness_2 | 0,822 | 0,858 |
| Proactiveness_3 | 0,857 | 0,854 |
| Competitive_Aggressiveness_1 | 0,725 | 0,623 |
| Competitive_Aggressiveness_2 | 0,834 | 0,971 |
| Competitive_Aggressiveness_3 | 0,573 | 0,495 |
| Autonomy_1 | 0,759 | 0,759 |
| Autonomy_2 | 0,860 | 0,789 |
| Autonomy_3 | 0,743 | 0,732 |
| Autonomy_4 | 0,811 | 0,817 |
| Autonomy_5 | 0,646 | 0,566 |
| Autonomy_6 | 0,572 | 0,522 |
| Extraction Method: Principal Axis Factoring. | | |

## EO – Varimax rotation

EFA with Varimax rotation was performed, and factor loadings of below 0.45 were suppressed. Table 24 shows the rotated factor matrix and the associated reliability statistics. All five factors were found to have high and distinct loadings. When the EFA was initially performed with 53 responses Autonomy_6 had a cross loading of almost equal magnitude amongst factors 1, 4, and 5. Autonomy_2 had a cross loading between factor 1 and 3, however the loading for factor 1 was significantly higher, hence it was kept as associated to factor 1. Innovativeness_2, and 3 also had cross loadings between factor 2 and 5. With the increased data sample size there was no cross loading, as can be seen in Table 24.

**Table 24: EO – varimax rotation**

| Rotated Factor Matrix[a] | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Factor | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | | |
| Autonomy_1 | 0,791 | | | | | **Reliability Statistics** | |
| Autonomy_2 | 0,774 | | | | | Cronbach's Alpha | N of Items |
| Autonomy_3 | 0,783 | | | | | 0,914 | 6 |
| Autonomy_4 | 0,844 | | | | | | |
| Autonomy_5 | 0,601 | | | | | | |
| Autonomy_6 | 0,499 | | | | | | |
| Competitive_Aggressiveness_1 | | | 0,617 | | | **Reliability Statistics** | |
| Competitive_Aggressiveness_2 | | | 0,851 | | | Cronbach's Alpha | N of Items |
| Competitive_Aggressiveness_3 | | | 0,571 | | | 0,855 | 3 |
| Innovativeness_1 | | | | | 0,668 | **Reliability Statistics** | |
| Innovativeness_2 | | | | | 0,771 | Cronbach's Alpha | N of Items |
| Innovativeness_3 | | | | | 0,598 | 0,889 | 3 |
| Proactiveness_1 | | 0,668 | | | | **Reliability Statistics** | |
| Proactiveness_2 | | 0,793 | | | | Cronbach's Alpha | N of Items |
| Proactiveness_3 | | 0,765 | | | | 0,929 | 3 |
| Risk_1 | | | | 0,738 | | **Reliability Statistics** | |
| Risk_2 | | | | 0,679 | | Cronbach's Alpha | N of Items |
| Risk_3 | | | | 0,600 | | 0,896 | 3 |

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

## Performance

EFA was performed on the performance construct, with loadings suppressed at 0.5. The variance table (Table 25) as well as the scree plot (Figure 27) indicated that there were two factors associated with the construct of performance.

**Table 25: Performance – variance table**

**Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 5,590 | 62,110 | 62,110 | 5,590 | 62,110 | 62,110 | 4,828 | 53,642 | 53,642 |
| 2 | 1,432 | 15,912 | 78,022 | 1,432 | 15,912 | 78,022 | 2,194 | 24,380 | 78,022 |
| 3 | 0,703 | 7,813 | 85,835 | | | | | | |
| 4 | 0,431 | 4,785 | 90,620 | | | | | | |
| 5 | 0,274 | 3,039 | 93,660 | | | | | | |
| 6 | 0,211 | 2,344 | 96,003 | | | | | | |
| 7 | 0,177 | 1,970 | 97,973 | | | | | | |
| 8 | 0,104 | 1,153 | 99,126 | | | | | | |
| 9 | 0,079 | 0,874 | 100,000 | | | | | | |

Extraction Method: Principal Component Analysis.

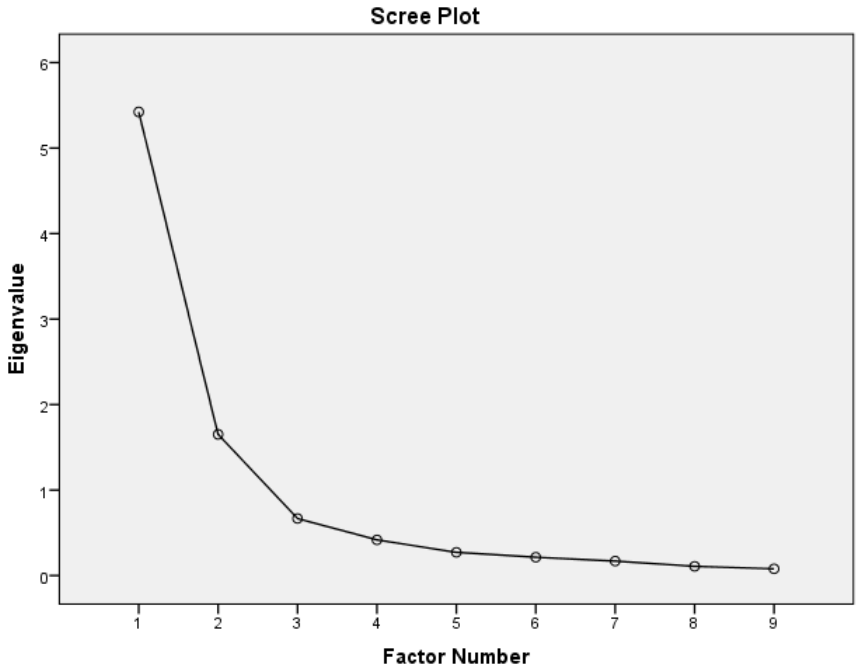



**Figure 27: Performance, scree plot**

The rotated factor matrix did not show any cross loadings, suggesting that the questions for performance assessed two very distinct constructs. From the questions on factor 1, it can be inferred that factor 1 is financial performance while factor 2 is market growth. Questions associated with factor 2 were removed from the factor, and factor analysis was performed again, and the new factor was tested for reliability. The Alpha coefficient was found to be above 0.7, which is considered reliable (Table 26). The performance factor could only test financial performance. When the EFA was performed in the absence of Question 1 and Question 5 the single factor explained 73% of the variance, and there was no cross loading (For results see APPENDIX D).

**Table 26: Performance – rotated factor matrix**

| Rotated Factor Matrix[a] | | | | |
|---|---|---|---|---|
| | Factor | | | |
| | 1 | 2 | Reliability Statistics | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Growth in sales | | 0,907 | Cronbach's Alpha | N of Items |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Return on sales (ROS) /Gross margin | 0,754 | | 0,941 | 7 |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Growth in return on sales (ROS) | 0,565 | | | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Growth in profit | 0,710 | | | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Growth in market share | | 0,790 | | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Return on investment (ROI) | 0,844 | | | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Growth in ROI | 0,898 | | | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Return on assets (ROA) | 0,902 | | | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Growth in ROA | 0,881 | | | |
| Extraction Method: Principal Axis Factoring.<br>Rotation Method: Varimax with Kaiser Normalization. | | | | |
| a. Rotation converged in 3 iterations. | | | | |

## Manufacturing capability

EFA was performed on manufacturing capability, using Principal Axis factoring and a Varimax rotation, with loadings suppressed at 0.5. The variance table (Table 27) as well as

the scree plot (Figure 28) indicated that there were four factors associated with the construct of manufacturing capability. All factors were found to be completely independent of each other. The four factors explained 72.9% of the variance in the data.

**Total Variance Explained**

| Component | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
|---|---|---|---|---|---|---|---|---|---|
| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 4,924 | 28,962 | 28,962 | 4,924 | 28,962 | 28,962 | 3,841 | 22,595 | 22,595 |
| 2 | 3,697 | 21,750 | 50,711 | 3,697 | 21,750 | 50,711 | 2,965 | 17,442 | 40,037 |
| 3 | 2,123 | 12,489 | 63,200 | 2,123 | 12,489 | 63,200 | 2,963 | 17,428 | 57,465 |
| 4 | 1,661 | 9,773 | 72,973 | 1,661 | 9,773 | 72,973 | 2,636 | 15,508 | 72,973 |
| 5 | 0,806 | 4,743 | 77,716 | | | | | | |
| 6 | 0,665 | 3,909 | 81,626 | | | | | | |
| 7 | 0,602 | 3,543 | 85,169 | | | | | | |
| 8 | 0,446 | 2,621 | 87,789 | | | | | | |
| 9 | 0,409 | 2,406 | 90,195 | | | | | | |
| 10 | 0,343 | 2,019 | 92,214 | | | | | | |
| 11 | 0,300 | 1,765 | 93,979 | | | | | | |
| 12 | 0,249 | 1,467 | 95,446 | | | | | | |
| 13 | 0,218 | 1,281 | 96,727 | | | | | | |
| 14 | 0,173 | 1,015 | 97,743 | | | | | | |
| 15 | 0,150 | 0,884 | 98,627 | | | | | | |
| 16 | 0,124 | 0,727 | 99,353 | | | | | | |
| 17 | 0,110 | 0,647 | 100,000 | | | | | | |

Extraction Method: Principal Component Analysis.

**Table 27: Manufacturing capability, variance**

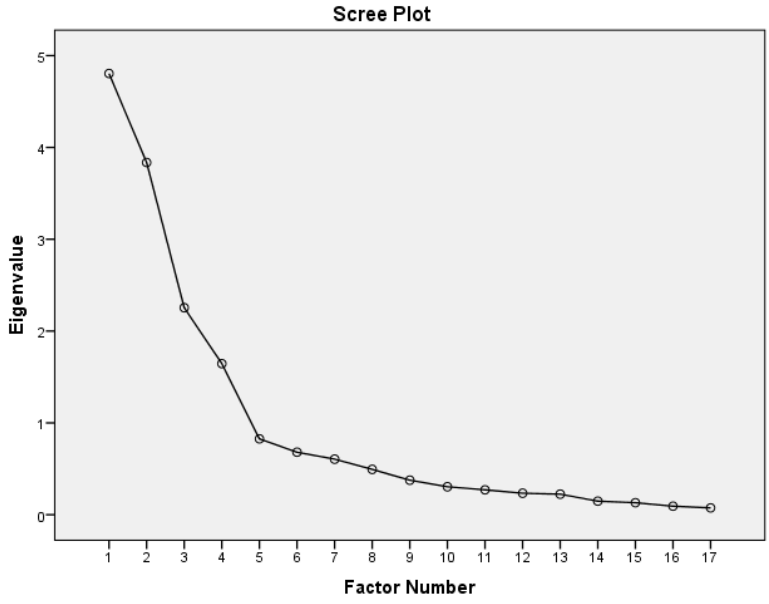



**Figure 28: Manufacturing capability, scree plot**

The rotated factor matrix (Table 28), showed four distinct factors, each with loadings above 0.6. Each factor was tested for reliability. It was found that all factors displayed a reliability factor above 0.8, indicating that the factors could be reliably tested. The factor loadings and reliability statistics were not affected by an increase in sample data size.

**Table 28: Manufacturing capability – rotated factor matrix**

| Rotated Factor Matrix[a] | | | | | | |
|---|---|---|---|---|---|---|
| | Factor | | | | | |
| | 1 | 2 | 3 | 4 | | |
| Cost_1 | | | | 0,732 | **Reliability Statistics** | |
| Cost_2 | | | | 0,645 | Cronbach's Alpha | N of Items |
| Cost_3 | | | | 0,825 | 0,819 | 4 |
| Cost_4 | | | | 0,674 | | |
| Delivery_1 | 0,755 | | | | **Reliability Statistics** | |
| Delivery_2 | 0,832 | | | | Cronbach's Alpha | N of Items |
| Delivery_3 | 0,862 | | | | 0,914 | 5 |
| Delivery_4 | 0,916 | | | | | |
| Delivery_5 | 0,659 | | | | | |
| Flexibilty_1 | | | 0,812 | | **Reliability Statistics** | |
| Flexibility_2 | | | 0,713 | | Cronbach's Alpha | N of Items |
| Flexibility_3 | | | 0,745 | | 0,853 | 4 |
| Flexibility_4 | | | 0,731 | | | |
| Quality_1 | | 0,740 | | | **Reliability Statistics** | |
| Quality_2 | | 0,644 | | | Cronbach's Alpha | N of Items |
| Quality_3 | | 0,881 | | | 0,871 | 4 |
| Quality_4 | | 0,862 | | | | |
| Extraction Method: Principal Axis Factoring. Rotation Method: Varimax with Kaiser Normalization. | | | | | | |
| a. Rotation converged in 6 iterations. | | | | | | |

## 4.4 Factor normality

To perform correlation analysis and test hypothesis 3, the data was tested in order to ascertain the correct normality test. The factors were tested for normality using the Shapiro-Wilk significance test. The test suggests that if the factor has a significance level below 0.05, then based on the null hypothesis that factor is significant meaning that the data is not normally distributed i.e. the null hypothesis is supported.

The Shapiro-Wilk test found all the factors, with the exception of financial performance, to be non-parametric (not normally distributed). This can be seen in Table 29 below. When the sample data size was increased more variables failed the null hypothesis. Initially flexibility, delivery and financial performance were normally distributed, however with more responses they became not normally distributed.

**Table 29: Schapiro –Wilk test on all factors**

| Tests of Normality | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | | |
| | Statistic | df | Sig. | Statistic | df | Sig. | |
| Quality | 0,231 | 72 | 0,000 | 0,767 | 72 | 0,000 | Not normally distributed |
| Delivery | 0,169 | 72 | 0,000 | 0,852 | 72 | 0,000 | Not normally distributed |
| Flexibility | 0,135 | 72 | 0,002 | 0,955 | 72 | 0,012 | Not normally distributed |
| Cost | 0,126 | 72 | 0,007 | 0,966 | 72 | 0,047 | Not normally distributed |
| Risk | 0,173 | 72 | 0,000 | 0,911 | 72 | 0,000 | Not normally distributed |
| Innovativeness | 0,175 | 72 | 0,000 | 0,901 | 72 | 0,000 | Not normally distributed |
| Proactiveness | 0,147 | 72 | 0,001 | 0,931 | 72 | 0,001 | Not normally distributed |
| Competitive_Agressiveness | 0,156 | 72 | 0,000 | 0,887 | 72 | 0,000 | Not normally distributed |
| Autonomy | 0,157 | 72 | 0,000 | 0,907 | 72 | 0,000 | Not normally distributed |
| Financial_Perfomance | 0,105 | 72 | 0,046 | 0,975 | 72 | 0,161 | Normally distributed, accept null hypothesis at 0.05 |
| a. Lilliefors Significance Correction | | | | | | | |

To try and make the data more parametric, outliers were removed, however this did not make any change to the data normality, as each time an outlier was removed more outliers emerged. The data only began to emulate normality after the removal of almost 10% of the data. The data was transformed using logarithmic and exponential functions, however its normality could not improve, hence the regression model was performed on the data with outliers included (See APPENDIX D ).

## 4.5 Regression hypothesis 1 (MC – financial performance)

Regression analysis was performed, with missing numbers replaced by the mean.

**Table 30: Manufacturing capability descriptive statistics**

| Manufacturing Capability Descriptive Statistics | | | | | | |
|---|---|---|---|---|---|---|
| Which sector do you work for? | | Quality | Delivery | Flexibility | Cost | Financial_ Performance |
| Processing and preserving of fruit and vegetables | Mean | 6,0750 | 5,2000 | 5,1000 | 4,7250 | 3,1571 |
| | N | 10 | 10 | 10 | 10 | 10 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Std. Deviation | 0,61294 | 1,05935 | 1,15590 | 1,18702 | 1,16341 |
| Manufacture of vegetable and animal oils and fats | Mean | 6,0000 | 6,0000 | 5,5000 | 2,5000 | 2,0000 |
| | N | 1 | 1 | 1 | 1 | 1 |
| | Std. Deviation | | | | | |
| Manufacture of dairy products | Mean | 6,5417 | 6,0833 | 4,2045 | 3,6250 | 3,9544 |
| | N | 12 | 12 | 11 | 12 | 12 |
| | Std. Deviation | 0,45017 | 0,62462 | 1,15552 | 0,93845 | 0,88183 |
| Manufacture of bakery products, sugar, cocoa, chocolate and sugar confectionery | Mean | 5,5000 | 5,8333 | 5,0556 | 3,8889 | 2,8413 |
| | N | 9 | 9 | 9 | 9 | 9 |
| | Std. Deviation | 1,53603 | 0,39528 | 1,12346 | 1,38694 | 1,04111 |
| Manufacture of other food products | Mean | 6,3370 | 5,5870 | 5,2500 | 4,4659 | 2,7619 |
| | N | 23 | 23 | 23 | 22 | 21 |
| | Std. Deviation | 0,62889 | 1,14963 | 1,30340 | 1,33027 | 0,92839 |
| Manufacture of grain mill products | Mean | 5,6250 | 5,0625 | 4,6875 | 3,8750 | 3,6786 |
| | N | 4 | 4 | 4 | 4 | 4 |
| | Std. Deviation | 1,05079 | 2,06534 | 0,98689 | 1,37689 | 0,92122 |
| Manufacture of Beverages (Juice, water & non-alcoholic beverages) | Mean | 6,1094 | 5,3281 | 4,7031 | 4,4531 | 3,1339 |
| | N | 16 | 16 | 16 | 16 | 16 |
| | Std. Deviation | 0,99150 | 1,16804 | 1,46691 | 1,36997 | 1,10345 |
| Total | Mean | 6,1433 | 5,5667 | 4,9054 | 4,2331 | 3,1432 |
| | N | 75 | 75 | 74 | 74 | 73 |
| | Std. Deviation | 0,89213 | 1,07359 | 1,27119 | 1,29364 | 1,06511 |

The descriptive statistics for manufacturing capability and performance shows an almost consistent standard deviation between the independent and dependant variables. The manufacturing capability factors were computed on a seven (7) point Likert scale with number one (1) being lowest in the capability and number seven (7) being highest in the capability. The performance factor was computed on a seven (7) point Likert scale with number one (1) representing high performance and number (7) representing poor performance.

The mean for quality was highest in the dairy and other food products sectors. The mean for delivery was highest in the baked good and dairy sector. The mean for flexibility was highest in the preserving of fruits and vegetables sector. The lowest cost producers were found in the preservation of fruits and vegetables sector. All companies in the sector showed below midpoint performance, with the sectors of other food products and bakery, having the strongest average performance at a mean of (2.7 and 2.8) respectively.

The variables were regressed using stepwise/ hierarchical regression. The stepwise regression removed quality, and cost. Flexibility and delivery remained as significant variables (Table 32).

**Table 31: Manufacturing capability – performance model summary**

| Model Summary[c] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Change Statistics | | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 | Sig. F Change | Durbin-Watson |
| 1 | .415[a] | 0,172 | 0,161 | 0,96237 | 0,172 | 15,193 | 1 | 73 | 0,000 | |
| 2 | .466[b] | 0,217 | 0,195 | 0,94242 | 0,045 | 4,124 | 1 | 72 | 0,046 | 1,839 |
| a. Predictors: (Constant), Flexibility | | | | | | | | | | |
| b. Predictors: (Constant), Flexibility, Delivery | | | | | | | | | | |
| c. Dependent Variable: Financial_ Performance | | | | | | | | | | |

Table 31 shows an increase in model fit as more variables were introduced. The proposed model had a coefficient of determination of 0.195. This means the variables of flexibility and delivery account for 19.5% of the overall data variance. The Durbin Watson statistic was between 1.5 and 2.5 suggesting that there was no meaningful serial correlation between manufacturing capability and performance. Field (2009) suggests that values under 1 or more than 3 can be a cause for concern.

F-value of the model was very low suggesting that flexibility was not very statistically significant to performance, however as more variables were introduced the F-value decreased, and the significance value of the model increased.

**Table 32: Manufacturing capability – performance coefficients**

| Coefficients[a] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Unstandardized Coefficients | | Standardized Coefficients | | | 95,0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
| Model | | B | Std. Error | Beta | t | Sig. | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 4,837 | 0,449 | | 10,782 | 0,000 | 3,943 | 5,732 | | | | | |
| | Flexibility | -0,345 | 0,089 | -0,415 | -3,898 | 0,000 | -0,522 | -0,169 | -0,415 | -0,415 | -0,415 | 1,000 | 1,000 |
| 2 | (Constant) | 5,903 | 0,684 | | 8,627 | 0,000 | 4,539 | 7,267 | | | | | |
| | Flexibility | -0,326 | 0,087 | -0,392 | -3,734 | 0,000 | -0,500 | -0,152 | -0,415 | -0,403 | -0,389 | 0,988 | 1,012 |
| | Delivery | -0,208 | 0,103 | -0,213 | -2,031 | 0,046 | -0,413 | -0,004 | -0,256 | -0,233 | -0,212 | 0,988 | 1,012 |
| a. Dependent Variable: Financial_ Performance | | | | | | | | | | | | | |

The coefficient of flexibility was found to be -.392, while that of delivery is found to be -0.213 suggesting a negative relationship between flexibility, delivery and performance. These

results are similar to those that were achieved with a data sample of 53 respondents. The main difference between the regressions based on sample size was that with a lower sample size (53) only flexibility was significant, however as the sample size increased, delivery became significant. This was consistent with Sullivan and Feinn (2012), who suggest that the low P and F-values for significance can exist when independent variable has a precise estimate, low variability or a large sample size, and hence may not necessarily constitute importance. Large sample sizes will always constitute significance unless effect size is zero.

The VIF and tolerance values show multicollinearity values above 0.7. The model shows very little multicollinearity as 99% of the variance of both independent variables was explained by the variables themselves. This was further confirmed by the scatter plot (Table 26) which shows that the data was largely not completely heteroscedastic.

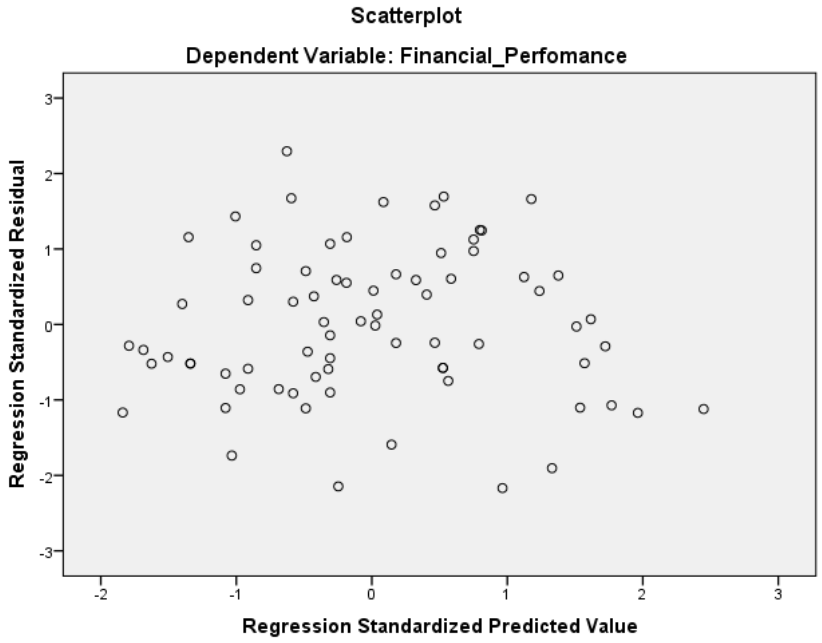



**Figure 29: Manufacturing capability performance residual error scatter plot**

The P-P plot shows that the errors were normally distributed as most points lie on the diagonal line.

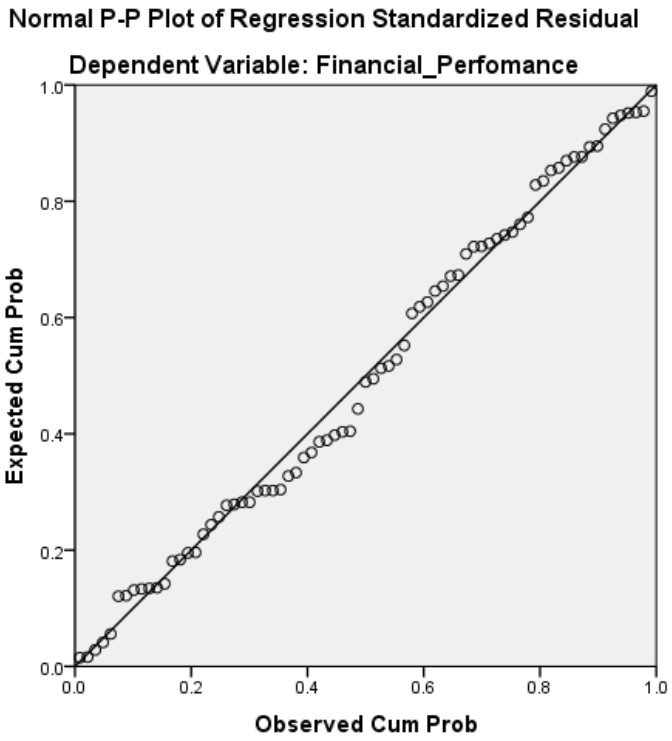



**Figure 30: Manufacturing capability, performance residual error P-P Plot**

**Table 33: Manufacturing capability, performance excluded variables**

| Excluded Variables[a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Collinearity Statistics | | |
| Model | | Beta In | t | Sig. | Partial Correlation | Tolerance | VIF | Minimum Tolerance |
| 1 | Quality | -.008[b] | -0,071 | 0,943 | -0,008 | 1,000 | 1,000 | 1,000 |
| | Delivery | -.213[b] | -2,031 | 0,046 | -0,233 | 0,988 | 1,012 | 0,988 |
| | Cost | .054[b] | 0,465 | 0,643 | 0,055 | 0,862 | 1,161 | 0,862 |
| 2 | Quality | .091[c] | 0,798 | 0,427 | 0,094 | 0,841 | 1,189 | 0,832 |
| | Cost | .054[c] | 0,474 | 0,637 | 0,056 | 0,862 | 1,161 | 0,853 |
| a. Dependent Variable: Financial_ Performance | | | | | | | | |
| b. Predictors in the Model: (Constant), Flexibility | | | | | | | | |
| c. Predictors in the Model: (Constant), Flexibility, Delivery | | | | | | | | |

Table 33 shows the excluded variables and their respective correlation coefficients. Quality and cost were found to have a small but positive correlation with financial performance. Furthermore, the tolerance values were above the cut-off value of 0.7 for multicollinearity.

## 4.6 Regression Hypothesis 2 (EO – performance)

The descriptive statistics for EO and performance show an almost consistent standard deviation between the independent and dependent variables (Table 34). An eighteen (18)-item EO scale was used to gather data (See APPENDIX B). The scale assessed the EO dimensions of risk, innovativeness, proactiveness, using a seven (7) point Likert scale. Number one (1) on the scale representing the highest level and number seven (7) on the scale representing the lowest level. The processing of fruit and vegetables, on average performed highest on all factors of EO, while the manufacture of grain mill performed poorest in all factors of EO.

**Table 34: EO, performance descriptive statistics**

| EO – Performance descriptive statistics | | | | | | | |
|---|---|---|---|---|---|---|---|
| Which Sector Do you Work For? | | Risk | Innovativeness | Proactiveness | Competitive_ Aggressiveness | Autonomy | Financial_ Performance |
| Processing and preserving of fruit and vegetables | Mean | 2,6000 | 2,1667 | 2,6000 | 2,2667 | 2,4833 | 3,1571 |
| | N | 10 | 10 | 10 | 10 | 10 | 10 |
| | Std. Deviation | 1,41247 | 1,05702 | 1,25511 | 0,75031 | 0,77559 | 1,16341 |
| Manufacture of vegetable and animal oils and fats | Mean | 4,0000 | 2,0000 | 2,6667 | 2,3333 | 2,3333 | 2,0000 |
| | N | 1 | 1 | 1 | 1 | 1 | 1 |
| | Std. Deviation | | | | | | |
| Manufacture of dairy products | Mean | 3,4722 | 2,2500 | 2,4722 | 2,0278 | 3,3056 | 3,9544 |
| | N | 12 | 12 | 12 | 12 | 12 | 12 |
| | Std. Deviation | 1,37406 | 0,76706 | 1,01959 | 0,75823 | 1,12778 | 0,88183 |
| Manufacture of bakery products, sugar, cocoa, chocolate and sugar confectionery | Mean | 3,0741 | 2,4815 | 3,0741 | 2,5926 | 2,6481 | 2,8413 |
| | N | 9 | 9 | 9 | 9 | 9 | 9 |
| | Std. Deviation | 1,39222 | 0,74742 | 0,86245 | 1,05116 | 0,42853 | 1,04111 |
| Manufacture of other food products | Mean | 2,8182 | 2,5909 | 3,0758 | 2,7273 | 2,8455 | 2,7619 |
| | N | 22 | 22 | 22 | 22 | 22 | 21 |
| | Std. Deviation | 1,53177 | 1,44724 | 1,53248 | 1,65115 | 1,30609 | 0,92839 |
| Manufacture of grain mill products | Mean | 4,3333 | 3,5000 | 3,7500 | 3,7500 | 4,1667 | 3,6786 |
| | N | 4 | 4 | 4 | 4 | 4 | 4 |
| | Std. Deviation | 1,30526 | 1,29099 | 1,52449 | 2,44002 | 1,41421 | 0,92122 |
| Manufacture of Beverages (Juice, water & non-alcoholic beverages) | Mean | 3,1667 | 2,6875 | 3,1250 | 2,3958 | 2,6875 | 3,1339 |
| | N | 16 | 16 | 16 | 16 | 16 | 16 |
| | Std. Deviation | 1,52995 | 1,57512 | 1,50000 | 1,08333 | 1,11368 | 1,10345 |
| Total | Mean | 3,0991 | 2,5270 | 2,9550 | 2,5135 | 2,8775 | 3,1432 |
| | N | 74 | 74 | 74 | 74 | 74 | 73 |
| | Std. Deviation | 1,46468 | 1,24967 | 1,33028 | 1,30237 | 1,12914 | 1,06511 |

The variables were regressed in a stepwise manner. The stepwise regression removed innovativeness, competitive aggressiveness, proactiveness, and autonomy. Only risk remained as a significant variable. This was the finding even when the sample size was increased.

**Table 35: Entrepreneurial orientation – performance model summary**

| Model Summary[b] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Change Statistics | | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 | Sig. F Change | Durbin-Watson |
| 1 | .324[a] | 0,105 | 0,093 | 1,00751 | 0,105 | 8,467 | 1 | 72 | 0,005 | 1,708 |
| a. Predictors: (Constant), Risk | | | | | | | | | | |
| b. Dependent Variable: Financial_ Performance | | | | | | | | | | |

Table 35 shows that risk only accounts for 9.3% of the data variance. The Durbin Watson statistic was between 1.5 and 2.5, suggesting that there was no meaningful serial correlation between manufacturing capability and performance.

F-value of the model was very low suggesting that risk was not very statistically significant to performance.

**Table 36: Entrepreneurial orientation, performance coefficients**

| Coefficients | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Unstandardized Coefficients | | Standardized Coefficients | | | 95,0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
| Model | | B | Std. Error | Beta | t | Sig. | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 2.424 | .319 | | 7.593 | .000 | 1.783 | 3.065 | | | | | |
| | Risk | .259 | .096 | .352 | 2.688 | .010 | .065 | .452 | .352 | .352 | .352 | 1.000 | 1.000 |
| a. Dependent Variable: Business_ Performance | | | | | | | | | | | | | |

The coefficient of risk was 0.352, suggesting a moderate positive correlation between risk and performance. This correlation was not affected by the increasing number of respondents. The constant was 2.42, suggesting that risk exists even in the absence of performance.

The scatter plot in Figure 31 shows that the data is heteroscedastic. Figure 32 shows that the residual errors of the independent and predictor variable are normally distributed as the majority of the errors are on the diagonal. Multicollinearity could not be checked as the model only had one independent variable.

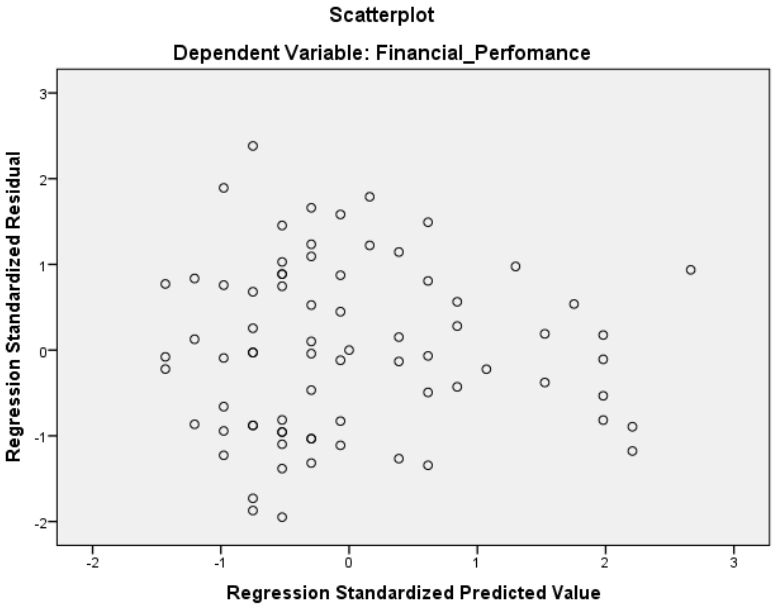



**Figure 31: Entrepreneurial orientation, performance residual error scatter plot**

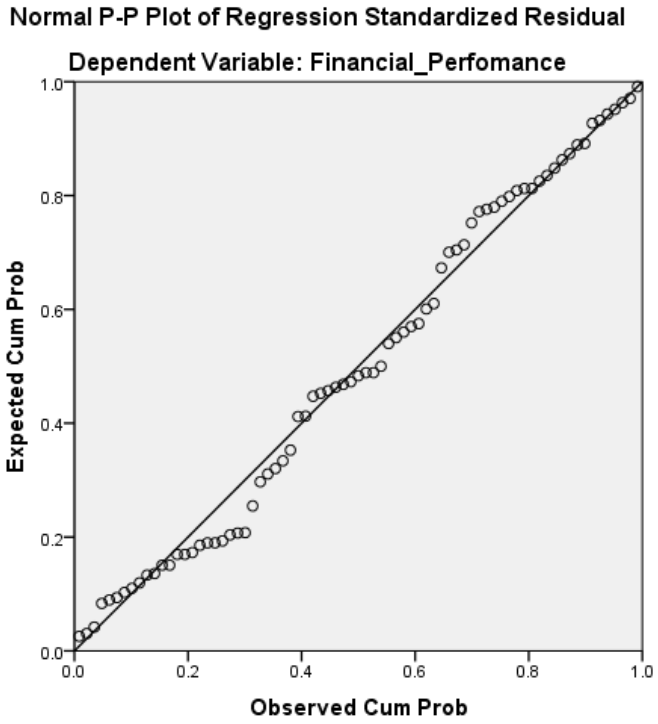



**Figure 32: Entrepreneurial orientation, performance residual error P-P Plot**

**Table 37: Coefficients of excluded variables**

| Excluded Variables [a] | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model | | Beta In | t | Sig. | Partial Correlation | Collinearity Statistics | | |
| | | | | | | Tolerance | VIF | Minimum Tolerance |
| 1 | Innovativeness | .039[b] | 0,263 | 0,793 | 0,031 | 0,569 | 1,757 | 0,569 |
| | Proactiveness | -.053[b] | -0,343 | 0,733 | -0,041 | 0,523 | 1,911 | 0,523 |
| | Competitive_ Aggressiveness | .158[b] | 1,132 | 0,261 | 0,133 | 0,634 | 1,577 | 0,634 |
| | Autonomy | .184[b] | 1,255 | 0,213 | 0,147 | 0,574 | 1,742 | 0,574 |
| a. Dependent Variable: Financial_ Performance | | | | | | | | |
| b. Predictors in the Model: (Constant), Risk | | | | | | | | |

Table 37 shows multicollinearity between the different EO dimensions. The variable with the highest collinearity was proactiveness. Proactiveness had a tolerance value of 52%, suggesting that it alone can only explain 52% of its variance. The remainder of its variance (48%) can be explained by the other variables.

## 4.7 Factor correlation (EO – MC – performance – hypothesis 3)

To check for factor correlation, it was important to establish the type of data distribution. The factors were tested for normality and it was found that the data was non-parametric, hence, correlation analysis was performed using the Spearman correlation. According to Field, (2009) a correlation coefficient of;

- ±.1 = small effect
- ±.3 = medium effect
- ±.5 = large effect

### 4.7.1 *Manufacturing capability correlations*

Quality was found to have a highly significant moderate positive correlation with delivery only. Delivery was found to have a significant moderate correlation with flexibility and quality. Delivery was found to have a low significant negative correlation with financial performance.

Flexibility was found to have a highly significant moderate correlation with cost and financial performance.

### 4.7.2 *Entrepreneurial orientation correlations*

Risk was found to have strong and highly significant moderate correlations with all EO factors. Risk was found to have a moderate correlation with low significance with financial performance (see table 38).

Innovativeness was found to have strong highly significant relationships with all EO factors. Innovativeness was found to have a low significant moderate correlation with financial performance (see table 38).

Proactiveness was found to have strong highly significant relationships with all EO factors. Proactiveness was found to have a low significant moderate correlation with financial performance (see table 38).

Competitive-aggressiveness had strong and highly significant correlations with risk, innovativeness, and autonomy. It was found to have highly significant moderate correlation with financial performance (see table 38).

Autonomy was found to have a strong and significant correlation with risk, innovation and competitive-aggressiveness and proactiveness. It was found to have a low, significant moderate correlation with financial performance (see table 38).

### 4.7.3 *Cross correlations*

Proactiveness was found to have highly significant moderate negative correlations with the manufacturing capabilities of cost, delivery, flexibility and a low significant, moderate negative correlation with quality. Innovativeness had highly significant moderate negative correlations with the manufacturing capabilities of cost, delivery and flexibility. Competitive aggressiveness had low significant, moderate negative correlations with delivery, cost and flexibility. Autonomy had a highly significant moderate negative correlation with flexibility and a low significant moderate correlation with cost (see table 38 ).

**Table 38: EO, MC, spearman correlation analysis**

| EO,MC, Spearman correlation table | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Quality | Delivery | Flexibility | Cost | Financial_ Performance | Risk | Innovativeness | Proactiveness | Competitive_ Aggressiveness | Autonomy |
| Spearman's rho | Quality | Correlation Coefficient | 1,000 | .493** | 0,052 | -0,022 | -0,060 | -0,105 | -0,220 | -.265* | -0,159 | 0,047 |
| | | Sig. (2-tailed) | | 0,000 | 0,659 | 0,849 | 0,613 | 0,375 | 0,060 | 0,023 | 0,177 | 0,689 |
| | | N | 75 | 75 | 74 | 74 | 73 | 74 | 74 | 74 | 74 | 74 |
| | Delivery | Correlation Coefficient | .493** | 1,000 | .282* | 0,047 | -.274* | -0,121 | -.375** | -.317** | -.246* | -0,092 |
| | | Sig. (2-tailed) | 0,000 | | 0,015 | 0,693 | 0,019 | 0,304 | 0,001 | 0,006 | 0,035 | 0,436 |
| | | N | 75 | 75 | 74 | 74 | 73 | 74 | 74 | 74 | 74 | 74 |
| | Flexibility | Correlation Coefficient | 0,052 | .282* | 1,000 | .368** | -.463** | -.305** | -.405** | -.378** | -.271* | -.313** |
| | | Sig. (2-tailed) | 0,659 | 0,015 | | 0,001 | 0,000 | 0,009 | 0,000 | 0,001 | 0,020 | 0,007 |
| | | N | 74 | 74 | 74 | 73 | 72 | 73 | 73 | 73 | 73 | 73 |
| | Cost | Correlation Coefficient | -0,022 | 0,047 | .368** | 1,000 | -0,137 | -.475** | -.367** | -.427** | -.239* | -.288* |
| | | Sig. (2-tailed) | 0,849 | 0,693 | 0,001 | | 0,249 | 0,000 | 0,001 | 0,000 | 0,041 | 0,013 |
| | | N | 74 | 74 | 73 | 74 | 73 | 74 | 74 | 74 | 74 | 74 |
| | Financial_ Performance | Correlation Coefficient | -0,060 | -.274* | -.463** | -0,137 | 1,000 | .354** | .297* | .234* | .335** | .323** |
| | | Sig. (2-tailed) | 0,613 | 0,019 | 0,000 | 0,249 | | 0,002 | 0,011 | 0,046 | 0,004 | 0,005 |
| | | N | 73 | 73 | 72 | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| | Risk | Correlation Coefficient | -0,105 | -0,121 | -.305** | -.475** | .354** | 1,000 | .573** | .618** | .609** | .615** |
| | | Sig. (2-tailed) | 0,375 | 0,304 | 0,009 | 0,000 | 0,002 | | 0,000 | 0,000 | 0,000 | 0,000 |
| | | N | 74 | 74 | 73 | 74 | 73 | 74 | 74 | 74 | 74 | 74 |
| | Innovativeness | Correlation Coefficient | -0,220 | -.375** | -.405** | -.367** | .297* | .573** | 1,000 | .668** | .611** | .570** |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Sig. (2-tailed) | 0,060 | 0,001 | 0,000 | 0,001 | 0,011 | 0,000 | | 0,000 | 0,000 | 0,000 |
| | | N | 74 | 74 | 73 | 74 | 73 | 74 | 74 | 74 | 74 | 74 |
| | Proactiveness | Correlation Coefficient | -.265* | -.317** | -.378** | -.427** | .234* | .618** | .668** | 1,000 | .625** | .498** |
| | | Sig. (2-tailed) | 0,023 | 0,006 | 0,001 | 0,000 | 0,046 | 0,000 | 0,000 | | 0,000 | 0,000 |
| | | N | 74 | 74 | 73 | 74 | 73 | 74 | 74 | 74 | 74 | 74 |
| | Competitive_ Agressiveness | Correlation Coefficient | -0,159 | -.246* | -.271* | -.239* | .335** | .609** | .611** | .625** | 1,000 | .645** |
| | | Sig. (2-tailed) | 0,177 | 0,035 | 0,020 | 0,041 | 0,004 | 0,000 | 0,000 | 0,000 | | 0,000 |
| | | N | 74 | 74 | 73 | 74 | 73 | 74 | 74 | 74 | 74 | 74 |
| | Autonomy | Correlation Coefficient | 0,047 | -0,092 | -.313** | -.288* | .323** | .615** | .570** | .498** | .645** | 1,000 |
| | | Sig. (2-tailed) | 0,689 | 0,436 | 0,007 | 0,013 | 0,005 | 0,000 | 0,000 | 0,000 | 0,000 | |
| | | N | 74 | 74 | 73 | 74 | 73 | 74 | 74 | 74 | 74 | 74 |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | | | | |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | | | | | | | | | | |

## 4.8 Summary of the results

The survey had a final response rate of 75%. The results showed that were was no response biases between early and late respondents. The demographic age of respondents was such that 77.3% of the sampled population was found to be between the ages of 30 and 60. Respondents were mostly from other food manufacturing, however beverages, bakery, dairy and preserving fruit and vegetables were almost equally represented. Grain mill products and oils and fats were poorly represented, as well as the remaining subdivisions of meat products, fish products, vegetable and animal oils and animal feeds. Most of the respondents were from Gauteng and the Western Cape, followed by KwaZulu-Natal, Eastern Cape and Limpopo respectively. Provinces that were not represented were the Free State, Mpumalanga, Northern Cape and the North Western provinces. 77.4% of the respondents were highly experienced with an experience range of 10 – 20+ years. Most of the respondents were senior managers followed by middle managers and executive manager's respectively. Most of respondents had 0-5 years of experience in their roles with the respective firms, with their age ranging between 30 – 50 years old.

The mean score of the factors showed financial performance to be below the midpoint of the Likert scale (slightly better than average performance, 3.14), while the factors of EO were below the midpoint (moderate to strong levels of EO, Risk – 3.09, innovativeness – 2.55, proactiveness – 2.95, competitive aggressiveness – 2.51, autonomy – 2.877). Factors of manufacturing capability were all slightly above the midpoint of the scale (quality -6.1, delivery- 5.5, flexibility- 4.9, and cost 4.2).

The results of the EFA, confirmed the construct validity of the survey, and no questions for EO or manufacturing capability were eliminated. The EFA separated the performance construct into two, namely, market and financial performance. The market performance factor only had two variables and failed the reliability test hence, it was eliminated. All factors loaded above 0.5. The factors that were created did not have a normal distribution, and had Cronbach reliability factors above 80%.

The results showed that only flexibility, delivery, and risk were significant to organizational performance, when computed in a linear model. However, when

computed using a non-parametric technique (Spearman correlation) the results found that all factors of EO were significantly and moderately correlated to financial performance. Furthermore, the results showed that EO and manufacturing capability have a negative relationship.

The stepwise linear regression model for EO and financial performance was found to be:

***Performance = 0.359 (risk) +2.42***

In the absence of risk, performance will be below the midpoint of the scale (2.42) No multicollinearity was observed in this model and a coefficient of determination of 9.3% was observed. Residual errors were found to be normally distributed. High multicollinearity was found between the excluded variables on innovativeness, competitive aggressiveness, proactiveness and autonomy.

The stepwise linear regression model for manufacturing capability and financial performance was found to be:

***Performance = (-3.92)* (flexibility) + (-0.213)*(delivery) + 4.837***

In the absence of all manufacturing capabilities financial performance was found to be above the midpoint of the Likert scale. No multicollinearity was observed in the manufacturing capability performance regression model. The coefficient of determination was found to be 19.5%. The residual errors of the model were found to be normally distributed. The eliminated variables of cost and quality were found to have no multicollinearity. The results illustrated that as data size increased significance of variable to the model increased, however the correlations did not change.

The overall results show high inter-correlations between the EO variables and between EO, flexibility and delivery. Quality was only correlated to proactiveness.

# CHAPTER 5. DISCUSSION OF THE RESULTS

## 5.1 Introduction

This chapter discusses the data presented in chapter 4. It will begin by discussing participant demographics and their respective characteristics. This will be followed by an analysis of the tests used for reliability, content, and construct validity. Construct validity will be analyzed by discussing factor analysis. The final part of this chapter will discuss the results obtained from the multiple regression analyses and the correlation analysis (OLS analysis). A summary table of the correlation analysis will be provided prior to its discussion. All results will be discussed and explained with reference to the literature review.

## 5.2 Demographic profile of respondents

100 surveys were sent to 10 companies in the food manufacturing industry in South Africa. Surveys were circulated to Tiger brands, Pioneer foods, RCL Foods, Premier Foods, Rhodes Foods, Tongaat, Hulettes, Famous Brands, Clover Beverages and AVI. Key people were identified in these organizations and were asked to circulate the survey to 10 respondents in their respective companies. Some respondents were identified through personal relationships, others were identified with the assistance of Agbiz SA and the manufacturing circle.

Due to the anonymity required by the respective companies, it was not possible to determine or ascertain the company the responses came from. Elliot et al. (1994) suggests that large public firms are often skeptical of information disclosure in situations where competitors develop the ability to impose significantly greater disadvantages with the use of the information or litigation costs become too perverse. Company specific analysis was not possible, and it was not possible to determine if all of the companies participated in the survey. The survey was circulated to executive-, senior-, and middle managers.

The survey received 53 initial responses. The survey had 75 final responses, representing a 75% response rate. The response rate based on email surveys where

the unit of analysis is the organization was an improvement to that of Bhaskaran, S. (2006) who had a response rate of 26% and Chavez, (2017) who had a response rate of 26.8%. However, given the small population size, higher response rates were required. A 53% response rate was adequate to give a 95% confidence interval as per Cochran's (1997) formula.

Data was collected by sending weekly email and telephonic reminders over a 12-week period. Initially responses were higher, however as the Christmas break approached, responses declined. Responses only increased again from the end of January. The responses were further improved when board members in particular organizations intervened.

Due to the difficulty in getting responses via email surveys, questionnaires were sent via WhatsApp and participants were given a separate anonymous link to ascertain the effectiveness of using mobile phones to improve response rates. No responses were received from the mobile phone link. This suggests that the use of mobile phones is not an effective tool in surveying food manufacturing executives.

### 5.2.1 *Age and leadership*

More than 60% of the respondents were over the age of 40 years. Age was cross-tabulated with years of experience and management level (Table 15). The majority of senior managers and executive management were between the ages of 30 and 50 years. These represent the leadership in the sector and hence, their predispositions to entrepreneurial orientation will be manifested in the culture of the organization.

According to the Global Entrepreneurship Monitor 2016/2017 report the Employee Entrepreneurial Activity (EEA) is 0.7% which is low, however EEA is highest in those aged between 35 and 54. This is attributed to an increase in work experience and confidence in personal activities. Gupta and Gupta, (2015) suggests that only transformational leadership through the provision of a vision, providing an appropriate model, having high expectations, and showing supportive leadership behavior can ensure that the positive effects of EO are actualized.

### 5.2.2 *Leadership and experience*

85% of executive managers have more than 20 years' experience in the manufacturing sector, while 71% of the senior managers have above 15 years' experience in the manufacturing industry (Table 16). Stam, & Elfring, (2008), found that high network centrality and expansive bridging ties strengthened the relationship between entrepreneurial orientation and performance. Similarly Jiang, Liu, Fey and Jiang, F (2018), highlight the role of resource acquisition through networks, as an important mediating mechanism through which entrepreneurial orientation influences firm performance. The experience of leadership in the South African food manufacturing sector (SAFM) suggests that leadership will have high network centrality and expansive bridging ties.

The dairy sector, oils and fats, and the baked goods subdivisions did not have any executive management representation (Table 17). While fruit processing did not have any middle management representation. This suggests that there may not have been diverse views in this sector. Swink et al. (2007) found that perceptual business performance measures were highly correlated ($p < .05$) with managers' estimates of market share. Hence, a more diverse distribution of leadership levels would likely present a more accurate picture.

## 5.3 Scale analysis and EFA

### 5.3.1 *Entrepreneurial orientation Scale*

An eighteen (18)-item EO scale was used to gather data (See APPENDIX A). The scale assessed the EO dimensions of risk, innovativeness, and proactiveness, using a 7-point Likert scale. Number 1 on the scale represents the lowest level and number 7 on the scale represents the highest level. To test content and construct validity, EFA was performed. The EFA found five (5) distinct factors, with no cross loadings when loading factors were suppressed at 0.45.

Dimensions of EO were below the midpoint (moderate to strong levels of EO, risk – 3.09, innovativeness – 2.55, proactiveness – 2.95, competitive aggressiveness – 2.51,

autonomy – 2.877). The processing of fruit and vegetables, on average performs highest on all factors of EO, while the manufacture of grain mill performs poorest in all factors of EO. It can be said that there is moderately high levels of EO in the SAFM. The comparatively low level of EO in the grain milling sector could be due to the narrow set of homogenous products that they produce (predominantly staple foods). The dairy industry although highly concentrated, shows high levels of EO, and the lowest financial performance. The low financial performance in the dairy industry could be more to do with the capabilities they have perused, than the amount of EO.

### 5.3.2 *Manufacturing capability scale*

Manufacturing capability was measured using a sixteen (16) item, 7-point Likert scale (See APPENDIX A). EFA was computed to assess construct validity. The results confirmed the validity of each factor with zero cross loadings, when loadings were suppressed at below 0.6.

The mean for quality and delivery was seen to be highest in products that were perishable (dairy, other food products, baked goods) This was consistent with Barnes, (2017) who suggests that the perishable nature of products and, customer returns imply major costs to processors, as do raw material costs to processors, as do raw material inventories that expire or are damaged prior to undergoing processing.

The mean for flexibility was highest in the preserving of fruits and vegetables sector. The lowest cost producers were found in the preservation of fruits and vegetables sector. On average Table 30 shows high levels of quality and delivery, and above midpoint levels on flexibility and cost.

The results show that good quality and delivery are necessary conditions for participation in the SAFM sector. The data further shows that the industries that perform well on quality and delivery (dairy), perform poorly on flexibility and cost. Whereas those that perform well on flexibility and cost (fruit and vegetable processing) perform poorly on quality and delivery. The findings support Priem and Butler's, (2001) observation that resources are differentially valuable across different environments, consequently manufacturing capabilities will differ based on the type of industry. This is further confirmed by Prajogo et al. (2016) who found that the relationship between

supply logistics integration and competitive operational performance; the relationship is fully mediated by inbound supply performance and internal lean production processes

### 5.3.3 *Organizational performance Scale*

Organizational performance was measured using a nine (9) item, 7-point Likert scale. Prior to the creation of the organizational performance factor, the scale was tested for reliability, construct and content validity using EFA and Cronbach's alpha coefficient. The EFA revealed two distinct factors in the measurement of performance. One construct focusing on financial performance and another focusing on market performance (growth in sales and market share). The market performance factor only had two indicators and hence, could not be reliably measured with a Cronbach coefficient of 0.55. Consequently, the factor was discarded and only financial performance was measured.

All companies in the sector show below midpoint performance (Table 30 and Table 34,) with the sectors of other food products and bakery, having the strongest average performance at a mean of (2.7 and 2.8) respectively. The weakest performing sector was the dairy sector. Above average sector performance is supported by Figure 7, which shows that from 2010 to 2016 food and beverage manufacturing had above average performance in the manufacturing sector. The SAFM sector yields above average financial performance, but shows there is opportunity for greater improvement. This could be attributed to the high sector concentration, which according to Fedderke, (2008); Louw et al. (2013); Bernstein (2013) is frosted by large market power resulting in supernormal profits, reduced consumer surplus, inefficiencies and collusion.

**Manufacturing capability and performance relationship**

The model for manufacturing capability and performance was found to be;

***Performance = (-3.92)* (Flexibility) + (-0.213)*(Delivery) + 4.837***

Table 39 shows the hypothesized relationships and whether they have been supported.

**Table 39: Manufacturing capability, financial performance hypothesis matrix**

| Sub problem | Literature | Hypothesis | Correlation coefficient | Significance | Supported / not supported |
|---|---|---|---|---|---|
| Identify the dimensions of manufacturing capability that influence firm performance | Terjesen et al. (2011) Swink et al. (2007) Antonio et al. (2007) Chavez et al. (2015 ) (Flynn et al. (2010) Wong et al. (2011)<br><br>Lu et al. (2018).<br><br>Prajogo et al. (2016).<br><br>Ataseven & Nair, (2017)<br><br>O'Neill et al. (2016). | H1. Manufacturing capabilities are positively associated with organizational performance in the South African food manufacturing sector | Negative | Only flexibility and delivery | Not Supported |
| | | • H1a: Quality is positively associated with organizational performance in the South African food manufacturing sector. | 0.091 | non | Not Supported |
| | | • H1b: Delivery is positively associated with organizational performance in the South African food manufacturing sector. | -.213 | Significant at 0.05 | Not Supported |
| | | H1c: Flexibility is positively associated with organizational performance in the South African food | -0.392 | Significant at 0.01 | Not supported |

| | | | | | |
|---|---|---|---|---|---|
| | | manufacturing sector. | | | |
| | | • H1d: Cost is positively associated with organizational performance in the South African food manufacturing sector. | 0.54 | Not significant | Not supported |

### 5.3.4 *H1: Manufacturing capability has a positive impact on organizational performance in the South African food manufacturing sector.*

The hypothesis that manufacturing capability is positively associated with financial performance in the SAFM sector has not been supported by the results in the study. The study suggests that in the SAFM sector quality is a necessary condition to market entry, and that delivery and flexibility drivers of firm performance. The coefficient of flexibility was found to be -.392, while that of delivery was found to be -0.213 suggesting a negative relationship between flexibility, delivery and performance.

There are three primary competitive strategies: price, differentiation, and responsiveness. The findings of the study, suggest that the food manufacturing industry in South Africa lacks competitiveness and the drivers of performance in the entire sector are subsector specific. When investigating specific subdivisions of the food manufacturing sector descriptive analysis offers different insights (i.e. firms that perform well in quality and delivery, perform poorly in flexibility and cost) , however due to limited data, relationships are unable to be further analysed

Product and process flexibility have a negative impact on performance. Production lines are geared to product based on economies of scale and supplier integration is lacking, and so the creation of any flexibility results in down time, non-delivery and increased costs.

Quality of products can be viewed as an order qualifier, as food quality in South Africa is regulated by The Foodstuffs, Cosmetics and Disinfectant Act ,1972 (FCD Act), the Agricultural Product Standards Act, 1990, The South African Bureau of Standards (SAB)S for canned meat and frozen and canned fishery products through the Standards Act, 1993.

The correlation analysis in Table 40 illustrates that delivery has high inter-correlations quality, and cost has high inter-correlations with flexibility. An increase in flexibility leads to significant increase in cost (decrease in product cost). Firms attempting to pursue cost leadership, need to improve the capabilities of flexibility, this however will not lead to improved profitability. The results of the study suggest that improved manufacturing capabilities lead to reduced finical performance, and that the divers of performance lie elsewhere.

Quality was positively correlated to delivery, suggesting that better quality means fewer customer returns, which could potentially lower overall product costs. Quality, delivery, and flexibility seem to increase costs in the SAFM, which could suggest that the underlying costs that have not been uncovered in this study are those of labor productivity.

**Table 40: Manufacturing capability, performance Spearman correlation (extracted from table 38)**

**Manufacturing capability, performance Spearman correlation table**

| | | | Quality | Delivery | Flexibility | Cost | Financial_ Performance |
|---|---|---|---|---|---|---|---|
| Spearman's rho | Quality | Correlation Coefficient | 1,000 | .493** | 0,052 | -0,022 | -0,060 |
| | | Sig. (2-tailed) | | 0,000 | 0,659 | 0,849 | 0,613 |
| | | N | 75 | 75 | 74 | 74 | 73 |
| | Delivery | Correlation Coefficient | .493** | 1,000 | .282* | 0,047 | -.274* |
| | | Sig. (2-tailed) | 0,000 | | 0,015 | 0,693 | 0,019 |
| | | N | 75 | 75 | 74 | 74 | 73 |
| | Flexibility | Correlation Coefficient | 0,052 | .282* | 1,000 | .368** | -.463** |
| | | Sig. (2-tailed) | 0,659 | 0,015 | | 0,001 | 0,000 |
| | | N | 74 | 74 | 74 | 73 | 72 |
| | Cost | Correlation Coefficient | -0,022 | 0,047 | .368** | 1,000 | -0,137 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Sig. (2-tailed) | 0,849 | 0,693 | 0,001 | | 0,249 |
| | | N | 74 | 74 | 73 | 74 | 73 |
| | Financial_ Performance | Correlation Coefficient | -0,060 | -.274* | -.463** | -0,137 | 1,000 |
| | | Sig. (2-tailed) | 0,613 | 0,019 | 0,000 | 0,249 | |
| | | N | 73 | 73 | 72 | 73 | 73 |

### 5.3.5 *H1a: Quality is positively associated with organizational performance.*

The hypothesis that quality is positively associated with organizational performance was not supported by the results. Quality was found to have a small, negative, non-significant association with financial performance, in the South African food manufacturing sector. The theoretical underpinnings of the above hypothesis were premised on the emergence of private grades and standards in the sector that have a high emphasis on quality. The past 10 years have seen retailers such as Woolworths emerging and setting set standards for commodities produced by food processors and primary producers (DAAF, 2012).

Product reliability, conformance quality (low defect rates), and performance quality (high performance products), are necessary entry criteria for the food manufacturing industry in South Africa and hence, do not create any form of competitive financial advantage.

The notion that quality does not have a positive and significant relationship with operational performance is supported by (Chavez et al., 2015), who found that quality is an order qualifier and not an order winner. Order qualifiers are product features that allow firms to enter or remain in a market. Order winners allows firms to surpass competitors and are a competitive advantage. This perspective is confirmed by O'Neill et al. (2016), who found that firm quality management orientation does not provide a statistically significant financial performance advantage over its manufacturing counterparts.

### 5.3.6 *H1b: Delivery is positively associated with organizational performance in the South African food manufacturing sector.*

The hypothesis that delivery is positively associated with organizational performance was not supported by the results in this study. Delivery was found to have a negative (-0.213), association with financial performance that is significant at 0.01. This finding was consistent with that of Chavez et al. (2015) and Rosenzweig et al. (2013), who suggests that delivery is an order qualifier and not an order winner.

The premise of the hypothesis was based on the perishable nature of most food products and how easily they spoil. The ability to achieve fast turnaround times could be a source of competitive advantage. Furthermore, Ward et al. (1998) argued that winning orders can largely be attributed to the ability to deliver goods faster than competitors.

The negative relationship of delivery and financial performance in the South African food manufacturing sector, could likely be attributed to the concentrated nature of the sector. Due to the limited number of suppliers of food in the sector delivery to customers may not be a priority as there are few alternatives. It was not possible to test the importance of perishability though a linear regression as there were only 13 responses in the dairy sector and linear regression due to data size. Hair, Anderson, Tatham and Black (1995) suggest that the ratio of observations to independent variables should not fall below 10: 1.

Barnes, (2017) notation that raw material costs and customer returns greatly impact the profitability of perishable goods, implying that good quality delivery can lead to increased financial performance, was not supported. Chabane et al. (2008); Louw et al.(2013) ; Bernstein (2013) argue that the Agricultural Marketing Act ( Act 37 of 1937) that restricted the issuing of food processing licenses had the greatest impact on the dairy industry, where very large processors were able to create regional monopolies in both the procurement and supply of milk. Milk in South Africa in 2005 had a CR4 of 70%. This monopolistic behavior is detrimental to output growth, lowers labor productivity and raises unit costs (Fedderke & Szalontai. 2004; Roberts 2009)

The negative relationship of delivery and financial performance in the South African food manufacturing sector could be due to the fact that following market deregulation and the abolition of single-channel marketing, many formerly state-controlled cooperatives became private companies and underwent horizontal and vertical integration. According to Roberts (2009), the CR4% of maze milling and wheat in South Africa is 90% and consists of Pioneer, Tiger Brands, Premier, Foodcorp (now called RCL), which are further vertically integrated into baking activities.

Order qualifiers and winners vary in different contexts and change over time (Antonio et al., 2007). Attributes of setup time reduction, reduction in process inventory, and increase in cycle time, combined with reliable deliveries constitutes the core of delivery. It was expected that the high technological investments and mechanization that can be seen in the large companies in the food manufacturing sector would make delivery both significant and positively correlated as per the findings on Swink et al. (2007), Antonio et al. (2007) and Ataseven and Nair 2017. However, in the case of the South African food manufacturing sector, delivery is negatively correlated to business performance, suggesting that the concentrated nature of the industry has led to an environment where focus on delivery is costly either due to the transportation infrastructure or that delivery is seen as an order qualifier or a necessary condition for market participation.

### 5.3.7 *H1c: Flexibility is positively associated with organizational performance in the South African food manufacturing sector.*

The hypothesis that flexibility is positively associated with organizational performance was not supported by the results of the study. Flexibility was found to have a negative moderate, but significant relationship with business performance, at a significance level of 0.01. The core of flexibility lies in the ability to adapt and respond to changes in production, or volume mix to give customers individual treatment or to introduce new products and services. The findings of this study are is vastly different to a study by Chavez et al. (2017), and Zhao et al. (2006a), (2006b), who suggest that flexibility is a very powerful capability to harness in emerging economies as seen in the Chinese economy.

Aghion et al. (2005) suggested that the high levels of concentration in any industry were due to two factors, namely the escape competition and the Schumpeterian effect. Aghion el al. (2005), who suggests that the escape competition effect, explains why large firms remain dominant in manufacturing industry. The theoretical underpinning of the escape competition effect is founded on the notion that large firms are forced to innovate in order to maintain a gap between themselves and their competitors. Escape competition innovation is characterized by high technological investments, and high R&D costs, which smaller firms cannot afford.

Given the raw input horizontal and vertical integration of the South African food manufacturing industry, one would have expected that flexibility would have a strong positive correlation with performance as close supplier responses enable quick responses to product and volume demand shifts. However According to Evans and Wurster (2000), the sheer size of a large organization may inhibit its ability to develop close relationships with supply chain partners. Large corporation size could be the reason that flexibility has a negative impact on the South African food manufacturing industry

On the other hand it has been proven by Swink et al. (2007); Swink, Schoenherr (2015) that, it is new product capabilities and not process flexibility that enables stronger market-based performance. This is especially true in dynamic markets that are suited to the production of customized products and service solutions. The high sector concentration in the South African food manufacturing industry, illustrates that the environment is not dynamic and hence the benefits of flexibility impact on companies in the SAFM sector negatively.

### 5.3.8 *H1d: Cost is positively associated with organizational performance in the South African food manufacturing sector.*

The hypothesis that cost is positively associated with organizational performance is not supported by the results. Cost was found to have a small negative correlation to performance (0.054). The linear regression further found that cost was not significant.

Cost efficiency can influence profitability and market share by allowing manufacturers to adjust prices to respond to market and competition. Slack et al. (2009), argue that manufacturing capabilities that contribute to low operating costs are particularly conducive to conferring competitive advantage when environmental uncertainties are few.

Due to the few participants in the SAFM industry, one could infer stability. Woodward, (1965); Schroeder et al. (1986); Swamidass & Newell, (1987); and Miller & Roth, (1994) have suggested that cost-efficient, lean approaches are suited to producing a narrow set of products in stable and homogeneous operating and market environments. Prajogo et al. 2016 found that lean production processes have a positive effect on inbound supply performance. Limitations in the SAFM sector could be attributed to low labour productivity, making it difficult to produce products at low costs.

Cost leadership is found to have a positive impact on organizational performance in environments where there are high supply chain partnerships (Ataseven and Nair, 2017). The partnerships manifest into performance through new product development efforts to reduce costs and speed time-to-market for highly desirable consumer products (Frohlich and Westbrook, 2001). This capability can become a competitive advantage as it is difficult to imitate. However according to Evans and Wurster (2000), the sheer size of a large organization may inhibit its ability to develop close relationships with supply chain partners. Our result suggest that companies in the South African food manufacturing sector are governors of the value chain and do not have supply chain integration, but rather dictate to suppliers.

## 5.4 Entrepreneurial orientation and performance relationship

The model for Entrepreneurial orientation and performance was found to be;

***Performance = 0.359 (risk) +2.42***

Table 41 below shows the hypothesized relationships and whether they have been supported.

**Table 41: Entrepreneurial orientation – financial performance hypothesis matrix**

| Sub problem | Literature | Hypothesis | Correlation coefficient | Significance | Supported or not supported |
|---|---|---|---|---|---|
| Identify the Dimensions of EO that have influence on Firm performance in the South African food manufacturing sector | Wiklund & Shepherd (2003), Lumpkin and Dess, (2001) Covin & Slevin (1989), Kreiser and Davids (2011) Hughes and Morgan (2007) (Rauch et al. (2009). Anderson et al. (2015) Lechner and Gundmundson (2014)<br><br>Gupta and Gupta (2015)<br><br>Martin et al. (2017)<br><br>Rosenbusch, Rauch, and Bausch, (2013) | H2 EO is positively associated with organisational performance in the South African food manufacturing sector | Positive | Only Risk is significant | Supported |
| | | H2a :Higher levels of innovation and the development of new products in the South African food manufacturing sector is positively associated to increased financial and market performance | 0.237 | Not significant | Non Supported |
| | | • H2b: Risk Taking has a positive impact on organisational performance in the South African food manufacturing sector | 0.359 | Significant at 0.01 | Supported |
| | | • H2c : Proactiveness has a positive impact on organisational performance in the South African food manufacturing sector | 0.133 | Not significant | Not Supported |
| | | H2d : Autonomy has a positive impact on organisational performance in the | 0.272 | Significant at 0.05 | Supported |

| | | | | | |
|---|---|---|---|---|---|
| | | South African food manufacturing sector | | | |
| | | H2e : Competitive Aggressiveness has a positive impact on organisational performance in the South African food manufacturing sector | 0.307 | Not significant | Not supported |

### 5.4.1 *H2: EO has a positive impact organizational performance in the South African food manufacturing sector*

The hypothesis that EO has a positive impact on organisational performance in the South African Food Manufacturing Industry is supported, by the results. The multidimensional EO construct, does not require that all dimensions be present in order for EO to exist, hence the existence of only risk allows the hypothesis to be valid.

**Table 42: EO, performance correlation (extracted from table 38)**

**Entrepreneurial orientation and performance Correlation table**

| | | | Risk | Innovativeness | Proactiveness | Competitive_ Aggressiveness | Autonomy |
|---|---|---|---|---|---|---|---|
| | Financial_ Performance | Correlation Coefficient | .354** | .297* | .234* | .335** | .323** |
| | | Sig. (2-tailed) | 0,002 | 0,011 | 0,046 | 0,004 | 0,005 |
| | | N | 73 | 73 | 73 | 73 | 73 |
| | Risk | Correlation Coefficient | 1,000 | .573** | .618** | .609** | .615** |
| | | Sig. (2-tailed) | | 0,000 | 0,000 | 0,000 | 0,000 |
| | | N | 74 | 74 | 74 | 74 | 74 |
| | Innovativeness | Correlation Coefficient | .573** | 1,000 | .668** | .611** | .570** |
| | | Sig. (2-tailed) | 0,000 | | 0,000 | 0,000 | 0,000 |
| | | N | 74 | 74 | 74 | 74 | 74 |
| | Proactiveness | Correlation Coefficient | .618** | .668** | 1,000 | .625** | .498** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | Sig. (2-tailed) | 0,000 | 0,000 | | 0,000 | 0,000 |
| | | N | 74 | 74 | 74 | 74 | 74 |
| | Competitive_ Aggressiveness | Correlation Coefficient | .609** | .611** | .625** | 1,000 | .645** |
| | | Sig. (2-tailed) | 0,000 | 0,000 | 0,000 | | 0,000 |
| | | N | 74 | 74 | 74 | 74 | 74 |
| | Autonomy | Correlation Coefficient | .615** | .570** | .498** | .645** | 1,000 |
| | | Sig. (2-tailed) | 0,000 | 0,000 | 0,000 | 0,000 | |
| | | N | 74 | 74 | 74 | 74 | 74 |

Table 42 shows strong and significant correlations between all the factors of EO, suggesting that perhaps EO should have been assessed as a unidimensional construct as opposed to multidimensional. The correlations suggest that although only risk was found to be significant, it is difficult to separate risk from the other dimensions of EO. The non-significance of the other factors could be attributed to the low sample size, as low population samples decrease probability of significance. EO when correlated using the Spearman correlation, yields stronger, more significant relationships with performance

EO will differ based on company size, environment, company structure, and leadership. Gupta and Gupta (2015), found that the competitive intensity and demand volatility of an industry serve as the boundary conditions that provide guidance on the conditions in which EO is most effective. They found that environments with high levels of competitive intensity are characterized by price-based rivalry and frequent counter moves by competitor. In the short-term, EO was found to have a positive association with performance as in competitively intense environments, profitability is dependent on the pursuit and monetization of opportunities at premium prices. The findings of this study support this perspective. EO in the SAFM is found to be low and attributable to first-mover advantage as opposed to competitiveness.

The source of EO in the SAFM could be explained by Stam and Elfring (2008), and Jiang et al. (2018), who indicated that the combination of high network centrality and extensive bridging ties strengthen the EO – performance link, whereas among firms with few bridging ties, centrality weakens the relationship between EO and performance. As is the case with the SAFM. This is further evidenced by value chain integration and leadership experience.

The moderate EO performance link in the SAFM could be attributable to the moderative effects of resources, legitimacies, social ties, and role formalization as suggested by Covin and Slevin (1991); Tang et al. (2008). Without sufficient resources, legitimacies and social ties, and the appropriate organizational structure, EO disrupts the firm's accord with the market environment or circumstances in which it is competing (Miller, 1983) and further hurts firm performance.

For EO to be transformed into performance firms need to acquire resources from their external environment and turn them into products and services, exploring and exploiting opportunities provided by the environment. In this complex relationship, EO is a critical factor because it influences specific strategic decisions and resource allocations (Atuahene-Gima & Ko, 2001) that favor opportunity exploration and exploitation (D. Miller, 1983). Only those firms that apply the appropriate strategic orientation in a specific environment may be able to transform advantages provided by the environment into above-average performance levels

As seen in Table 4 in the literature review, Kreiser (2010) suggests the relationship between environment, structure and levels of EO that lead to optimal performance. The findings from the study suggest that EO in the SAFM is moderate, and the organizational structures are a combination of organic and mechanistic. The combination of structures is evidenced by the high level of autonomy in the EO descriptives table (Table 34). The environment can be described as stable and munificent.

Roesenbach et al. (2014) found that environmental munificence appears to have the strongest impact on EO and firm performance, whereas hostility does not seem to affect EO. Large firms have more resources that can be used to pursue entrepreneurial strategies, even in hostile environments. Proclivity to risk is more likely when firms possess the resources to absorb potential losses. In addition, large firms benefit from greater market shares and higher volumes, which make it easier for them to compete in hostile environments with intense competition for resources and opportunities. In complex environments, small firms increase their EO whereas large firms seem to decrease it. This may reflect the different organizational structures found in firms of different sizes. The SAFM is characterized by large firms, however

opportunities are vast as there are few competitors. The results suggest that EO in the SAFM can be explained by exploitation of new opportunities and process innovation

### 5.4.2 *H2a: Higher levels of innovation and the development of new products in the South African food manufacturing sector is positively associated with increased financial and market performance.*

The hypothesis that higher levels of innovation and the development of new products in the South African food manufacturing sector is positively associated with increased financial and market performance is not supported in this research. The linear model, using the Pearson correlation found innovativeness to be non-significant with a correlation coefficient of 0.039. The Spearman correlation found innovativeness to have a moderate (0.297) and significant relationship with financial performance.

The conflicting results suggest that the relationship between EO and financial performance in the SAFM is non-linear, and that either a larger normally distributed sample or a different regression nonlinear regression model, can explain the true relationship of EO and financial performance in the SAFM.

According to Gupta and Gupta (2015), environments with high levels of price-based rivalry and competitiveness, makes firms pursue new opportunities in order to invade competition, address new customer segments and charge premium prices. Environments characterised by low competitiveness, first mover advantage gained by the pioneering firm can lead to financial performance as in the absence of strong competition customers will remain with existing firms. The low positive correlation of innovativeness to performance as evidenced by the linear model supports the notion that firms in the South African food industry maintain performance by relying on the status quo, and that changes in product innovation may upset consumer preferences(Gupta and Gupta, 2015)

Kreiser et al. 2010, have argued that innovative behaviors were critical to firm survival, arguing, “success in today’s competitive environment requires a company to pursue a coherent technology strategy to articulate its plans to develop, acquire, and deploy technological resources to achieve superior financial performance. Khanna, Guler and

Nerkar (2016), found that the number, importance, and timing of small failures are associated with a decrease in R&D output (patent count) but an increase in the quality of the R&D output (forward citations to patents). Large firms rely on technological barriers and institutional memory to create barrier to entry, as opposed to product innovation. Lechner and Gudmundsson (2014) found that cost leadership strategy is a more capital-intensive strategy necessitating only minimum innovativeness. Greater innovativeness will be detrimental to the cost leadership strategy.

### 5.4.3 *H2b: Risk Taking has a positive impact organizational performance in the South African food manufacturing sector (SAFM)*

The hypothesis that risk taking has a positive impact on organizational performance was supported by the results. Risk was found to be significant at a level of 0.01, supporting the null hypothesis. The Pearson correlation coefficient for Risk was found to be 0.352, suggesting a moderate correlation.

This finding is contradictory to the finding of Kreiser et al. (2010) who suggests that risk- taking behaviours will be more positively associated with firm performance when firms have organic flat structures as opposed to mechanistic structures. The structure of an organisation will have an impact on their performance (Kreiser et al., 2010). Organizational structures have often been conceptualized as running on a continuum from organic to mechanistic (Kreiser et al., 2010). The results suggest that the South Africa food manufacturing structures are a combination of both mechanistic and organic, as the risk correlation in only moderate. This is further supported by the high level of autonomy that was found when assessing the EO descriptive

The risk – performance correlation could be associated with first-mover firms being able to gain advantages in terms of their ability as pioneering firms to earn higher economic profits through such advantages as technological leadership and increased buyer switching costs. Decisions on first-mover advantage are correlated more to risk than to proactiveness and innovation. The risk performance correlation was not impacted when correlation analysis was performed with Spearman and Pearson correlation.

### 5.4.4 *H2c: Proactiveness has a positive impact organisational performance in the South African food manufacturing sector*

The hypothesis that proactiveness has a positive impact on organisational performance in the SAFM sector was not supported by the results. The linear model, using the Pearson correlation found proactiveness to be non-significant with a correlation coefficient of 0.039. The Spearman correlation found proactiveness to have a moderate (0.234) and significant relationship with financial performance.

Proactiveness anticipates competitive moves and maintains first-mover advantage; it is an important factor for differentiation. Innovation as a driver of uniqueness requires proactive behaviour (Lechner and Gudmundsson, 2014).

The conflicting results suggest that the relationship between EO and financial performance in the SAFM is non-linear, and that either a larger normally distributed sample or a different regression nonlinear regression model, can explain the true relationship of proactiveness and financial performance in the SAFM.

Proactive behaviours are found to have a performance association in opportunity driven environments, with organizations that have organic structures. The highly concentrated nature of the SAFM industry suggests that it is not opportunity driven, cost leadership based environment and hence the negative associations with proactiveness.

### 5.4.5 *H2d: Autonomy has a positive impact organisational performance in the South African food manufacturing sector*

The hypothesis that autonomy has a positive impact on organisational performance was not supported by the linear regression model. Autonomy was found to be non-significant with a Pearson correlation of 0.184. This is a small to moderate correlation. The spearman correlation found autonomy to be significant (at a level of 0.01) and moderately correlated (0.323) to financial performance.

The conflicting results suggest that the relationship between autonomy and financial performance in the SAFM is non-linear, and that either a larger normally distributed

sample or a different regression nonlinear regression model, can explain the true relationship of EO and financial performance in the SAFM.

Lumpkin and Dess, (2005) argue that autonomy can be used to encourage creative thinking and brain storming about new ideas. Autonomy allows for the ambidextrous process that leads to innovation (Martin, Javalgi, Cavusgil, 2017). Autonomy is associated with organic organisational structures. High levels of autonomy were found in the SAFM based on the Likert scale responses.

### 5.4.6 *H2e: Competitive aggressiveness has a positive impact organisational performance in the South African food manufacturing sector*

The hypothesis that competitive aggressiveness has a positive impact on organisational performance not supported by the study. Competitive aggressiveness was not found to be significant at a level of 0.05. The study found competitive aggressiveness to have a moderate correlation (0.158) with financial performance, based on a linear regression model. The spearman correlation found competitive aggressiveness to be significant (at a level of 0.01) and moderately correlated (0.335) to financial performance

The conflicting results suggest that the relationship between competitive aggressiveness and financial performance in the SAFM is non-linear, and that either a larger normally distributed sample or a different regression nonlinear regression model, can explain the true relationship of EO and financial performance in the SAFM.

Lechner and Gudmundsson (2014), found that competitive aggressiveness was negatively associated with both a differentiation strategy and a cost leadership strategy. Cost leadership creates greater market share, which does not imply profitability.

The SAFM has not seen many new entrants, and so it was expected that this dimension would be significant, however as previously found, barriers to entry are bases on technological barriers and capital investment. This could be the reason for the non-significance of competitive aggressiveness.

## 5.5 EO – Manufacturing Capability Correlation

From the results as evidenced in table 38, proactiveness was found to have highly significant moderate negative correlations with the manufacturing capabilities of cost, delivery, flexibility and a low significant, moderate correlation with quality. Innovativeness had highly significant moderate negative correlations with the manufacturing capabilities of cost, delivery and flexibility. Competitive aggressiveness had low significant, moderate negative correlations with delivery, cost and flexibility. Autonomy had a highly significant moderate negative correlation with flexibility and a low significant moderate correlation with cost. Lomberg, Urbig, Stöckmann, Marino & Dickson (2017) suggest that there is a covariation between the EO dimensions. This is consistent with the EO conceptualization by Anderson et al. (2015). Both scholars suggest that proactiveness will vary with innovativeness, and risk will not covary with the others. The results highlight the independence of risk and covariance of proactiveness and innovativeness.

It was suggested in chapter 2 that EO could likely be the link that leads to increased manufacturing capability, which could result in increased financial performance. However, the survey results seem to suggest otherwise.

The results suggest that the EO – manufacturing capability link could be moderated by operating environment. They further suggest that there is a strong link between delivery, flexibility, risk, cost, innovativeness, and proactiveness with the nature of the relationship moderated by the environment. This view is supported by Chavez et al. 2017 who found that EO moderates the relationship between flexibility, cost and organizational performance. Chavez el al, (2017), further suggest that in environments where EO is low, competitive advantage is not secured from employing flexibility and cost resources. Environments characterized by high entrepreneurial behavior will encourage exploitation of manufacturing capabilities such as flexibility and cost.

## 5.6 Conclusion

Required combinations of manufacturing capabilities and EO will differ based on the type of industry (Kreisier et al., 2011). The manufacturing capabilities seem to occur in pairs, with quality and delivery closely linked and flexibility and cost closely linked.

The study found that sub divisions that excelled in quality and delivery, did not perform well in flexibility and low cost production. This is consistent with Barnes, (2017) notation that raw material costs and customer returns greatly impact the profitability of perishable goods, hence good quality will lead to increased delivery as there will be fewer customer returns.

SAFM sector yields above average financial performance, suggesting opportunities for performance improvement, this could be attributed to the high sector concertation, which according to Fedderke (2008), is frosted by large market power resulting in supernormal profits, reduced consumer surplus, inefficiencies and collusion.

The hypothesis that the manufacturing capability is positively associated with financial performance in the SAFM sector has not been supported by the results in the study. The study suggests that in the SAFM delivery and quality are necessary conditions to market entry. Flexibility and cost impact negatively on financial performance. This could be due to market stability with diminishing returns to increased manufacturing capability. Implying that any efforts to increase manufacturing capability will result in decrease financial performance, and more emphasis should be put on first mover advantage. Reasons cited by other scholars (for extensive review see Ataseven and Nair, 2018) for this negative relationship include, poor supply chain integration and partnerships, high sector concentration and low productivity.

The hypothesis that EO is positively associated with financial performance is supported by the study. Risk is found to be the only significant factor. The results show that all the factors of EO are very closely interrelated. Furthermore, the EO in the SAFM sector can be explained by large firm size and their ability to absorb potential losses. In addition, large firms benefit from greater market shares and higher volumes, which make it easier for them to compete.

The positive EO- performance link in the SAFM, could further be attributed to, long term effects of first mover advantage, strong leadership network ties, experience and value chain integration, resource abundance of large firms for research and development, and combined organisational structures that afford managers autonomy to make decisions.

The results suggest that the EO – manufacturing capability link could be moderated by the operating environment. They further suggest that there is a strong link between delivery, flexibility, risk, cost, innovativeness and proactiveness with the nature of the relationship being moderated by the environment. These results are consistent with by Anderson et al. (2015), who suggests that proactiveness will vary with innovativeness, and risk will not covary with the other variables. The results highlight the independence of risk and covariance of proactiveness and innovativeness.

The conflicting EO correlation results based on the spearmen and Pearson correlations suggest that the relationship between EO and financial performance in the SAFM is non-linear, and that either a larger normally distributed sample or a different regression nonlinear regression model, can explain the true relationship of EO and financial performance in the SAFM. This view is supported by that of Xie, (2011) who found a curvilinear relationship between EO and performance.

# CHAPTER 6. CONCLUSIONS & RECOMMENDATIONS

## 6.1 Introduction

This chapter will begin with the summary of the findings and the conclusions that were inferred in the study, based on different literature sources and empirical estimations. This will be followed by subsections on recommendations, management implications and suggestions for future research.

## 6.2 Conclusions of the study

The study has set out to evaluate and assess the relationship between EO (risk, proactiveness, innovativeness, competitive aggressiveness, and autonomy), manufacturing capabilities (cost, flexibility, delivery and quality) and organizational performance. The key premise of the research was that EO is the mechanism through which manufacturing capabilities (MC) are linked to market needs in the South African food manufacturing industry. A summary table presenting the various hypotheses and sub-hypotheses and their respective outcomes can be seen in Table 43.

**Table 43: Research hypothesis and findings**

| Sub problem | Hypothesis | Correlation coefficient | Significance | Supported/ not supported |
|---|---|---|---|---|
| Identify the dimensions of manufacturing capability that influence firm performance | H1. Manufacturing capabilities are positively associated with organizational performance | Negative | Only flexibility is significant | Not Supported |
| | • H1a: Quality is positively associated with organizational performance in the South African food manufacturing sector. | 0.091 | non | Supported |
| | • H1b: Delivery is positively associated with organizational performance in the South African food manufacturing sector. | -.213 | Significant at 0.01 | Not Supported |

| | | | | |
|---|---|---|---|---|
| | H1c: Flexibility is positively associated with organizational performance in the South African food manufacturing sector. | -0.392 | Significant at 0.01 | Not supported |
| | H1d: Cost is positively associated with organizational performance in the South African food manufacturing sector. | 0.054 | Not significant | Not supported |
| Identify the Dimensions of EO that have influence on Firm performance in the South African food manufacturing sector | H2 EO is positively associated with Organisational Performance in the South African food manufacturing sector | Positive | Only Risk is significant | Supported |
| | H2a :Higher levels of innovation and the development of new products in the South African food manufacturing sector is positively associated to increased financial and market performance | 0.039 | Not significant | Non Supported |
| | • H2b: Risk Taking has a positive impact on organisational performance in the South African food manufacturing sector | 0.352 | Significant at 0.01 | Supported |
| | • H2c : Proactiveness has a positive impact on organisational performance in the South African food manufacturing sector | -.053 | Not significant | Not Supported |
| | H2d : Autonomy has a positive impact on organisational performance in the South African food manufacturing sector | 0.184 | Significant at 0.05 | Supported |
| | H2e : Competitive Aggressiveness has a positive impact on organisational performance in the South African food manufacturing sector | 0.158 | Not significant | Not supported |
| Determine the strength of the correlation between the manufacturing capability and EO | H3: A strong co-relationship exists between EO and Manufacturing capability | Main factors with high relationships are risk, innovativeness, proactiveness, delivery and flexibility | | Supported, moderate negative co-relationship |

The hypothesis that Manufacturing capabilities are positively associated with organizational performance was not supported. The research found that delivery and flexibility negatively influenced financial performance. These results are similar to those of Rosenweig (2003) and Antonio et al. (2007). Low cost and quality had a very small and insignificant negative relationship with financial performance. One can

conclude that the findings are contextual and that different manufacturing capabilities will be important based on the industry structure and environmental conditions.

Flexibility and delivery impact negatively on financial performance. This could be due to market stability with diminishing returns to increased manufacturing capability. Implying that any efforts to increase manufacturing capability will result in decrease financial performance, and more emphasis should be put on first mover advantage. Reasons cited by other scholars (Atseven and Nair, 2018; Prajogo et al. 2016) for this negative relationship include, poor supply chain integration and partnerships, high sector concentration and low productivity.

The hypothesis that EO was positively associated with organizational performance was supported in this study. These findings suggest a data normality, and likely a sample size problem. Risk by its very nature is associated with large firm R&D, and learning from previous failures, which is a characteristic of large organizations (Khanna et al., 2016). The significance of risk is consistent with Anderson et al. (2015), who suggest that proactiveness will vary with innovativeness, and risk will not covary with the other variables.

Findings show that risk is significantly correlated to financial performance when using the Pearson correlation, however when the Spearman correlation is used all the factors of EO are found to be significant. Sullivan & Feinn (2012), suggest that the low P- and F-values for significance can exist when independent variables have a precise estimate, low variability or a large sample size, and thus may not necessarily constitute importance. Large sample sizes will always constitute significance unless the effect size is zero.

EO in the SAFM sector is largely due to the escape competition effect is described, as a phenomenon that occurs when firms are ‘forced’ to innovate in order to maintain a gap between themselves and their competitors. This innovation comes when firms at the technology frontier realize that if they do not invest and innovate, firms immediately below them will catch up causing the former leaders to lose their monopoly rents (Alvarez and Barney, 2013). The high income to assets ratio of the large food manufacturing firms in comparison to the small manufacturing firms is evidence of this effect (see figure 10) .

It was observed that sample data size only changed the significance values and not the correlation coefficients. EO in the SAFM sector can be explained by large firm sizes and their ability to absorb potential losses. In addition, large firms benefit from greater market share and higher volumes, which makes it easier for them to compete.

The conflicting EO correlation results based on the Spearmen and Pearson correlations suggest that the relationship between EO and financial performance in the SAFM is non-linear, and that either a larger normally distributed sample or a different regression nonlinear regression model, can explain the true relationship of EO and financial performance in the SAFM. This view is supported by that of Xie, (2011) who found a curvilinear relationship between EO and performance.

The results suggest that the EO manufacturing capability link could be moderated by operating environment. There also appears to be a strong link between delivery, flexibility, risk, cost, innovativeness and proactiveness. With the nature of the relationship being moderated by the environment. This is consistent with (Rauch et al., (2009); Wales et al., (2011) who suggest that the EO– performance relationship is mediated or moderated by diverse variables.

In the context of manufacturing, firm performance has largely been attributed to manufacturing capability, with research rooted in Skinners, (1969) publication of *Manufacturing – Missing Link in Corporate Strategy*. The study supports the notion that entrepreneurial traits of risk tolerance, innovativeness, and proactiveness can be pivotal in assisting firms to leverage their manufacturing competencies and develop capabilities such as flexibility, agility, quality and efficiency, allowing firms to respond to market opportunities and meet rapidly changing needs (Handfield et al., 2009; Hsu et al., 2011; Giunipero et al., 2005).

## 6.3 Recommendations

The significance of this research, was that it attempted to bridge the link between operations management literature and that of entrepreneurship. The study set out to provide insights on how EO may complement manufacturing capabilities to improve organizational performance. Furthermore, the significance of the study lies in providing

insights on EO in concentrated markets, and how to perform research in these particular industries.

The choice of Manufacturing Capability enhancement will dictate if performance will increase or decrease in that particular environment. Given that resources are differentially valuable across environments, Manufacturing Capabilities that contribute to low operating costs and product quality may have their most positive relationships with performance among ventures operating in specific environments (Priem and Butler. 2001). If firms do not match EO with supporting resources and organizational structure, EO may hurt firm performance Rosenbauch et al. (2013).

## 6.4 Management Implications

Competitiveness in the SAFM is based on first mover advantage as there is low competitive intensity. It is recommended the firms focus on improving proactiveness and competitive aggressiveness as these are the traits with the closest links to first mover advantage. In the absence of strong competition customers will remain with the entrepreneurial frim extending is benefits of being a first mover (Gupta and Gupta 2015).

The relationship found between manufacturing capability and performance, suggests that further investment in improving manufacturing capabilities will not enhance financial performance. Businesses in the SAFM, need to focus on opportunity creation. The ability to recognise novel opportunities in the external environment, evaluate and prioritise these opportunities and then translate these opportunities into viable and profitable businesses lies at the heart of the entrepreneurial process (Goodale et al., 2011). Only with opportunity creation will firms in the SAFM, be able to sustain increased financial performance.

The study supports the Kreiser and Davids, (2011) configuration of EO in stable and munificent environments. They suggest moderate risk, high proactiveness and high innovativeness and an organic yet mechanistic (combination) organisational structure as the optimal performance configuration.

Implications for policy makers are that competitive intensity in the SAFM will need to be improved. The main reason for low competitive intensity can be attributed to lack of market entrance by new competitors. Barriers to entry include access to raw material inputs, supply side constraints, inadequate incentives, raw material supply challenges, the proliferation of private standards, technology and high transaction costs (DAFF, 2012).

Many scholars assert that industry concentration inhibits competition amongst firms. This is frosted by large market power resulting in supernormal profits, reduced consumer surplus, inefficiencies and collusion and below par financial performance (Fedderke, 2008). The below midpoint response from the analysis on the performance construct, suggests that few companies are growing aggressively.

## 6.5 Suggestions for further research

Given the conflicting results between the Pearson and Spearman correlation coefficients, I would recommend that the data be regressed using nonlinear regression techniques. These could uncover the true relationship between EO, MC and performance.

The results suggest that the EO manufacturing capability link could be moderated by operating environment. There also appears to be a strong link between delivery, flexibility, risk, cost, innovativeness and proactiveness. With the nature of the relationship being moderated by the environment. Further research is required to assess the moderating effects of EO on manufacturing capability.

Stam, & Elfring, (2008) found that high network centrality and expansive bridging ties strengthened the relationship between entrepreneurial orientation and performance. Jiang et al. (2018), highlight the role of resource acquisition through networks as an important mediating mechanism, through which entrepreneurial orientation influences firm performance. High levels of EO, above average levels of financial performance and highly experienced leadership in the SAFM sector, is consistent with the observations of both Stam, & Elfring. (2008) and Jiang et al. (2018). Further research in this regard is establish further asses the nature of this relationship

The findings of the study, suggest that the food manufacturing industry in South Africa lacks competitiveness and the drivers of performance in the entire sector are subsector specific. When investigating specific subdivisions of the food manufacturing sector descriptive analysis offers different insights (i.e. firms that perform well in quality and delivery, perform poorly in flexibility and cost) , however due to limited data, relationships are unable to be further analysed.

The form of competitive strategy that is prevalent with the SAFM sector is unclear. Lechner and Gudmundsson (2014), found that risk and competitive aggressiveness were not associated with differentiation or cost leadership. Research on entrepreneurial orientation in the SAFM, could be improved through a study focusing on a subdivision i.e. milk, grain etc. Due to the sector concentration issue, I would suggest that within the specific industry population sample be increased to 300 people. The population should include board members, and small firms.

Further research could also explore the relationship between EO, performance and manufacturing capability, focusing on all manufacturing companies in South Africa. The study should use the CEO's of all manufacturing companies as the population South Africa. The current research was limited by sector participation and hence cannot account for the entire food manufacturing sector, as not all sectors were represented, and of the sectors represented number of participants were not the same.

Further research could also be explored by assessing EO and manufacturing capability, by comparing two companies in the SAFM, one that is publicly listed and is performing well and another what has not listed and is privately owned. This could provide insights into the impact of company structure, and leadership on performance in the SAFM

To uncover the manufacturing capability – performance relationship, I would suggest that research be carried out with flexibility separated into process and product flexibility, and performance separated into financial, and market performance. A more granular investigation of manufacturing capability and performance is required. Another research suggestion would be to investigate EO in the SAFM and a unidimensional construct, and asses its relationship with manufacturing capability and performance.

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# APPENDIX A - SURVEY

Q1 How old are you (in years)?

- O 10-20 (1)
- O 20-30 (2)
- O 30-40 (3)
- O 40-50 (4)
- O 50-60 (5)
- O 60-70 (6)

Q2 Which Sector Do you Work For?

- O Production, processing and preserving of meat and meat products (1)
- O Processing and preserving of fish and fish products (2)
- O Processing and preserving of fruit and vegetables (3)
- O Manufacture of vegetable and animal oils and fats (4)
- O Manufacture of dairy products (5)
- O Manufacture of prepared animal feeds (6)
- O Manufacture of bakery products, sugar, cocoa, chocolate and sugar confectionery (7)
- O Manufacture of other food products (8)
- O Manufacture of grain mill products (9)
- O Manufacture of Beverages (Juice, water & non alcoholic beverages) (10)

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Q3 Which Province are you located in / do you report to work?

- O Freestate (1)
- O Gauteng (2)
- O Limpopo (3)
- O Mpumalanga (4)
- O Northern Cape (5)
- O Western Cape (6)
- O Kwazulu Natal (7)
- O Eastern Cape (8)
- O North West (9)

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Q4 How long have you worked in the manufacturing industry (in years)?

- O 0-5 (1)
- O 5-10 (2)
- O 10-15 (3)
- O 15-20 (4)
- O 20+ (5)

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Q5 What is your managment level?

- O Middle Management (P8-6) (1)
- O Senior Management (P5-3) (2)
- O Executive Management (P3 -1) (3)

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Q6 Duration with current firm, in current position(in years)?

- O 0-5 (1)
- O 5-10 (2)
- O 10-15 (3)
- O 15-20 (4)
- O 20+ (5)

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Q7 Quality - Please indicate the degree to which you agree with the following statements concerning your firm's performance with respect to your major customers.

| | Strongly disagree (1) | Disagree (2) | Somewhat disagree (3) | Neither agree nor disagree (4) | Somewhat agree (5) | Agree (6) | Strongly agree (7) |
|---|---|---|---|---|---|---|---|
| Produce high performance products that meet customer needs (1) | O | O | O | O | O | O | O |
| Produce consistent quality products with low defects (2) | O | O | O | O | O | O | O |
| Offer highly reliable products that meet customer needs (3) | O | O | O | O | O | O | O |
| Produce high quality products that meet our customer needs (4) | O | O | O | O | O | O | O |

Q8 Delivery - Please indicate the degree to which you agree to the following statements concerning your firm's performance with respect to your major customers.

| | Strongly disagree (1) | Disagree (2) | Somewhat disagree (3) | Neither agree nor disagree (4) | Somewhat agree (5) | Agree (6) | Strongly agree (7) |
|---|---|---|---|---|---|---|---|
| Our company always delivers the correct quantity with the right kind of product (1) | O | O | O | O | O | O | O |
| Our company always deliver products quickly or in a short lead-time (2) | O | O | O | O | O | O | O |
| Our company always provides on-time delivery to our customers (3) | O | O | O | O | O | O | O |
| Our company always provides reliable delivery to our customers (4) | O | O | O | O | O | O | O |
| Our company always reduces the time it takes for customers to place orders (5) | O | O | O | O | O | O | O |

Q9 Flexibility- Please indicate the degree to which you agree to the following statements concerning your firm's performance with respect to your major customers.

| | Strongly disagree (1) | Disagree (2) | Somewhat disagree (3) | Neither agree nor disagree (4) | Somewhat agree (5) | Agree (6) | Strongly agree (7) |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Our company can rapidly change production volume (1) | O | O | O | O | O | O | O |
| Our Company can produce customized product features (2) | O | O | O | O | O | O | O |
| Our Company can reduce broad product specifications within same facility (3) | O | O | O | O | O | O | O |
| Our Company can make rapid product mix changes (4) | O | O | O | O | O | O | O |

Q10 Cost - Please indicate the degree to which you agree to the following statements concerning your firm's performance with respect to your major customers.

| | Strongly disagree (1) | Disagree (2) | Somewhat disagree (3) | Neither agree nor disagree (4) | Somewhat agree (5) | Agree (6) | Strongly agree (7) |
|---|---|---|---|---|---|---|---|
| Our company produces products with low manufacturing costs (1) | O | O | O | O | O | O | O |
| Our company produces products with low inventory costs (2) | O | O | O | O | O | O | O |
| Our company produces products with low overhead costs (3) | O | O | O | O | O | O | O |
| We offer price as low or lower than our competitors (4) | O | O | O | O | O | O | O |

Q11 Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors.

| | Much better (1) | Moderately better (2) | Slightly better (3) | About the same (4) | Slightly worse (5) | Moderately worse (6) | Much worse (7) |
|---|---|---|---|---|---|---|---|
| Growth in sales (1) | O | O | O | O | O | O | O |
| Return on sales (ROS) /Gross magin (2) | O | O | O | O | O | O | O |
| Growth in return on sales (ROS) (3) | O | O | O | O | O | O | O |
| Growth in profit (4) | O | O | O | O | O | O | O |
| Growth in market share (5) | O | O | O | O | O | O | O |
| Return on investment (ROI) (6) | O | O | O | O | O | O | O |
| Growth in ROI (7) | O | O | O | O | O | O | O |
| Return on assets (ROA) (8) | O | O | O | O | O | O | O |
| Growth in ROA (9) | O | O | O | O | O | O | O |

Q12 Risk taking - Please indicate the degree to which you agree to the following statements concerning the firm you work for.

| | Strongly agree (1) | Agree (2) | Somewhat agree (3) | Neither agree nor disagree (4) | Somewhat disagree (5) | Disagree (6) | Strongly disagree (7) |
|---|---|---|---|---|---|---|---|
| The term 'risk taker' is considered a positive attribute for people in our business (1) | O | O | O | O | O | O | O |
| People in our business are encouraged to take calculated risks with new ideas (2) | O | O | O | O | O | O | O |
| Our business emphasizes both exploration and experimentation for opportunities (3) | O | O | O | O | O | O | O |

Q13 Innovativeness - Please indicate the degree to which you agree to the following statements concerning the firm you work for.

| | Strongly agree (1) | Agree (2) | Somewhat agree (3) | Neither agree nor disagree (4) | Somewhat disagree (5) | Disagree (6) | Strongly disagree (7) |
|---|---|---|---|---|---|---|---|
| We actively introduce improvements and innovations in our business (1) | O | O | O | O | O | O | O |
| Our business is creative in its methods of operation (2) | O | O | O | O | O | O | O |
| Our business seeks our new ways to do things (3) | O | O | O | O | O | O | O |

Q14 Proactiveness - Please indicate the degree to which you agree to the following statements concerning the firm you work for.

| | Strongly agree (1) | Agree (2) | Somewhat agree (3) | Neither agree nor disagree (4) | Somewhat disagree (5) | Disagree (6) | Strongly disagree (7) |
|---|---|---|---|---|---|---|---|
| We always try to take the initiative in every situation(e.g. against competitors, in projects when working with others) (1) | O | O | O | O | O | O | O |
| We excel at identifying opportunities in the market or our operations (2) | O | O | O | O | O | O | O |
| We initiate actions to which other organisations respond (3) | O | O | O | O | O | O | O |

Q15 Competitive Aggressiveness - Please indicate the degree to which you agree to the following statements concerning the firm you work for.

| | Strongly agree (1) | Agree (2) | Somewhat agree (3) | Neither agree nor disagree (4) | Somewhat disagree (5) | Disagree (6) | Strongly disagree (7) |
|---|---|---|---|---|---|---|---|
| Our business is intensely competitive (1) | O | O | O | O | O | O | O |
| In general, our business takes a bold aggressive approach when competing (2) | O | O | O | O | O | O | O |
| We try and out manoeuvre the competition as best as we can (3) | O | O | O | O | O | O | O |

Q16 Autonomy -Please indicate the degree to which you agree to the following statements concerning the firm you work for.

| | Strongly agree (1) | Agree (2) | Somewhat agree (3) | Neither agree nor disagree (4) | Somewhat disagree (5) | Disagree (6) | Strongly disagree (7) |
|---|---|---|---|---|---|---|---|
| Employees are permitted to ask and think without interference (1) | O | O | O | O | O | O | O |
| Employees perform jobs that allow them to make and investigate changes in the way they perform their work (2) | O | O | O | O | O | O | O |
| Employees are given freedom and independence to decide on their own how to go about doing their work (3) | O | O | O | O | O | O | O |
| Employees are given freedom to communicate without interference (4) | O | O | O | O | O | O | O |
| Employees are give authority and responsibility to act alone if the think it to be in the best interests of the business (5) | O | O | O | O | O | O | O |
| Employees have access to all vital information regarding the firm (6) | O | O | O | O | O | O | O |

# APPENDIX B - COVER LETTER

Role of Manufacturing capability and entrepreneurial orientation in the South African food manufacturing sector

The University of Witwatersrand
Graduate School of Business Administration
Cell: 071 623 6378
Email: 0507131J@students.wits.ac.za
Date: 15.10.2017

Role of Manufacturing Capability and Entrepreneurial Orientation in the South African Food Manufacturing (Agro processing) sector

Dear Sir/Madam,

My name is Mosiuoa Sole, I am currently studying a Masters of Management in Entrepreneurship and New Venture Creation in Johannesburg at the University of Witwatersrand Business School (Wits Business School). My MM research title is: “The Role of Entrepreneurial Orientation in the South African food manufacturing sector”.

The objective of this research is to determine the relationship between business performance and the corporate culture of innovation, corporate proactivity and risk appetite within the South African food packaging manufacturing sector. Furthermore, this research will investigate the relationship between corporate performance based on the financial performance and market share, and strong manufacturing capability, namely flexibility, delivery, quality, and cost.

I would like to humbly request for you participation in my research by completing the attached questionnaire. The questionnaire has three sections. The first section focuses on your firm’s manufacturing capability. Second section assesses your firm’s financial and market performance. The last section

asks about your firm's corporate culture. This questionnaire consists of 20 questions and should take no more than 15 minutes to complete.

**Outcomes of research participation**

There are no right or wrong answers and you do not have to answer every question. Your participation is voluntary; hence your consent will be required. You are not obliged to participate. If you desire feedback of a cross-sectional view of your specific company it will be provided on request. This research is for academic purposes only and the results from the study will be reported only in my thesis and journal articles. Your Company name will remain anonymous. Your responses remain strictly confidential and will not be shared with anyone else. The questionnaires from this research will be kept for 5 years for possible further research after which they will be destroyed. The data will reported in aggregated manner and not on individual respondent identity basis or individual company basis, hence all individuals and companies will have anonymity and confidentiality. Respondents and participating firms will participate under guarantee and Ethics protection granted through anonymity and confidentiality.

Should you have queries related to the research, please feel free to contact my Supervisor: Dr McEdward Murimbika on 083 613 6530 or Email: McEdward.Murimbika@wits.ac.za

You may directly request copies of the results of the research from me on 0507131J@students.wits.ac.za

Kind Regards

Mosiuoa M. Sole

# APPENDIX C – CONSISTENCY MATRIX

Table C1 – Consistency Matrix

| **Research problem stated here** | | | | | |
|---|---|---|---|---|---|
| **Sub-problem** | **Literature Review** | **Hypotheses or Propositions or Research questions** | **Source of data** | **Type of data** | **Analysis** |
| Identify the Dimensions of EO that have influence on Firm performance in the South African food manufacturing sector | Wiklund & Shepherd (2003), Lumpkin and Dess, (2001) Covin & Slevin (1989), Kreiser and Davids (2011) Hughes and Morgan (2007) (Rauch et al. (2009). Anderson et al. (2015) Lechner and Gundmundson (2014)<br><br>Gupta and Gupta (2015)<br><br>Martin et al. (2017)<br><br>Rosenbusch, Rauch, and Bausch, (2013) | H2 EO is positively associated with Organisational Performance in the South African food manufacturing sector<br><br>H2a :Higher levels of innovation and the development of new products in the South African food manufacturing sector is positively associated to increased financial and market performance<br><br>H2b: Risk Taking has a positive impact organisational performance in the South African food manufacturing sector<br><br>H2c : Proactiveness has a positive impact organisational performance in the South African food manufacturing sector | Questionnaire Questions using 7 point likert scale<br><br>Annual Financial Statements | Interval | OLS to test linearity and Multicolliniearity |

| | | | | | |
|---|---|---|---|---|---|
| | | H2d : Autonomy has a positive impact organisational performance in the South African food manufacturing sector<br><br>H2c : Competitive Aggressiveness has a positive impact organisational performance in the South African food manufacturing sector | | | |
| Identify the dimensions of manufacturing capability that influence firm performance | Terjesen et al. (2011) Swink et al. (2007) Antonio et al. (2007) Chavez et al. (2015 ) (Flynn et al. (2010) Wong et al. (2011)<br><br>Lu et al. (2018).<br><br>Prajogo et al. (2016).<br><br>Ataseven & Nair, (2017)<br><br>O'Neill et al. (2016). | H1. Manufacturing capabilities are positively associated with organizational performance.<br><br>• H1a: Quality is positively associated with organizational performance in the South African food manufacturing sector.<br><br>• H1b: Delivery is positively associated with organizational performance in the South African food manufacturing sector.<br><br>• H1c: Flexibility is positively associated with organizational performance in the South African food manufacturing sector.<br><br>• H1d: Cost is positively associated with organizational performance in the South African food manufacturing sector. | Questionnaire Questions using 7 point likert scale.<br><br>Annual Financial Statements | Interval | OLS to test linearity and Multicolliniearity |

| | | | | | |
|---|---|---|---|---|---|
| Determine the strength of the correlation between the manufacturing capability and firm performance | Handfiled et al. (2009); Hsu et al. ( 2011) ;Giunipero et al. (2005). | H3: A strong relationship between EO and Manufacturing Capability has a positive impact on organizational performance | Questionnaire Questions using 7 point likert scale.<br><br>Annual Financial Statements | Interval | Correlation analysis |

# APPENDIX D – STATISTICAL DATA

## D1.1 Non-Response Bias Tests

**Table D1: Group statistics**

| Group Statistics | | | | | |
|---|---|---|---|---|---|
| VAR00001 | | N | Mean | Std. Deviation | Std. Error Mean |
| Quality_1 | Early RP | 16 | 5,81 | 1,601 | 0,400 |
| | Late RSP | 16 | 6,06 | 1,063 | 0,266 |
| Quality_2 | Early RP | 16 | 5,88 | 1,784 | 0,446 |
| | Late RSP | 16 | 5,88 | 0,885 | 0,221 |
| Quality_3 | Early RP | 16 | 6,31 | 1,250 | 0,313 |
| | Late RSP | 16 | 5,81 | 1,047 | 0,262 |
| Quality_4 | Early RP | 16 | 6,31 | 1,493 | 0,373 |
| | Late RSP | 16 | 6,00 | 0,966 | 0,242 |
| Delivery_1 | Early RP | 16 | 6,25 | 0,447 | 0,112 |
| | Late RSP | 16 | 5,75 | 1,125 | 0,281 |
| Delivery_2 | Early RP | 16 | 5,94 | 0,854 | 0,213 |
| | Late RSP | 15 | 5,47 | 0,834 | 0,215 |
| Delivery_3 | Early RP | 16 | 5,81 | 0,750 | 0,188 |
| | Late RSP | 16 | 5,56 | 1,031 | 0,258 |
| Delivery_4 | Early RP | 16 | 6,25 | 0,683 | 0,171 |
| | Late RSP | 16 | 5,56 | 0,814 | 0,203 |
| Delivery_5 | Early RP | 16 | 5,69 | 1,078 | 0,270 |
| | Late RSP | 16 | 5,00 | 1,033 | 0,258 |
| Flexibilty_1 | Early RP | 15 | 5,60 | 1,242 | 0,321 |
| | Late RSP | 16 | 4,50 | 1,932 | 0,483 |
| Flexibility_2 | Early RP | 15 | 5,00 | 1,648 | 0,425 |
| | Late RSP | 16 | 4,25 | 1,483 | 0,371 |
| Flexibility_3 | Early RP | 15 | 5,33 | 1,397 | 0,361 |
| | Late RSP | 16 | 4,69 | 1,401 | 0,350 |
| Flexibility_4 | Early RP | 15 | 4,87 | 1,685 | 0,435 |
| | Late RSP | 16 | 3,94 | 1,914 | 0,478 |
| Cost_1 | Early RP | 15 | 4,47 | 1,356 | 0,350 |
| | Late RSP | 16 | 4,25 | 1,880 | 0,470 |
| Cost_2 | Early RP | 15 | 4,20 | 1,207 | 0,312 |
| | Late RSP | 16 | 4,00 | 1,751 | 0,438 |
| Cost_3 | Early RP | 15 | 3,87 | 1,302 | 0,336 |
| | Late RSP | 16 | 3,75 | 1,693 | 0,423 |
| Cost_4 | Early RP | 15 | 3,13 | 1,407 | 0,363 |
| | Late RSP | 16 | 3,81 | 1,940 | 0,485 |
| Business_Perfromance_1 | Early RP | 15 | 2,67 | 1,113 | 0,287 |
| | Late RSP | 15 | 3,33 | 1,175 | 0,303 |
| Business_Perfromance_2 | Early RP | 15 | 3,20 | 1,082 | 0,279 |
| | Late RSP | 15 | 3,33 | 1,543 | 0,398 |
| Business_Perfromance_3 | Early RP | 15 | 3,13 | 1,060 | 0,274 |
| | Late RSP | 15 | 3,20 | 1,320 | 0,341 |
| Business_Perfromance_4 | Early RP | 15 | 3,00 | 1,309 | 0,338 |
| | Late RSP | 15 | 2,93 | 1,033 | 0,267 |
| Business_Perfromance_5 | Early RP | 15 | 2,53 | 0,915 | 0,236 |
| | Late RSP | 15 | 3,67 | 1,175 | 0,303 |
| Business_Perfromance_6 | Early RP | 15 | 3,07 | 1,163 | 0,300 |
| | Late RSP | 15 | 3,20 | 1,265 | 0,327 |

| | | | | | |
|---|---|---|---|---|---|
| Business_Perfromance_7 | Early RP | 15 | 3,00 | 1,309 | 0,338 |
| | Late RSP | 15 | 3,20 | 1,320 | 0,341 |
| Business_Perfromance_8 | Early RP | 15 | 3,20 | 1,265 | 0,327 |
| | Late RSP | 15 | 2,93 | 1,335 | 0,345 |
| Business_Perfromance_9 | Early RP | 15 | 3,13 | 1,125 | 0,291 |
| | Late RSP | 15 | 3,27 | 1,387 | 0,358 |
| Risk_1 | Early RP | 15 | 3,80 | 1,424 | 0,368 |
| | Late RSP | 16 | 3,50 | 1,506 | 0,376 |
| Risk_2 | Early RP | 15 | 2,67 | 1,113 | 0,287 |
| | Late RSP | 15 | 3,27 | 1,624 | 0,419 |
| Risk_3 | Early RP | 15 | 2,40 | 1,056 | 0,273 |
| | Late RSP | 16 | 3,50 | 1,897 | 0,474 |
| Innovativeness_1 | Early RP | 15 | 1,87 | 0,743 | 0,192 |
| | Late RSP | 16 | 2,56 | 1,548 | 0,387 |
| Innovativeness_2 | Early RP | 15 | 2,60 | 1,404 | 0,363 |
| | Late RSP | 16 | 3,06 | 1,289 | 0,322 |
| Innovativeness_3 | Early RP | 15 | 2,13 | 1,187 | 0,307 |
| | Late RSP | 16 | 2,88 | 1,586 | 0,397 |
| Proactiveness_1 | Early RP | 15 | 2,40 | 1,242 | 0,321 |
| | Late RSP | 16 | 3,06 | 1,436 | 0,359 |
| Proactiveness_2 | Early RP | 15 | 3,13 | 1,407 | 0,363 |
| | Late RSP | 16 | 3,38 | 1,544 | 0,386 |
| Proactiveness_3 | Early RP | 15 | 2,87 | 1,302 | 0,336 |
| | Late RSP | 16 | 3,63 | 1,668 | 0,417 |
| Competitive_Aggressiveness_1 | Early RP | 15 | 1,87 | 1,552 | 0,401 |
| | Late RSP | 16 | 2,38 | 1,310 | 0,328 |
| Competitive_Aggressiveness_2 | Early RP | 15 | 2,27 | 1,100 | 0,284 |
| | Late RSP | 16 | 2,94 | 1,482 | 0,370 |
| Competitive_Aggressiveness_3 | Early RP | 15 | 2,07 | 1,335 | 0,345 |
| | Late RSP | 16 | 2,50 | 1,265 | 0,316 |
| Autonomy_1 | Early RP | 15 | 2,47 | 1,187 | 0,307 |
| | Late RSP | 16 | 2,88 | 1,204 | 0,301 |
| Autonomy_2 | Early RP | 15 | 2,13 | 0,990 | 0,256 |
| | Late RSP | 15 | 2,73 | 1,163 | 0,300 |
| Autonomy_3 | Early RP | 15 | 2,60 | 0,828 | 0,214 |
| | Late RSP | 16 | 2,88 | 1,258 | 0,315 |
| Autonomy_4 | Early RP | 14 | 2,43 | 0,938 | 0,251 |
| | Late RSP | 16 | 2,63 | 1,147 | 0,287 |
| Autonomy_5 | Early RP | 15 | 2,87 | 1,457 | 0,376 |
| | Late RSP | 16 | 3,25 | 1,183 | 0,296 |
| Autonomy_6 | Early RP | 15 | 2,60 | 1,183 | 0,306 |
| | Late RSP | 16 | 3,13 | 1,544 | 0,386 |

**Table D2: Independent sample test**

| Independent Samples Test | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
| | | | | | | | | | 95% Confidence Interval of the Difference | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Quality_1 | Equal variances assumed | 0,456 | 0,505 | -0,520 | 30 | 0,607 | -0,250 | 0,480 | -1,231 | 0,731 |
| | Equal variances not assumed | | | -0,520 | 26,07 | 0,607 | -0,250 | 0,480 | -1,237 | 0,737 |
| Quality_2 | Equal variances assumed | 1,822 | 0,187 | 0,000 | 30 | 1,000 | 0,000 | 0,498 | -1,017 | 1,017 |
| | Equal variances not assumed | | | 0,000 | 21,961 | 1,000 | 0,000 | 0,498 | -1,033 | 1,033 |
| Quality_3 | Equal variances assumed | 0,092 | 0,764 | 1,227 | 30 | 0,229 | 0,500 | 0,408 | -0,332 | 1,332 |
| | Equal variances not assumed | | | 1,227 | 29,103 | 0,230 | 0,500 | 0,408 | -0,334 | 1,334 |
| Quality_4 | Equal variances assumed | 0,449 | 0,508 | 0,703 | 30 | 0,488 | 0,313 | 0,445 | -0,595 | 1,220 |
| | Equal variances not assumed | | | 0,703 | 25,687 | 0,488 | 0,313 | 0,445 | -0,602 | 1,227 |
| Delivery_1 | Equal variances assumed | 6,308 | 0,018 | 1,651 | 30 | 0,109 | 0,500 | 0,303 | -0,118 | 1,118 |
| | Equal variances not assumed | | | 1,651 | 19,622 | 0,115 | 0,500 | 0,303 | -0,132 | 1,132 |
| Delivery_2 | Equal variances assumed | 0,346 | 0,561 | 1,552 | 29 | 0,132 | 0,471 | 0,303 | -0,150 | 1,091 |
| | Equal variances not assumed | | | 1,553 | 28,947 | 0,131 | 0,471 | 0,303 | -0,149 | 1,091 |
| Delivery_3 | Equal variances assumed | 0,818 | 0,373 | 0,784 | 30 | 0,439 | 0,250 | 0,319 | -0,401 | 0,901 |
| | Equal variances not assumed | | | 0,784 | 27,405 | 0,439 | 0,250 | 0,319 | -0,403 | 0,903 |
| Delivery_4 | Equal variances assumed | 0,617 | 0,438 | 2,588 | 30 | 0,015 | 0,688 | 0,266 | 0,145 | 1,230 |
| | Equal variances not assumed | | | 2,588 | 29,124 | 0,015 | 0,688 | 0,266 | 0,144 | 1,231 |
| Delivery_5 | Equal variances assumed | 0,051 | 0,823 | 1,842 | 30 | 0,075 | 0,688 | 0,373 | -0,075 | 1,450 |
| | Equal variances not assumed | | | 1,842 | 29,945 | 0,075 | 0,688 | 0,373 | -0,075 | 1,450 |
| Flexibilty_1 | Equal variances assumed | 5,250 | 0,029 | 1,871 | 29 | 0,071 | 1,100 | 0,588 | -0,102 | 2,302 |
| | Equal variances not assumed | | | 1,897 | 25,773 | 0,069 | 1,100 | 0,580 | -0,092 | 2,292 |
| Flexibility_2 | Equal variances assumed | 0,003 | 0,956 | 1,334 | 29 | 0,193 | 0,750 | 0,562 | -0,400 | 1,900 |
| | Equal variances not assumed | | | 1,329 | 28,176 | 0,194 | 0,750 | 0,564 | -0,406 | 1,906 |
| Flexibility_3 | Equal variances assumed | 0,636 | 0,432 | 1,284 | 29 | 0,209 | 0,646 | 0,503 | -0,383 | 1,674 |
| | Equal variances not assumed | | | 1,284 | 28,881 | 0,209 | 0,646 | 0,503 | -0,383 | 1,674 |
| Flexibility_4 | Equal variances assumed | 0,680 | 0,416 | 1,431 | 29 | 0,163 | 0,929 | 0,649 | -0,399 | 2,257 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Equal variances not assumed | | | 1,437 | 28,894 | 0,161 | 0,929 | 0,647 | -0,394 | 2,252 |
| Cost_1 | Equal variances assumed | 6,174 | 0,019 | 0,366 | 29 | 0,717 | 0,217 | 0,592 | -0,994 | 1,428 |
| | Equal variances not assumed | | | 0,370 | 27,269 | 0,714 | 0,217 | 0,586 | -0,985 | 1,418 |
| Cost_2 | Equal variances assumed | 0,978 | 0,331 | 0,368 | 29 | 0,716 | 0,200 | 0,544 | -0,912 | 1,312 |
| | Equal variances not assumed | | | 0,372 | 26,708 | 0,713 | 0,200 | 0,537 | -0,903 | 1,303 |
| Cost_3 | Equal variances assumed | 1,384 | 0,249 | 0,214 | 29 | 0,832 | 0,117 | 0,545 | -0,998 | 1,232 |
| | Equal variances not assumed | | | 0,216 | 27,969 | 0,831 | 0,117 | 0,541 | -0,991 | 1,224 |
| Cost_4 | Equal variances assumed | 2,973 | 0,095 | -1,109 | 29 | 0,276 | -0,679 | 0,612 | -1,931 | 0,573 |
| | Equal variances not assumed | | | -1,121 | 27,340 | 0,272 | -0,679 | 0,606 | -1,922 | 0,563 |
| Business_Perfromance_1 | Equal variances assumed | 0,000 | 1,000 | -1,595 | 28 | 0,122 | -0,667 | 0,418 | -1,523 | 0,189 |
| | Equal variances not assumed | | | -1,595 | 27,917 | 0,122 | -0,667 | 0,418 | -1,523 | 0,189 |
| Business_Perfromance_2 | Equal variances assumed | 2,457 | 0,128 | -0,274 | 28 | 0,786 | -0,133 | 0,487 | -1,130 | 0,864 |
| | Equal variances not assumed | | | -0,274 | 25,091 | 0,786 | -0,133 | 0,487 | -1,135 | 0,869 |
| Business_Perfromance_3 | Equal variances assumed | 0,190 | 0,667 | -0,152 | 28 | 0,880 | -0,067 | 0,437 | -0,962 | 0,829 |
| | Equal variances not assumed | | | -0,152 | 26,752 | 0,880 | -0,067 | 0,437 | -0,964 | 0,831 |
| Business_Perfromance_4 | Equal variances assumed | 1,528 | 0,227 | 0,155 | 28 | 0,878 | 0,067 | 0,431 | -0,815 | 0,949 |
| | Equal variances not assumed | | | 0,155 | 26,560 | 0,878 | 0,067 | 0,431 | -0,817 | 0,951 |
| Business_Perfromance_5 | Equal variances assumed | 0,649 | 0,427 | -2,947 | 28 | 0,006 | -1,133 | 0,385 | -1,921 | -0,345 |
| | Equal variances not assumed | | | -2,947 | 26,419 | 0,007 | -1,133 | 0,385 | -1,923 | -0,343 |
| Business_Perfromance_6 | Equal variances assumed | 0,104 | 0,749 | -0,301 | 28 | 0,766 | -0,133 | 0,444 | -1,042 | 0,775 |
| | Equal variances not assumed | | | -0,301 | 27,804 | 0,766 | -0,133 | 0,444 | -1,042 | 0,776 |
| Business_Perfromance_7 | Equal variances assumed | 0,642 | 0,430 | -0,417 | 28 | 0,680 | -0,200 | 0,480 | -1,183 | 0,783 |
| | Equal variances not assumed | | | -0,417 | 27,998 | 0,680 | -0,200 | 0,480 | -1,183 | 0,783 |
| Business_Perfromance_8 | Equal variances assumed | 0,272 | 0,606 | 0,562 | 28 | 0,579 | 0,267 | 0,475 | -0,706 | 1,239 |
| | Equal variances not assumed | | | 0,562 | 27,920 | 0,579 | 0,267 | 0,475 | -0,706 | 1,239 |
| Business_Perfromance_9 | Equal variances assumed | 0,447 | 0,509 | -0,289 | 28 | 0,775 | -0,133 | 0,461 | -1,078 | 0,811 |
| | Equal variances not assumed | | | -0,289 | 26,860 | 0,775 | -0,133 | 0,461 | -1,080 | 0,813 |
| Risk_1 | Equal variances assumed | 0,000 | 0,989 | 0,569 | 29 | 0,574 | 0,300 | 0,527 | -0,778 | 1,378 |
| | Equal variances not assumed | | | 0,570 | 28,996 | 0,573 | 0,300 | 0,526 | -0,776 | 1,376 |
| Risk_2 | Equal variances assumed | 2,224 | 0,147 | -1,180 | 28 | 0,248 | -0,600 | 0,508 | -1,641 | 0,441 |
| | Equal variances not assumed | | | -1,180 | 24,769 | 0,249 | -0,600 | 0,508 | -1,647 | 0,447 |
| Risk_3 | Equal variances assumed | 5,992 | 0,021 | -1,976 | 29 | 0,058 | -1,100 | 0,557 | -2,239 | 0,039 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Equal variances not assumed | | | -2,011 | 23,764 | 0,056 | -1,100 | 0,547 | -2,230 | 0,030 |
| Innovativeness_1 | Equal variances assumed | 4,163 | 0,051 | -1,578 | 29 | 0,125 | -0,696 | 0,441 | -1,598 | 0,206 |
| | Equal variances not assumed | | | -1,611 | 21,868 | 0,122 | -0,696 | 0,432 | -1,592 | 0,200 |
| Innovativeness_2 | Equal variances assumed | 0,300 | 0,588 | -0,956 | 29 | 0,347 | -0,463 | 0,484 | -1,452 | 0,527 |
| | Equal variances not assumed | | | -0,953 | 28,349 | 0,348 | -0,463 | 0,485 | -1,456 | 0,531 |
| Innovativeness_3 | Equal variances assumed | 1,583 | 0,218 | -1,466 | 29 | 0,153 | -0,742 | 0,506 | -1,777 | 0,293 |
| | Equal variances not assumed | | | -1,480 | 27,688 | 0,150 | -0,742 | 0,501 | -1,769 | 0,286 |
| Proactiveness_1 | Equal variances assumed | 0,254 | 0,618 | -1,370 | 29 | 0,181 | -0,663 | 0,484 | -1,652 | 0,327 |
| | Equal variances not assumed | | | -1,376 | 28,825 | 0,179 | -0,663 | 0,481 | -1,647 | 0,322 |
| Proactiveness_2 | Equal variances assumed | 0,429 | 0,518 | -0,454 | 29 | 0,653 | -0,242 | 0,532 | -1,329 | 0,846 |
| | Equal variances not assumed | | | -0,456 | 28,981 | 0,652 | -0,242 | 0,530 | -1,326 | 0,843 |
| Proactiveness_3 | Equal variances assumed | 1,919 | 0,177 | -1,404 | 29 | 0,171 | -0,758 | 0,540 | -1,863 | 0,346 |
| | Equal variances not assumed | | | -1,416 | 28,110 | 0,168 | -0,758 | 0,536 | -1,855 | 0,339 |
| Competitive_Aggressiveness_1 | Equal variances assumed | 0,040 | 0,842 | -0,988 | 29 | 0,332 | -0,508 | 0,515 | -1,561 | 0,544 |
| | Equal variances not assumed | | | -0,982 | 27,498 | 0,335 | -0,508 | 0,518 | -1,569 | 0,553 |
| Competitive_Aggressiveness_2 | Equal variances assumed | 0,845 | 0,366 | -1,423 | 29 | 0,165 | -0,671 | 0,471 | -1,635 | 0,293 |
| | Equal variances not assumed | | | -1,437 | 27,597 | 0,162 | -0,671 | 0,467 | -1,628 | 0,286 |
| Competitive_Aggressiveness_3 | Equal variances assumed | 0,294 | 0,592 | -0,928 | 29 | 0,361 | -0,433 | 0,467 | -1,388 | 0,521 |
| | Equal variances not assumed | | | -0,927 | 28,587 | 0,362 | -0,433 | 0,468 | -1,390 | 0,524 |
| Autonomy_1 | Equal variances assumed | 0,004 | 0,949 | -0,950 | 29 | 0,350 | -0,408 | 0,430 | -1,287 | 0,471 |
| | Equal variances not assumed | | | -0,950 | 28,920 | 0,350 | -0,408 | 0,430 | -1,287 | 0,470 |
| Autonomy_2 | Equal variances assumed | 1,781 | 0,193 | -1,521 | 28 | 0,139 | -0,600 | 0,394 | -1,408 | 0,208 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Equal variances not assumed | | | -1,521 | 27,308 | 0,140 | -0,600 | 0,394 | -1,409 | 0,209 |
| Autonomy_3 | Equal variances assumed | 2,960 | 0,096 | -0,714 | 29 | 0,481 | -0,275 | 0,385 | -1,063 | 0,513 |
| | Equal variances not assumed | | | -0,723 | 26,094 | 0,476 | -0,275 | 0,380 | -1,057 | 0,507 |
| Autonomy_4 | Equal variances assumed | 1,419 | 0,244 | -0,509 | 28 | 0,615 | -0,196 | 0,386 | -0,987 | 0,595 |
| | Equal variances not assumed | | | -0,516 | 27,889 | 0,610 | -0,196 | 0,381 | -0,977 | 0,584 |
| Autonomy_5 | Equal variances assumed | 0,087 | 0,770 | -0,806 | 29 | 0,427 | -0,383 | 0,475 | -1,356 | 0,589 |
| | Equal variances not assumed | | | -0,801 | 27,019 | 0,430 | -0,383 | 0,479 | -1,365 | 0,599 |
| Autonomy_6 | Equal variances assumed | 0,894 | 0,352 | -1,057 | 29 | 0,299 | -0,525 | 0,497 | -1,540 | 0,490 |
| | Equal variances not assumed | | | -1,067 | 27,935 | 0,295 | -0,525 | 0,492 | -1,533 | 0,483 |

## D2.1 Analysis of EO & MC with a population sample of 53 people

## D3.1 Descriptive profiles of the respondents

The descriptive that were used in this research were those on Age, sector experience, geographic location within South Africa, management level, divisional sector participation, and duration with current firm in the current position. Descriptive analysis is performed to understand the simple features of the data. The frequencies of these descriptive will be analysed to test assumptions. Prior to descriptive analysis the data will be assessed for missing values and outliers to ensure data completeness.

## D4.1 Checking for Data completeness

**Table D3: Demographics statistics**

| Descriptive Statistics | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | N | Minimum | Maximum | Mean | Std. Deviation | Skewness | | Kurtosis | |
| | Statistic | Statistic | Statistic | Statistic | Statistic | Statistic | Std. Error | Statistic | Std. Error |
| How old are you (in years)? | 53 | 2 | 6 | 3,75 | 0,853 | 0,310 | 0,327 | -0,218 | 0,644 |
| Which Sector Do you Work For? | 53 | 3 | 10 | 7,17 | 2,351 | -0,590 | 0,327 | -0,820 | 0,644 |
| Which Province are you located in / do you report to work? | 53 | 2 | 8 | 4,49 | 2,216 | -0,136 | 0,327 | -1,800 | 0,644 |
| How long have you worked in the manufacturing industry (in years)? | 53 | 1 | 5 | 3,62 | 1,348 | -0,590 | 0,327 | -0,857 | 0,644 |
| What is your management level? | 52 | 1 | 3 | 1,81 | 0,658 | 0,222 | 0,330 | -0,664 | 0,650 |
| Duration with current firm, in current position (in years)? | 52 | 1 | 5 | 2,00 | 1,103 | 0,730 | 0,330 | -0,469 | 0,650 |
| Valid N (listwise) | 51 | | | | | | | | |

The data demonstrated one missing number in the firm duration and management level descriptive. This missing numbers were substituted for the mean of the variables (1,81 & 2) respectively. When assessed for frequency distribution based on the null hypothesis both the skewness and kurtosis are between 2 and -2 (George & Mallery, 2010), showing the data is normally distributed.

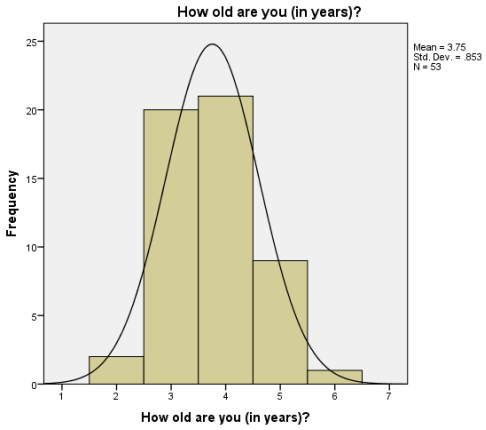
## D5.1 Age

The demographic age of respondents is such that 77.3% of the sampled population is between the ages of 30 and 60. Outliers in this data is the ages 60-70.

**Table D4: Frequency distribution of respondents by Age**

| How old are you (in years)? | | | | | | |
|---|---|---|---|---|---|---|
| | | Frequency | Percent | Valid Percent | Cumulative Percent | |
| Valid | 20-30 | 2 | 3,8 | 3,8 | 3,8 | |
| | 30-40 | 20 | 37,7 | 37,7 | 41,5 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 40-50 | 21 | 39,6 | 39,6 | 81,1 | |
| | 50-60 | 9 | 17,0 | 17,0 | 98,1 | |
| | 60-70 | 1 | 1,9 | 1,9 | 100,0 | |
| | Total | 53 | 100,0 | 100,0 | | |



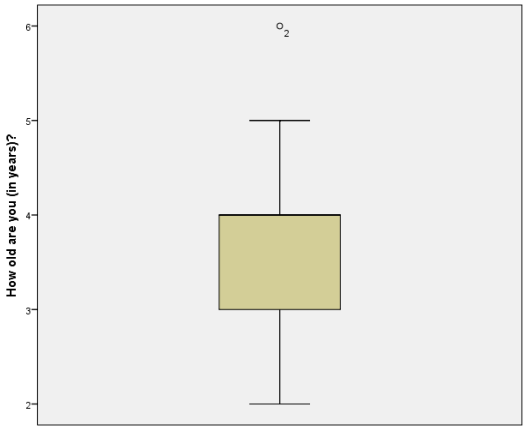




**Figure D1: Age Histogram**

**Figure D2: Age Box Plot**

**Table D5: Frequency distribution of respondents by sub-divisions**

| Which Sector Do you Work For? | | | | | |
|---|---|---|---|---|---|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Processing and preserving of fruit and vegetables | 8 | 15,1 | 15,1 | 15,1 |
| | Manufacture of dairy products | 8 | 15,1 | 15,1 | 30,2 |
| | Manufacture of bakery products, sugar, cocoa, chocolate and sugar confectionery | 5 | 9,4 | 9,4 | 39,6 |
| | Manufacture of other food products | 18 | 34,0 | 34,0 | 73,6 |
| | Manufacture of grain mill products | 3 | 5,7 | 5,7 | 79,2 |
| | Manufacture of Beverages (Juice, water & non alcoholic beverages) | 11 | 20,8 | 20,8 | 100,0 |
| | Total | 53 | 100,0 | 100,0 | |

Respondents that responded were predominantly from other food manufacturing, however beverages, bakery, dairy and preserving fruit and vegetables were almost equally represented. Grain mill products was poorly represented, as well as the remaining subdivisions of meat products, fish products, vegetable and animal oils and animal feeds (table D5)

## Sector

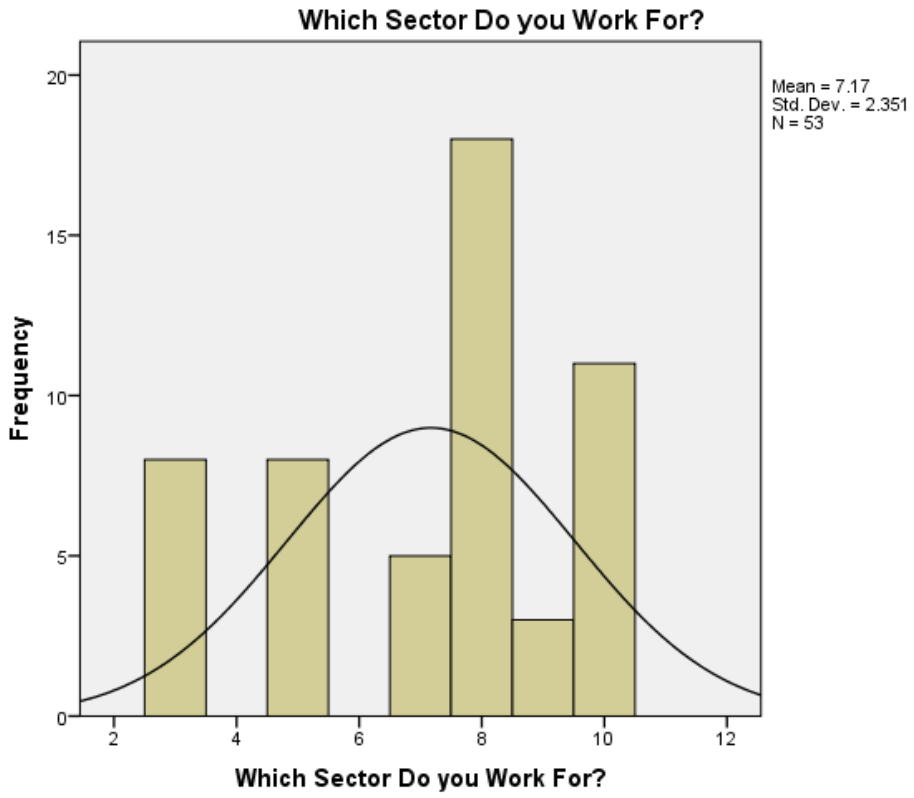



**Figure 33 Sector Histogram**

Figure:D3 shows that the data slightly skewed to the right, with a deviation of 1.15 from the mean.

## Geographic location

**Table D6: Frequency distribution of respondents by Geographic region**

| Which Province are you located in / do you report to work? | | | | | |
|---|---|---|---|---|---|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Gauteng | 22 | 41,5 | 41,5 | 41,5 |
| | Limpopo | 1 | 1,9 | 1,9 | 43,4 |
| | Western Cape | 21 | 39,6 | 39,6 | 83,0 |
| | Kwazulu Natal | 7 | 13,2 | 13,2 | 96,2 |
| | Eastern Cape | 2 | 3,8 | 3,8 | 100,0 |
| | Total | 53 | 100,0 | 100,0 | |

The majority of the respondents were from Gauteng and the Western Cape, followed by Kwazulu-Natal, Eastern Cape and Limpopo respectively. Provinces that were not

represented were the Free State, Mpumalanga, Northern Cape and the North Western provinces (Table D6).

## D6.1 Experience

**Table D7: Frequency distribution of respondents by Experience in the manufacturing Industry**

| How long have you worked in the manufacturing industry (in years)? | | | | | |
|---|---|---|---|---|---|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | 0-5 | 5 | 9,4 | 9,4 | 9,4 |
| | 5-10 | 7 | 13,2 | 13,2 | 22,6 |
| | 10-15 | 10 | 18,9 | 18,9 | 41,5 |
| | 15-20 | 12 | 22,6 | 22,6 | 64,2 |
| | 20+ | 19 | 35,8 | 35,8 | 100,0 |
| | Total | 53 | 100,0 | 100,0 | |

The majority of the respondents have over 20years experience in the manufacturing industry. 77.4% of the respondents have experience range of 10 – 20+ years, suggesting the respondents are highly experienced in the manufacturing sector.

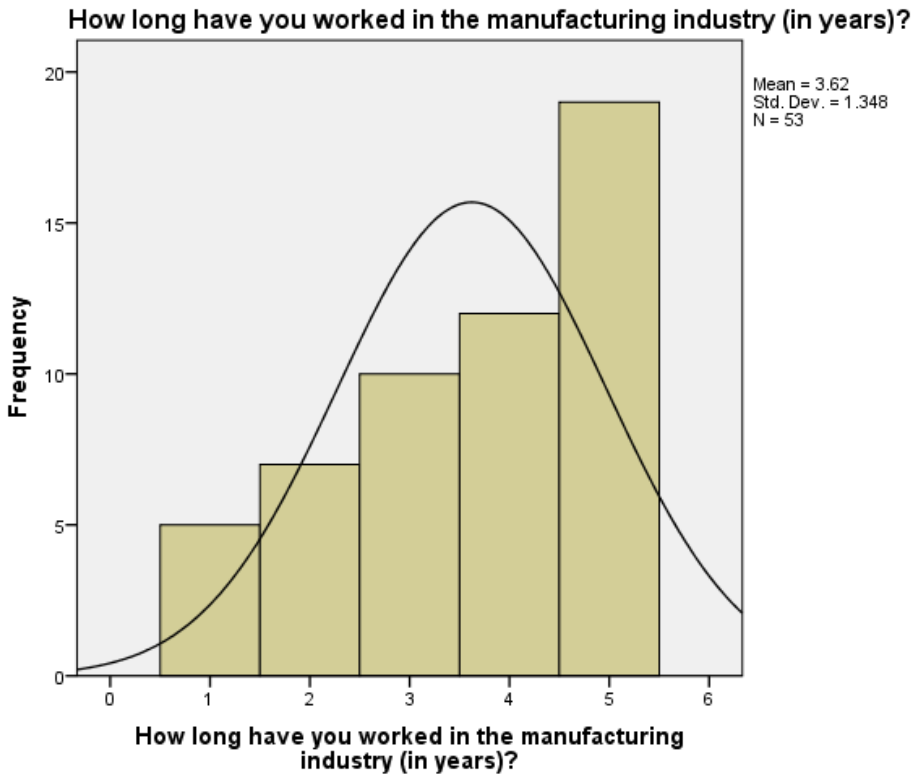


**Figure D4: Manufacturing experience**

## D7.1 Management Level

**Table D8: Frequency distribution of respondents by Management Level**

| What is your management level? | | | | | |
|---|---|---|---|---|---|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Middle Management (P8-6) | 17 | 32,1 | 32,7 | 32,7 |
| | Senior Management (P5-3) | 28 | 52,8 | 53,8 | 86,5 |
| | Executive Management (P3 -1) | 7 | 13,2 | 13,5 | 100,0 |
| | Total | 52 | 98,1 | 100,0 | |
| Missing | System | 1 | 1,9 | | |
| Total | | 53 | 100,0 | | |

Most of the respondents were senior managers followed by middle managers and executive manager's respectively. This distribution provides a balanced view of the sector as in conglomerate organisations there are few executives and middle managers.

### Duration with current firm

**Table D9: Frequency distribution of respondents by duration with current firm**

| Duration with current firm, in current position (in years)? | | | | | |
|---|---|---|---|---|---|
| | | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | 0-5 | 24 | 45,3 | 46,2 | 46,2 |
| | 5-10 | 10 | 18,9 | 19,2 | 65,4 |
| | 10-15 | 13 | 24,5 | 25,0 | 90,4 |
| | 15-20 | 4 | 7,5 | 7,7 | 98,1 |
| | 20+ | 1 | 1,9 | 1,9 | 100,0 |
| | Total | 52 | 98,1 | 100,0 | |
| Missing | System | 1 | 1,9 | | |
| Total | | 53 | 100,0 | | |

The majority of respondents have 0-5 years of experience in their roles with the respective firms.

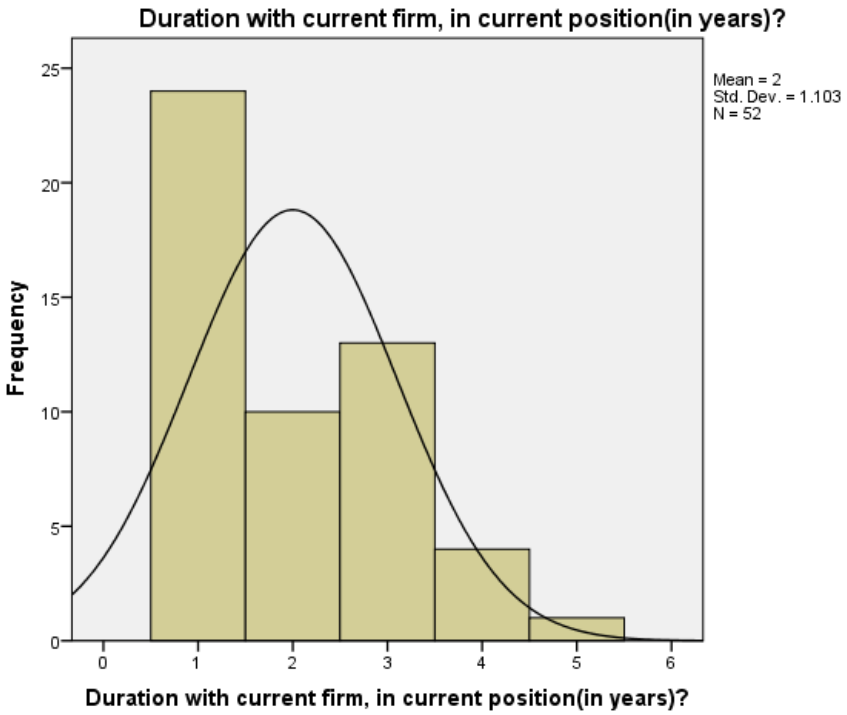



**Figure D5: Histogram of duration with current firm**

Figure D5 shows that this descriptive has a left hand sided distribution, suggesting that the respondents do not have exceptionally high levels of experience in their roles. On average respondents have experience between 10 and 15 years.

## D8.1 EFA

### *Data Integrity*

Missing Numbers

**Table D10: EFA test for missing numbers**

| Missing Patterns (cases with missing values) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Case | # Missing | % Missing | Autonomy_1 | Autonomy_3 | Autonomy_4 | Autonomy_5 | Autonomy_6 | Business_Perfromance_5 | Business_Perfromance_6 | Business_Perfromance_7 | Business_Perfromance_8 | Business_Perfromance_9 | Flexibility_3 | Flexibility_4 | Flexibilty_1 | Flexibility_2 | Delivery_2 | Autonomy_2 | Risk_2 |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 51 | 1 | 2,3 | + | + | + | | + | | | | | | | | | | | + | S |
| 46 | 2 | 4,5 | | | | | | | | | | | | | | | S | S | |
| 4 | 4 | 9,1 | | | | | | | | | | | S | S | S | S | | | |
| 14 | 5 | 11, 4 | | | | | | S | S | S | S | S | | | | | | | |
| - indicates an extreme low value, while + indicates an extreme high value. The range used is (Q1 - 1.5*IQR, Q3 + 1.5*IQR). | | | | | | | | | | | | | | | | | | | |
| a. Cases and variables are sorted on missing patterns. | | | | | | | | | | | | | | | | | | | |

## D9.1 KMO and Bartlet sphericity test

The KMO tests to determine adequacy of data sample size to perform EFA were run for the constructs of EO, performance and manufacturing capability. As can be seen in the tables below all KMO values were above 0.7 indicating that the sample size was adequate.

### EO

**Table D11: KMO Test for Entrepreneurial Orientation (EO)**

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | 0,863 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 399,672 |
| | df | 36 |
| | Sig. | 0,000 |

### Performance

**Table D12: KMO test for performance**

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | 0,863 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 399,672 |
| | df | 36 |
| | Sig. | 0,000 |

### Manufacturing capability

**Table D13: KMO test for manufacturing capability**

| KMO and Bartlett's Test |
|---|

| | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | 0,710 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 561,426 |
| | df | 136 |
| | Sig. | 0,000 |

## D10.1 EFA & Reliability

### EO – Promax rotation

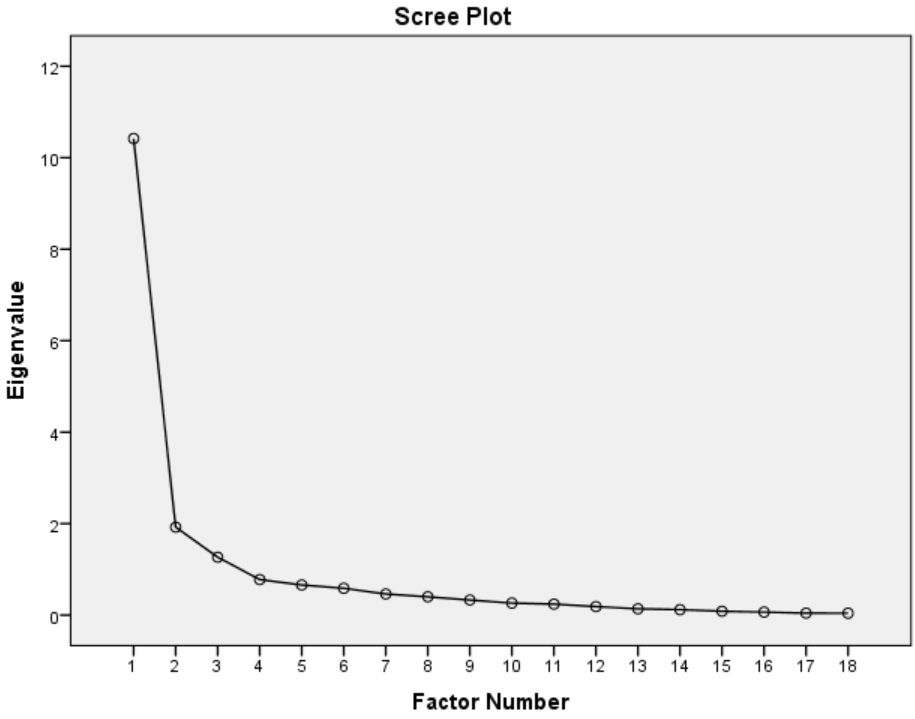



**Figure D6 EO – Scree plot**

The number of factors from the scree plot were then compared to the variance table (D14) to determine how much of the data variance they explained. I was found that the 5 factors explained 83% of the variance. It was decided to use the 5 five factors although factor 4 and 5 had an eigen value less than 1, as there was support of a point of inflation from the scree plot at 5 factors. This decision was further guided by the literature review.

**Table D14: EO – Variance table**

| Total Variance Explained | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings[a] |
| Factor | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total |
| 1 | 10,418 | 57,879 | 57,879 | 10,205 | 56,693 | 56,693 | 7,274 |
| 2 | 1,922 | 10,679 | 68,558 | 1,726 | 9,589 | 66,283 | 6,614 |
| 3 | 1,266 | 7,033 | 75,591 | 0,984 | 5,467 | 71,750 | 7,020 |
| 4 | 0,778 | 4,322 | 79,913 | 0,580 | 3,221 | 74,971 | 8,118 |
| 5 | 0,658 | 3,656 | 83,569 | 0,477 | 2,650 | 77,620 | 7,241 |
| 6 | 0,586 | 3,257 | 86,825 | | | | |
| 7 | 0,461 | 2,561 | 89,386 | | | | |
| 8 | 0,401 | 2,225 | 91,611 | | | | |
| 9 | 0,329 | 1,831 | 93,441 | | | | |
| 10 | 0,263 | 1,461 | 94,902 | | | | |
| 11 | 0,241 | 1,339 | 96,241 | | | | |
| 12 | 0,186 | 1,033 | 97,274 | | | | |
| 13 | 0,138 | 0,764 | 98,038 | | | | |
| 14 | 0,119 | 0,660 | 98,699 | | | | |
| 15 | 0,085 | 0,472 | 99,171 | | | | |
| 16 | 0,066 | 0,367 | 99,538 | | | | |
| 17 | 0,043 | 0,238 | 99,776 | | | | |
| 18 | 0,040 | 0,224 | 100,000 | | | | |
| Extraction Method: Principal Axis Factoring. | | | | | | | |
| a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance. | | | | | | | |

The structure matrix was then created and assessed along with the factor correlation matrix. The structure matrix showed a clear 5 factor structure with loadings above 0.7, however there was cross loading between the factors 2 and 5, and 3 and 5. This was evidence that there is a correlation between risk, competitive aggressiveness, innovativeness and proactiveness. The correlation matrix was created Table 23 and it confirmed the above, with all factors having inter correlations ranging from 0.4-0.7. This illustrated that the correlations existed but were not very strong. Due to the above EFA with Varimax rotation was performed.

**Table D15 - EO structure matrix**

| Structure Matrix | | | | | |
|---|---|---|---|---|---|
| | Factor | | | | |
| | 1 | 2 | 3 | 4 | 5 |
| Risk_1 | | | | 0,845 | |
| Risk_2 | | | 0,703 | 0,909 | 0,702 |

| | | | | | |
|---|---|---|---|---|---|
| Risk_3 | | | | 0,909 | |
| Innovativeness_3 | | 0,726 | | | 0,815 |
| Proactiveness_2 | | 0,936 | | | |
| Proactiveness_3 | | 0,891 | | | |
| Proactiveness_1 | | 0,869 | | | 0,733 |
| Innovativeness_1 | | | | | 0,878 |
| Innovativeness_2 | | 0,704 | | | 0,924 |
| Competitive_Aggressiveness_1 | | | 0,833 | | |
| Competitive_Aggressiveness_2 | | | 0,946 | | |
| Competitive_Aggressiveness_3 | | | 0,725 | | |
| Autonomy_1 | 0,857 | | | | |
| Autonomy_2 | 0,853 | | 0,723 | | |
| Autonomy_3 | 0,857 | | | | |
| Autonomy_4 | 0,894 | | | | |
| Autonomy_5 | | | | | |
| Autonomy_6 | | | | 0,719 | |
| Extraction Method: Principal Axis Factoring.<br>Rotation Method: Promax with Kaiser Normalization. | | | | | |

**Table D16 - EO – Correlation matrix**

| Factor Correlation Matrix | | | | | |
|---|---|---|---|---|---|
| Factor | 1 | 2 | 3 | 4 | 5 |
| 1 | 1,000 | | | | |
| 2 | 0,408 | 1,000 | | | |
| 3 | 0,638 | 0,557 | 1,000 | | |
| 4 | 0,680 | 0,635 | 0,589 | 1,000 | |
| 5 | 0,526 | 0,647 | 0,554 | 0,700 | 1,000 |
| Extraction Method: Principal Axis Factoring.<br>Rotation Method: Promax with Kaiser Normalization. | | | | | |

## EO – Varimax rotation

EFA with Varimax rotation was performed, and factor loadings of below 0.44 were suppressed. All 5 factors were found to have high and distinct loadings. Autonomy 6 had a cross loading of almost equal magnitude amongst factor 1, 4,5, and hence it was decide to keep the question as associated to Autonomy. Autonomy factor 2 had a cross loading between factor 1 and 3, however the loading for factor 1 was significantly higher hence it was kept as associated to factor 1. Innovativeness 2, and 3, also had cross loadings between factor 2 and 5 however the loadings for factor 5

were significantly higher than those of 2 hence both questions were kept as associated to innovativeness.

**Table D17 - EO – Varimax rotation**

| Rotated Factor Matrix[a] | | | | | | |
|---|---|---|---|---|---|---|
| | Factor | | | | | |
| | 1 | 2 | 3 | 4 | 5 | |
| Risk_1 | | | | 0,703 | | **Reliability Statistics** |
| Risk_2 | | | | 0,647 | | Cronbach's Alpha / N of Items |
| Risk_3 | | | | 0,640 | | 0,922 / 3 |
| Proactiveness_1 | | 0,736 | | | | **Reliability Statistics** |
| Proactiveness_2 | | 0,859 | | | | Cronbach's Alpha / N of Items |
| Proactiveness_3 | | 0,776 | | | | 0,924 / 3 |
| Innovativeness_1 | | | | | 0,657 | **Reliability Statistics** |
| Innovativeness_2 | | 0,488 | | | 0,746 | Cronbach's Alpha / N of Items |
| Innovativeness_3 | | 0,491 | | | 0,525 | 0,911 / 3 |
| Competitive_Aggressiveness_1 | | | 0,699 | | | **Reliability Statistics** |
| Competitive_Aggressiveness_2 | | | 0,830 | | | Cronbach's Alpha / N of Items |
| Competitive_Aggressiveness_3 | | | 0,645 | | | 0,874 / 3 |
| Autonomy_1 | 0,744 | | | | | **Reliability Statistics** |
| Autonomy_2 | 0,681 | | 0,455 | | | Cronbach's Alpha / N of Items |
| Autonomy_3 | 0,726 | | | | | 0,915 / 6 |
| Autonomy_4 | 0,831 | | | | | |
| Autonomy_5 | 0,528 | | | | | |
| Autonomy_6 | 0,455 | | | 0,447 | 0,473 | |

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 8 iterations.

## Performance

EFA was performed on performance, with loadings suppressed at 0.5. The variance table (Table D18) as well as the scree plot (Figure D7, indicated that there was two factors associated to the construct on performance.

**Table D18- Performance – variance table**

| Total Variance Explained | | | |
|---|---|---|---|
| Factor | Initial Eigenvalues | Extraction Sums of Squared Loadings | Rotation Sums of Squared Loadings |

| | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 5,423 | 60,254 | 60,254 | 5,177 | 57,519 | 57,519 | 4,738 | 52,640 | 52,640 |
| 2 | 1,651 | 18,348 | 78,602 | 1,420 | 15,781 | 73,299 | 1,859 | 20,659 | 73,299 |
| 3 | 0,667 | 7,412 | 86,014 | | | | | | |
| 4 | 0,417 | 4,637 | 90,651 | | | | | | |
| 5 | 0,271 | 3,014 | 93,665 | | | | | | |
| 6 | 0,214 | 2,377 | 96,042 | | | | | | |
| 7 | 0,169 | 1,879 | 97,921 | | | | | | |
| 8 | 0,108 | 1,202 | 99,123 | | | | | | |
| 9 | 0,079 | 0,877 | 100,000 | | | | | | |
| Extraction Method: Principal Axis Factoring. | | | | | | | | | |

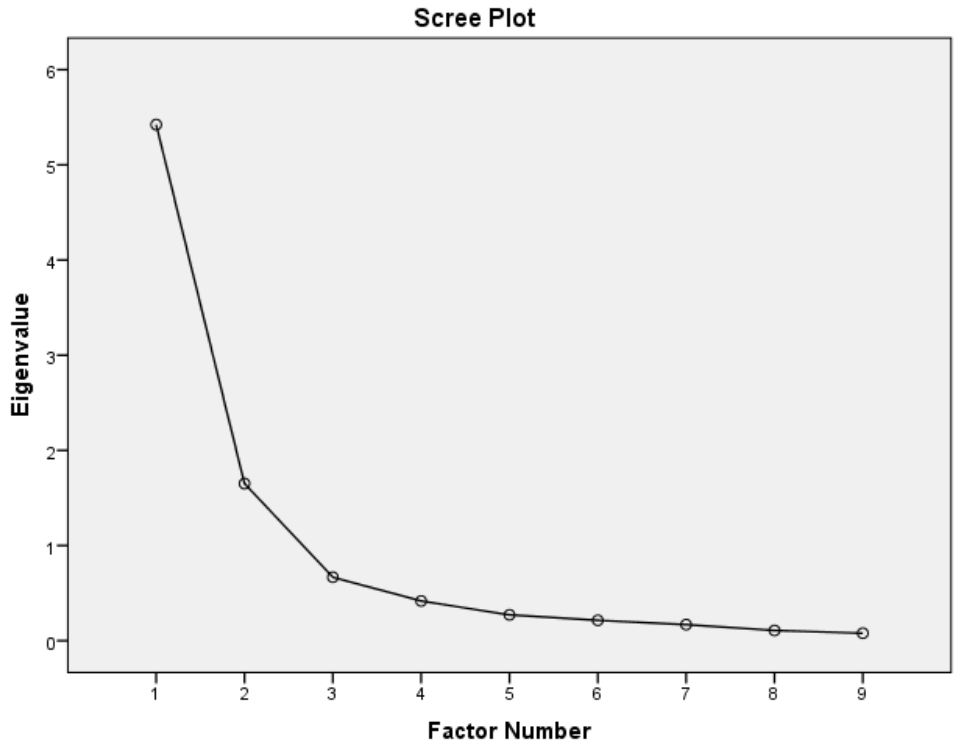



**Figure D7 – Performance, Scree plot**

The rotated factor matrix did not show any cross loadings, suggesting that the questions for performance assessed two very distinct constructs. From the questions on Factor 1 one can infer that factor 1 is business performance while factor 2 is market growth. Questions associated with factor 2 were removed from the factor the factor was tested for reliability. The alpha coefficient was found to be above 0.7 which is considered to be reliable.

**Table D19- Performance – Rotated Factor Matrix**

| Rotated Factor Matrix[a] | | | |
|---|---|---|---|
| | Factor | | |
| | 1 | 2 | **Reliability Statistics** |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Growth in sales | | 0,951 | Cronbach's Alpha: 0,940 — N of Items: 7 |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Return on sales (ROS) /Gross magin | 0,796 | | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Growth in return on sales (ROS) | 0,565 | | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Growth in profit | 0,733 | | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Growth in market share | | 0,752 | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Return on investment (ROI) | 0,861 | | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Growth in ROI | 0,925 | | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Return on assets (ROA) | 0,907 | | |
| Business Performance - Please evaluate your firm's performance in the following areas relative to your primary / major competitors. - Growth in ROA | 0,895 | | |
| Extraction Method: Principal Axis Factoring.<br>Rotation Method: Varimax with Kaiser Normalization. | | | |
| a. Rotation converged in 3 iterations. | | | |

## Manufacturing Capability

EFA was performed on manufacturing capability, using principal axis factoring and a varimax rotation, with loadings suppressed at 0.5. The variance table as well as the scree plot (Figure D8) indicated that there was four factors associated to the construct of manufacturing capability. All factors were found to have be completely independent of each other. The four factor explained 73.6 of the variance in the data

**Table D20: Manufacturing capability – variance**

| Total Variance Explained | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Initial Eigenvalues | | | Extraction Sums of Squared Loadings | | | Rotation Sums of Squared Loadings | | |
| Factor | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % | Total | % of Variance | Cumulative % |
| 1 | 4,805 | 28,265 | 28,265 | 4,522 | 26,599 | 26,599 | 3,664 | 21,554 | 21,554 |
| 2 | 3,836 | 22,563 | 50,828 | 3,493 | 20,546 | 47,145 | 2,655 | 15,616 | 37,170 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 2,254 | 13,259 | 64,087 | 1,956 | 11,507 | 58,652 | 2,620 | 15,409 | 52,579 |
| 4 | 1,645 | 9,679 | 73,766 | 1,247 | 7,334 | 65,986 | 2,279 | 13,407 | 65,986 |
| 5 | 0,826 | 4,858 | 78,624 | | | | | | |
| 6 | 0,681 | 4,003 | 82,627 | | | | | | |
| 7 | 0,605 | 3,558 | 86,185 | | | | | | |
| 8 | 0,494 | 2,904 | 89,089 | | | | | | |
| 9 | 0,376 | 2,210 | 91,299 | | | | | | |
| 10 | 0,304 | 1,791 | 93,090 | | | | | | |
| 11 | 0,271 | 1,596 | 94,686 | | | | | | |
| 12 | 0,234 | 1,376 | 96,063 | | | | | | |
| 13 | 0,224 | 1,317 | 97,379 | | | | | | |
| 14 | 0,148 | 0,869 | 98,248 | | | | | | |
| 15 | 0,131 | 0,770 | 99,018 | | | | | | |
| 16 | 0,093 | 0,545 | 99,562 | | | | | | |
| 17 | 0,074 | 0,438 | 100,000 | | | | | | |

Extraction Method: Principal Axis Factoring.

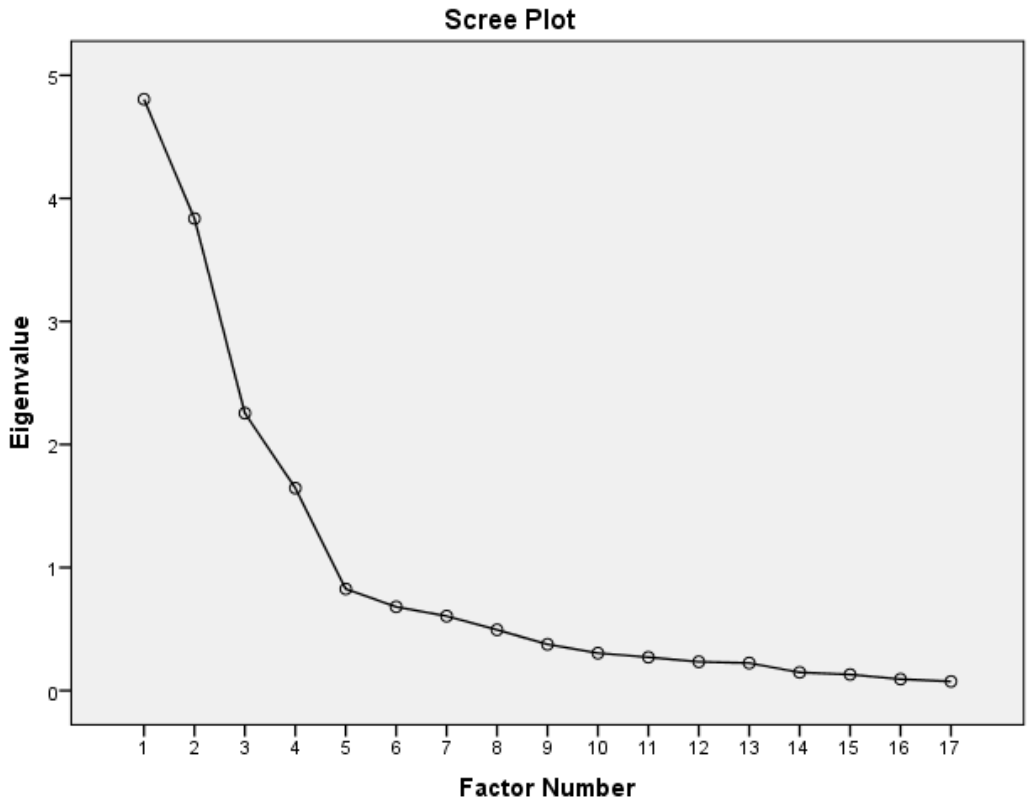



**Figure D8: Manufacturing capability – scree plot**

The rotated factor matrix (table D21), showed four distinct factors, each with loadings above 0.6. Each factor was tested for reliability. It was found that all factors displayed a reliability factor above 0.8. Indicating that the factors could be reliably tested.

**Table D21: Manufacturing capability – Rotated Factor Matrix**

| Rotated Factor Matrix[a] | | | | | | |
|---|---|---|---|---|---|---|
| | Factor | | | | | |
| | 1 | 2 | 3 | 4 | | |
| Quality_1 | | 0,758 | | | **Reliability Statistics** | |
| Quality_2 | | 0,636 | | | Cronbach's Alpha | N of Items |
| Quality_3 | | 0,888 | | | 0,866 | 4 |
| Quality_4 | | 0,854 | | | | |
| Delivery_1 | 0,768 | | | | **Reliability Statistics** | |
| Delivery_3 | 0,874 | | | | 0,920 | 5 |
| Delivery_4 | 0,939 | | | | | |
| Delivery_5 | 0,681 | | | | | |
| Flexibilty_1 | | | 0,797 | | **Reliability Statistics** | |
| Flexibility_2 | | | 0,707 | | Cronbach's Alpha | N of Items |
| Flexibility_3 | | | 0,765 | | 0,859 | 4 |
| Flexibility_4 | | | 0,752 | | | |
| Cost_1 | | | | 0,779 | **Reliability Statistics** | |
| Cost_2 | | | | 0,633 | Cronbach's Alpha | N of Items |
| Cost_3 | | | | 0,802 | 0,818 | 4 |
| Cost_4 | | | | 0,634 | | |

Extraction Method: Principal Axis Factoring.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 6 iterations.

## D11.1 Factor Normality

In order to perform correlation analysis and test hypothesis 3, the data was tested for normality in order to ascertain the correct normality test. The factors were tested for normality using the Shapiro-Wilk significant test. The test suggests that if the factor has a significance level below 0.05, then based on the null hypothesis that factor is significant meaning that the data is not normally distributed i.e. the null hypothesis cannot be refuted.

The Shapiro-Wilk test found all the factors with the exception of flexibility, performance and cost to be non- parametric (not normally distributed). This can be seen in table D22 below.

**Table D22 - Schapiro –Wilk Test on all Factors**

| Tests of Normality | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Kolmogorov-Smirnov[a] | | | Shapiro-Wilk | | | |
| | Statistic | df | Sig. | Statistic | df | Sig. | |
| Quality | 0,254 | 52 | 0,000 | 0,771 | 52 | 0,000 | not normally distributed |
| Delivery | 0,155 | 52 | 0,003 | 0,920 | 52 | 0,002 | not normally distributed |
| Flexibility | 0,109 | 52 | 0,173 | 0,959 | 52 | 0,071 | Normally distributed, accept null hypothesis at 0.05 |
| Cost | 0,116 | 52 | 0,078 | 0,971 | 52 | 0,227 | Normally distributed, accept null hypothesis at 0.05 |
| Risk | 0,215 | 52 | 0,000 | 0,878 | 52 | 0,000 | not normally distributed |
| Innovativeness | 0,187 | 52 | 0,000 | 0,875 | 52 | 0,000 | not normally distributed |
| Proactiveness | 0,202 | 52 | 0,000 | 0,904 | 52 | 0,001 | not normally distributed |
| Competitive Aggressiveness | 0,185 | 52 | 0,000 | 0,848 | 52 | 0,000 | not normally distributed |
| Autonomy | 0,148 | 52 | 0,006 | 0,916 | 52 | 0,001 | not normally distributed |
| Business_Perfromance | 0,107 | 52 | .200* | 0,976 | 52 | 0,372 | Normally distributed, accept null hypothesis at 0.05 |
| *. This is a lower bound of the true significance. | | | | | | | |
| a. Lilliefors Significance Correction | | | | | | | |

In order to try and make the data more parametric, outliers were removed, however this did not make any change to the data normality, as each time outlier were removed more outliers emerged. The data only began to emulate normality after the removal of almost 10% of the data. The data was transformed using logarithmic and exponential functions however its normality could not improve the normality, hence the regression model was performed on the data as is.

## D12.1 Regression Hypothesis 1 ( MC – Performance)

The descriptive statistics for manufacturing capability and performance shows an almost consistent standard deviation between the independent and dependant variables (table D23). The variables were regressed in a stepwise manner. The stepwise regression removed quality, delivery and cost. Only flexibility remained as a significant variable (table D24).

**Table D23: Manufacturing capability – performance model summary**

| Model Summary[b] | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Std. Error | Change Statistics | | | | | |
| Model | R | R Square | Adjusted R Square | of the Estimate | R Square Change | F Change | df1 | df2 | Sig. F Change | Durbin-Watson |
| 1 | .394[a] | .155 | .138 | 1.02215 | .155 | 9.199 | 1 | 50 | .004 | 1.852 |

| |
|---|
| a. Predictors: (Constant), Flexibility |
| b. Dependent Variable: Business_Perfromance |

Table D23 shows a poor model fit with the flexibility only accounting for 15.5% of the data variance. The Durbin-Watson statistic is between 1.5 and 2.5 suggesting that there is no meaningful serial correlation between manufacturing capability and performance.

F value of the model is very low suggesting that flexibility is not very statistically significant to performance.

**Table D24: Manufacturing capability – performance coefficients**

| Coefficients[a] | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Unstandardized Coefficients | | Standardized Coefficients | | | 95,0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
| Model | | B | Std. Error | Beta | t | Sig. | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 4.806 | .557 | | 8.631 | .000 | 3.688 | 5.925 | | | | | |
| | Flexibility | -.334 | .110 | -.394 | -3.033 | .004 | -.555 | -.113 | -.394 | -.394 | -.394 | 1.000 | 1.000 |
| a. Dependent Variable: Business_Perfromance | | | | | | | | | | | | | |

The coefficient of flexibility is found to be -.394, suggesting a negative relationship between flexibility and performance. The scatter plot shows that the data is not completely hederosdacistic, suggesting multi-collinearity.

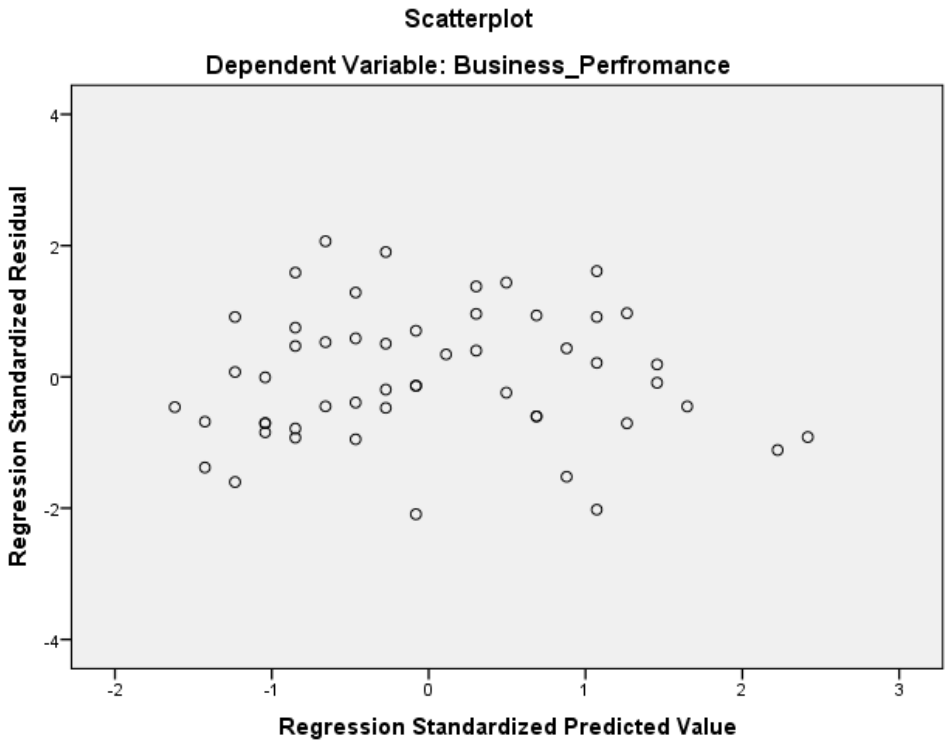



**Figure D9: Manufacturing capability – performance residual error scatter plot**

The P-P plot shows that the errors are normally distributed as most points lie on the horizontal line

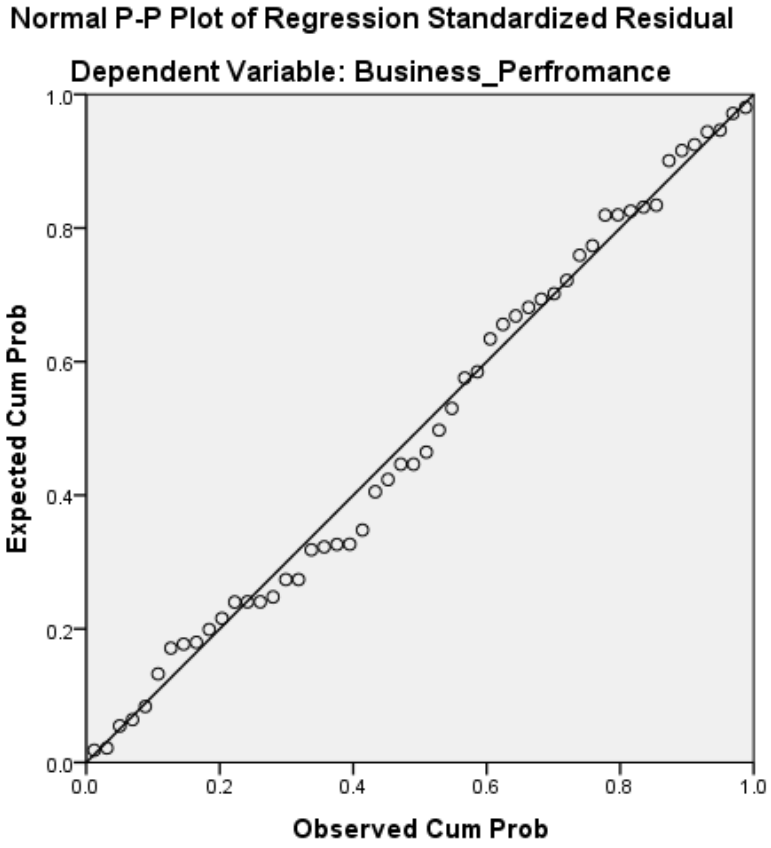



**Figure D10: Manufacturing capability – performance residual error P-P Plot**

## D13.1 Regression Hypothesis 2 (EO – Performance)

The descriptive statistics for manufacturing capability and performance shows an almost consistent standard deviation between the independent and dependant variables. The variables were regressed in a stepwise manner. The stepwise regression removed quality, delivery and cost. Only risk remained as a significant variable (table D26).

**Table D25: Entrepreneurial Orientation – performance model summary**

| Model Summary | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Change Statistics | | | | | |
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | R Square Change | F Change | df1 | df2 | Sig. F Change | Durbin-Watson |
| 1 | .352[a] | .124 | .107 | 1.03830 | .124 | 7.227 | 1 | 51 | .010 | 1.697 |
| a. Predictors: (Constant), Risk | | | | | | | | | | |
| b. Dependent Variable: Business_Perfromance | | | | | | | | | | |

Table D25 shows a poor model fit with risk only accounting for 12.4% of the data variance. The Durbin-Watson statistic is between 1.5 and 2.5 suggesting that there is no meaningful serial correlation between manufacturing capability and performance.

F value of the model is very low suggesting that risk is not very statistically significant to performance.

**Table D26: Entrepreneurial Orientation – Performance Coefficients**

| Coefficients | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Unstandardized Coefficients | | Standardized Coefficients | | | 95,0% Confidence Interval for B | | Correlations | | | Collinearity Statistics | |
| Model | | B | Std. Error | Beta | t | Sig. | Lower Bound | Upper Bound | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 2.424 | .319 | | 7.593 | .000 | 1.783 | 3.065 | | | | | |
| | Risk | .259 | .096 | .352 | 2.688 | .010 | .065 | .452 | .352 | .352 | .352 | 1.000 | 1.000 |
| a. Dependent Variable: Business_Perfromance | | | | | | | | | | | | | |

The coefficient of risk is found to be -.352, suggesting a moderate positive correlation between risk and performance. The scatter plot shows that the data is hederosdacistic, suggesting no multi-collinearity. The constant is 2.42, suggesting that risk exists even in the absence of performance

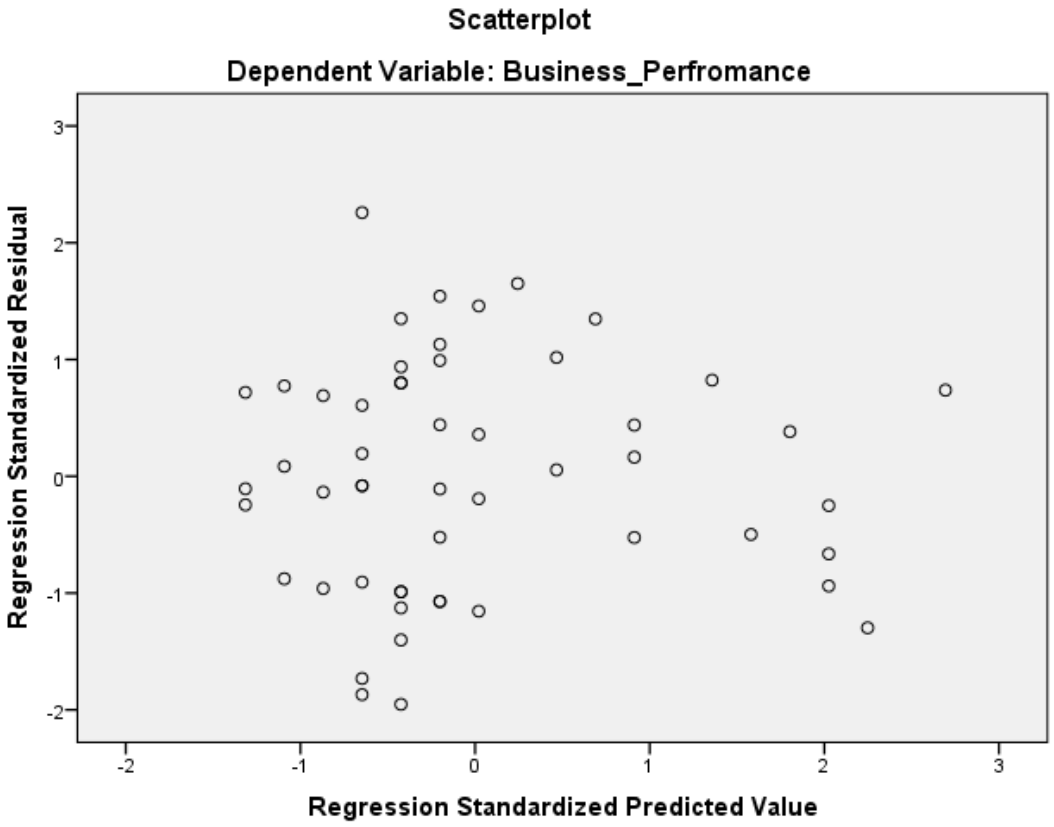



**Figure D11: Entrepreneurial orientation - performance residual error scatter plot**

## D14.1 Factor correlation (EO – MC – Performance – Hypothesis 3)

**Table D27: EO – MC spearman correlation analysis**

| EO – MC- Performance Correlations | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Quality | Delivery | Flexibility | Cost | Business_ Performance | Risk | Innovativeness | Proactiveness | Competitive_ Aggressiveness | Autonomy |
| Spearman's rho | Quality | Correlation Coefficient | 1,000 | .445** | -0,001 | -0,046 | 0,025 | -0,141 | -0,223 | -.290* | -0,127 | 0,062 |
| | | Sig. (2-tailed) | | 0,001 | 0,992 | 0,745 | 0,859 | 0,313 | 0,108 | 0,035 | 0,364 | 0,658 |
| | | N | 53 | 53 | 52 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| | Delivery | Correlation Coefficient | .445** | 1,000 | .303* | 0,125 | -.271* | -0,231 | -.425** | -.364** | -0,263 | -0,118 |
| | | Sig. (2-tailed) | 0,001 | | 0,029 | 0,373 | 0,050 | 0,096 | 0,002 | 0,007 | 0,057 | 0,400 |
| | | N | 53 | 53 | 52 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| | Flexibility | Correlation Coefficient | -0,001 | .303* | 1,000 | .438** | -.445** | -.311* | -.429** | -.391** | -0,211 | -.281* |
| | | Sig. (2-tailed) | 0,992 | 0,029 | | 0,001 | 0,001 | 0,025 | 0,002 | 0,004 | 0,133 | 0,044 |
| | | N | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 | 52 |
| | Cost | Correlation Coefficient | -0,046 | 0,125 | .438** | 1,000 | -0,133 | -.371** | -.374** | -.338* | -0,093 | -0,222 |
| | | Sig. (2-tailed) | 0,745 | 0,373 | 0,001 | | 0,343 | 0,006 | 0,006 | 0,013 | 0,508 | 0,111 |
| | | N | 53 | 53 | 52 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| | Business_Perfromance | Correlation Coefficient | 0,025 | -.271* | -.445** | -0,133 | 1,000 | .410** | 0,237 | 0,133 | .307* | .272* |
| | | Sig. (2-tailed) | 0,859 | 0,050 | 0,001 | 0,343 | | 0,002 | 0,088 | 0,342 | 0,025 | 0,049 |
| | | N | 53 | 53 | 52 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| | Risk | Correlation Coefficient | -0,141 | -0,231 | -.311* | -.371** | .410** | 1,000 | .565** | .607** | .591** | .652** |
| | | Sig. (2-tailed) | 0,313 | 0,096 | 0,025 | 0,006 | 0,002 | | 0,000 | 0,000 | 0,000 | 0,000 |
| | | N | 53 | 53 | 52 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Inovativness | Correlation Coefficient | -0,223 | -.425** | -.429** | -.374** | 0,237 | .565** | 1,000 | .636** | .597** | .601** |
| | | Sig. (2-tailed) | 0,108 | 0,002 | 0,002 | 0,006 | 0,088 | 0,000 | | 0,000 | 0,000 | 0,000 |
| | | N | 53 | 53 | 52 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| | Proactiveness | Correlation Coefficient | -.290* | -.364** | -.391** | -.338* | 0,133 | .607** | .636** | 1,000 | .456** | .490** |
| | | Sig. (2-tailed) | 0,035 | 0,007 | 0,004 | 0,013 | 0,342 | 0,000 | 0,000 | | 0,001 | 0,000 |
| | | N | 53 | 53 | 52 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| | Competitive_Aggressiveness | Correlation Coefficient | -0,127 | -0,263 | -0,211 | -0,093 | .307* | .591** | .597** | .456** | 1,000 | .676** |
| | | Sig. (2-tailed) | 0,364 | 0,057 | 0,133 | 0,508 | 0,025 | 0,000 | 0,000 | 0,001 | | 0,000 |
| | | N | 53 | 53 | 52 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |
| | Autonomy | Correlation Coefficient | 0,062 | -0,118 | -.281* | -0,222 | .272* | .652** | .601** | .490** | .676** | 1,000 |
| | | Sig. (2-tailed) | 0,658 | 0,400 | 0,044 | 0,111 | 0,049 | 0,000 | 0,000 | 0,000 | 0,000 | |
| | | N | 53 | 53 | 52 | 53 | 53 | 53 | 53 | 53 | 53 | 53 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

## D15.1 Manufacturing capability correlations

Quality and delivery were found to have moderate correlations that were highly significant. Flexibility, cost and business performance were also found to have moderate correlations with high significance to each other. Flexibility was found to have a moderate negative effect on business performance,

## D16.1 Entrepreneurial orientation correlations

Risk was found to have strong and significant correlations with all EO factors innovativeness, proactiveness, competitive-aggressiveness, and autonomy. Risk was also found to have a moderate correlation to Business performance.

Proactiveness was found to have strong and significant relationships to risk and innovativeness, however it had a moderate correlation with competitive aggressiveness and autonomy.

Competitive-aggressiveness had strong and significant correlations with risk, innovativeness' and autonomy. It had a moderate correlation with proactiveness.

Autonomy was found to have a strong and significant correlation with risk, innovation and competitive-aggressiveness. It was found to have a moderate correlation with proactiveness.

Innovativeness was found to have a strong and significant correlation with all dimensions of EO.

## D17.1 Cross Correlations

Proactiveness was found to have a moderate negative correlation with delivery and flexibility. Innovativeness' was found to have a moderate, significant negative, correlation with cost, flexibility and delivery. The dimensions of manufacturing capability have been found to have a negative or weak positive correlation with those of Entrepreneurial orientation.

## D18.1 Summary of the results

The results showed that only flexibility and risk were significant to organisational performance. Furthermore the results showed that EO and manufacturing capability have a negative relationship.

The model for EO and performance was found to be;

***Performance = 0.359 (risk) +2.42***

The model for manufacturing capability and EO was found to be;

***Performance = (-3.94)* (flexibility) + 4.806***