Determining the effect of mergers and acquisitions in the agricultural supply sector

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ABSTRACT

This study investigates the effect of mergers and acquisitions on the agricultural supply sector within South Africa. In 1998, a total of 25 agricultural supply companies serviced the South African agricultural industry. Currently, ten agricultural supply companies are servicing the South African market, and eight of them are presently negotiating mergers and acquisitions, or have just completed one. With the current number of mergers and acquisitions in process in the agricultural sector, and other on the horizon, it is postulated that there will only be a limited number of agricultural crop protection chemical companies soon who will service South African farmers. Although this scenario stimulates for future development, research and growth, it could also result in a drastic rise in the prices of agricultural chemicals because mergers and acquisitions are costly and these costs would have to be recovered. The primary objective of this study is to determine the impact of financial and economic on the end-user (farmer) in South Africa agricultural mergers and acquisitions. Online questionnaires were distributed via Survey Monkey, and 110 completed questionnaires were collected, signifying a response rate of 66.67%. The Kaiser-Meyer-Olkin measure of sampling adequacy indicated that an adequate sample exists. The data was also reliable as per Cronbach alpha ($\alpha \geq 0.70$). Farmer (end-users) believe that mergers and acquisitions ultimately have an impact on the end price they will receive, with 53.68% of the respondents either agreeing or strongly agreeing with the statement made. Some 40% of the respondent currently does not know if mergers and acquisitions will impact prices, but 53.68% believe that it will influence prices in the near future. Only 6.32% of the respondents do not agree that mergers and acquisitions will influence prices. Exploratory factor analysis extracted 11 factors explaining 76.1% of the variance. The factors Key selling points and Customer satisfaction with the suppliers are the two most important factors; they explain 13.9% and 13.8% of the variance, respectively.

Keywords: Mergers and acquisition, agricultural crop protection, agents, representative, suppliers, farmers, big six, input costs, factor analysis.

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LIST OF ACRONYMS AND ABBREVIATIONS

BIL	Billion
CARGR	Compound annual growth rate
COVID-19	Coronavirus disease of 2019
EFA	Exploratory factor analysis
EUR	Euro
GDP	Gross domestic product
GEPF	Government Employees Pension Fund
IPR	Intellectual Property Rights
KMO	Kaiser-Meyer-Olkin
M&A	Mergers and acquisitions
MIL	Million
NO.	Number
PTY LTD.	Proprietary Limited
R&D	Research and development
RQ	Research question
SA	South Africa
SPSS	Statistical Package for Social Science
STATS SA	Statistics South Africa

CHAPTER 1

NATURE AND SCOPE OF THE STUDY

1 INTRODUCTION

This study investigates the effect of mergers and acquisitions on the agricultural supply sector within South Africa. In 1998, 25 agricultural supply companies serviced the South African agricultural industry (Schreuder, 2002). This was a typically high number of suppliers that mostly consisted of research-based manufacturers. In 1999 and 2000, this number drastically declined to 15 due to the high amount of mergers and acquisition the industry saw (Clapp, 2017; Schreuder, 2002). Currently, ten agricultural supply companies are servicing the South African market, and eight of them are presently negotiating mergers and acquisitions, or have just completed one (Biodiversity, 2017c; Corporation, 2015; Markets, 2018; Technology, 2014). With the current number of mergers and acquisitions in process in the agricultural sector, and other on the horizon, it is postulated that there will only be a limited number of agricultural crop protection chemical companies soon who will service South African farmers.

Although this scenario stimulates for future development, research and growth, it could also result in a drastic rise in the prices of agricultural chemicals because mergers and acquisitions are costly and these costs would have to be recovered. In the United States of America, for example, a merger between Dow and Du Pont will have a projected market share weighted expectance price increase of 2.3% for corn seed and 1.9% for soybean seed (Bryant *et al.*, 2016). This pattern has also been followed in Germany with the Bayer/Monsanto merger, where the projected market share weighted expectance price increase in the market price for seed for cotton is 18.2% (Bryant *et al.*, 2016). Similar upward prices have been noticed in mergers around the world, with Canada, China and Brazil all showing strong indications of market price increases (Choi, 2017; Gullickson, 2017; Nishimoto, 2019; Robb, 2017)

This study, therefore, focuses specifically on the impact that these mergers and acquisitions have on the farmers, agents and representatives.

1.1 BACKGROUND

1.1.1 Regulations of the crop protection industry

In South Africa, the trade, manufacturing, and the distribution of crop protection chemicals are regulated under the Fertilisers, Farm Feeds, Seed and Remedies Act (No. 36 of 1947) (SA, 1947). This act:

- provides for the registration of fertilisers, farm feeds, sterilising plants and specific remedies;
- regulates the importation and sales of fertilisers, farm feeds, seeds and specific remedies; and
- prevents for matters incidental thereof.

In addition to the act and registration process, suppliers, distributors, and associates also strive to adhere to the general rules and regulations as set out by CropLife South Africa. “CropLife South Africa is a non-profit industry association that serves and represents responsible manufacturers, suppliers and distributors of sustainable crop protection and public health, non-crop and consumer sectors of South Africa” (CropLife, 2020).

1.1.2 South African agricultural statistics

According to Stats SA (2019), only 14.8% of South African households were involved in some sort of agricultural activities. This number declined since 2017 when 15.6% of South African households were then involved in some agricultural activities (SA), 2018:6). It is interesting to note that nationally, more than 75.6% of households of those households who were involved in agriculture, did so in an attempt to secure an additional source of food (SA), 2019:68-69). The percentage of South Africans who experience hunger also decreased from 29.3% in 2002 to 11.3% in 2018. Agriculture also plays a vital role within the South African economy and directly contributed 2.36% (2017), 2.18% (2018) and 1.88% (2019) to the GDP annually (Plecher, 2020). (The indirect contribution to the GDP is estimated to add a further 14% to 16%).

However, despite the 15% growth reflected between Q1 and Q2 of 2019, the annual cyclical tendency of agriculture did not yield the expected average cops yields. The 2019/20 production year showed quarter-to-quarter and year-to-year downward movements in the

latter part of 2019/2020, and resultantly, a lower contribution towards the GPD. This was detrimental to the economy because the agricultural sector is traditionally one of the main contributors to the yearly GPD of the country.

In 2020, Covid-19 also negatively influenced South Africa, and it has a devastating effect on the country's GDP. According to (Stats SA, 2019), the GDP fell over 16% between Quarter 1 and Quarter 2 of 2020, representing a massive negative growth rate of -51%. The agricultural industry, however, remained a shining light in the dark economic tunnel, and it is the only industry that is showing a positive contribution to South Africa's Covid-19 stricken economy GDP in 2020 (SA), 2020). Statistics South Africa (Stats SA, 2020) further describes this positive contribution towards the GDP as, "an increase in maise exports, as well as a rising international demand for citrus fruits and pecan nuts". This ultimately led to the positive growth rate of 15.1% in the agricultural sector, which improved from the first quarter to the second-quarter GDP figures (see Figure 1).

Figure 1: South African industries performance in the second quarter of 2020?

Source: (SA), 2020)

According to Fairclough (2020) there was an increase of 2% year on year from 2017 to 2018 in the global crop protection markets. At the same moment in time, South Africa's markets

grew by close to 5% from 2017 to 2018. This indicates an above-average growth rate from more than double that of the global rate. The average CAGR of the global markets for the period 2008 to 2018, is estimated at a 2.3% CAGR per annum. In contrast, South Africa's has outperformed the global market with a CAGR of 4.4% per annum for the same period in time.

1.1.3 Global agricultural mergers and acquisitions

The South African agriculture chemical industry is dominated by the so-called "Big Six" companies. They are BASF, Monsanto, Bayer, Dow, Syngenta and DuPont. These companies all have a strong market presentence, significant power and influence in the industry, and have earned good reputations among clients and the government. (MacDonald, 2017:1-10) states that these companies focus on crop protection chemicals, seeds and farm machinery in the private sector and all of them cooperate by combining their seeds and chemical research and development knowledge in their marketing efforts. Resultantly they all become more competitive in the market by identifying better and newer ways to add innovative products and services to their clients.

The downside of these mergers and acquisitions, according to (Gullickson, 2017), is that fewer suppliers service the market that could adversely affect competition. In South Africa, the "Big Six" will soon be known as the "Big Four" in the industry because of looming mergers between the companies Monsanto and Bayer, ChemChina and Syngenta as well as Dow and DuPont.

Figure 2 shows the proposed future mergers in the agricultural chemical crop protection market.

Figure 2: Current Major Agricultural Chemicals Mergers Under Review

Source: (Brown, 2016)

Several authors express concern about these three abovementioned mergers, stating that the mergers can have the following problems (Gullickson, 2017):

- The merger could lead to seed prices increases due to market integration and anti-competition tactics.
- Seed prices are projected to rise by 5.5% and cottonseeds by more than 20%.
- Price increases on the cottonseed are specifically affected adversely. Farmers using Monsanto brands' cotton seed could experience prices to increase by 19.23%.
- Similarly, farmers using Bayer brand cottonseed could also see their seed prices increase by up to 17.41%.

According to (Bryant *et al.*, 2016):

- The merger could lead to seed prices increases due to market integration and anti-competition tactics.

- Prices for agricultural chemicals and seeds have consequently increased in recent years.
- Additional sunk cost in the research and development, cross-licensing and intellectual property.
- Market power resulted from these mega-mergers makes farmers pay higher prices for purchased inputs.

According to (Clapp, 2017):

- The Dow-DuPont and Bayer-Monsanto mergers may result in seed prices that are likely to be increased in the region of 1.6% to 6.3%.
- Soy seeds in the region of 1.3% to 5.8%.
- The predicted effect from the Bayer-Monsanto merger on cotton seeds would be more in the region of 17.4% to 19.2% increases; and
- The merging firms claim that by increasing the prices this much, the end-user will have more access to enhanced technology integration, and this will lead to greater yields in the agricultural sector.

According to (Howard, 2015):

- The fact that agrochemical companies have shifted their focus more towards seed will result in more mergers with seed companies, and the result could be affecting the farmers as they will be experiencing additional price increases in the future.
- This will lead to an acceleration in the synergistic effects of consolidation among firms, and an increase in intellectual property protection.

MacDonald (2017), in support of these authors, clearly states that pricing issues are on the rise, specifically in the agricultural chemical industries, as all the firms are competing in different national and regional/provincial markets. Mergers will lead to a reduced seller's market that at this moment in time are already too small with few competitors.

Mergers and acquisitions of the abovementioned companies (see Figure 2) raise challenging questions with regards to pricing, market share, competitiveness and research and development (MacDonald, 2017). According to MacDonald (2019), the mergers generated concerns regarding competition in pricing and innovation, with subjected reviews by antitrust enforcement agencies in the United States, European Union, Australia, Brazil, Canada, China, India and South Africa (MacDonald, 2019).

The main arguments being the following:

- *Proponents* – Needed a grander scale for investment and research and development.
- *Opponents* - Less competition would lead to price increases. They would be less likely to invest in research and innovation once rivalry is gone.

According to MacDonald (2019), the antitrust agency reviled the following:

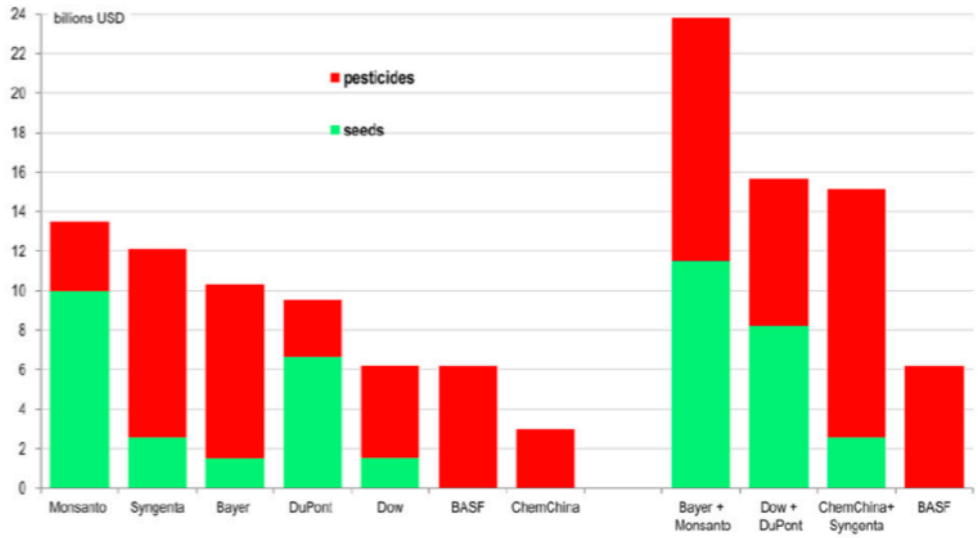
1. ChemChina's acquisition of Syngenta:
    - Syngenta was the market leader in sales of three products, Paraquat, Abamectin and Chlorothalonil.
    - ChemChina was the largest or second-largest producers of generic versions of these three products.
    - As a combined company they would account for world sales of, 60% of paraquat, 80% of abamectin and 40% of chlorothalonil.
    - The antitrust agencies confirmed that an increase in market concentration would lead to a reduction in competition, and allow remaining firms to raise prices.
    - The merger was approved but subjected to the divestiture of the ChemChina products in the three above mentioned markets.

2. The Dow-DuPont merger:
    - DuPont produced one of the largest selling herbicides for the control in broadleaf winter wheat. Dow also has a competing product.
    - The second concern was an insecticide used to control chewing pests, were Dow and DuPont was the two largest sellers of this insecticide.
    - As a combined company they would account for world sales of, 40% of the broadleaf herbicides and 75% of the chewing pests' insecticides.
    - The antitrust agencies confirmed that an increase in market concentration would lead to a reduction in competition, and allow remaining firms to raise prices.
    - They also argued that the rivalries between Dow and DuPont led to the development and introduction on new and improved products in each market and that this merger will eliminate the drive for new and exciting products.
    - The merger was approved but subjected to the divestiture of some of the pesticide business, some of the corn business in Brazil and that some of DuPont's assets including research and development must be sold to FMC Corporation.

3. Bayer's acquisition of Monsanto:
    - Both firms were the leading supplier of genetically modified cotton seeds.
    - They both also produced genetically modified traits for herbicide tolerance and insecticide resistance use in their seed and licenced to other seed firms.
    - They were both significant suppliers of genetically modified canola seeds.
    - Monsanto was the market leader in genetically modified soybean and the only provider of herbicide tolerance traits.
    - The antitrust agencies confirmed that the merger would affect competition in the corn seed markets, as a combined Monsanto and Bayer would be able to charge higher prices.
    - With a rival removed, firms will have less competitive pressure to develop new products.
    - The merger was approved in June 2018 but subjected to the divestiture of some of Bayer assets to BASF. They also needed to divest their research and development capabilities, several herbicide businesses and selected seed treatments.

The "Big 6", now becoming the "Big 4", all make sacrifices to finalise the mergers or acquisitions successfully. Antitrust agencies have focused more on innovation concerns in these three transactions, as this has become an essential feature in a growing number of cases across the agribusiness sector.

Figure 3: Comparison before and after the most recent mega-merger wave



(1) Previous situation (2002–2014) with six large groups, "The Big Six": Monsanto, Syngenta, DuPont, Bayer, Dow, and BASF.

(2) Possible situation in 2017, following the 2015–2016 concentrations leading to four main groups, "The Big Four": Bayer + Monsanto, DowDupont, Syngenta + ChemChina, and BASF.

Source: (Brown, 2016)

Figure 4 is an inductive graph of how the sales of seed and pesticides looked before any of the mergers and acquisitions took place, and how the intended sales will be effected after the "Big 6" became the "Big 4". From the figure, it is evident that the healthy competition between the different agrochemical companies is declining. Green & Willingham (2019) believes that end-users can have less bargaining power. When it comes to pricing, the odds are more likely of charging a higher price if end-users can offset six suppliers against one another, that what they are when you only offset four. This is plausible because are now less competitors in the market.

The consolidation of these major companies has reshaped the $100 billion global markets in pesticides, seeds and bio genes. Farmers are worried that fewer providers will lead to higher than regular prices and less product to choose from. According to Green & Willingham (2019), a 2018 survey found that 80% of crop farmers noticed that their seed prices have increased over the last five years. Almost is two-thirds of these farmers believe it is because they have less bargaining power because of less competition in the markets (Green & Willingham, 2019). Major presidential candidates have called for a moratorium on any further

agricultural mergers and breakup of any other big agricultural companies. Corteva, Bayer and ChemChina together now represent $50 Billion worth of pesticides and seed sales annually (Bunge, 2019). The sales figures of the Top-20 agrochemical companies appears in Figure 4.

Figure 4: Sales of top 20 global agrochemical firms in FY2019

Sales of top 20 global agrochemical firms in FY2019 ($ million) AGROPAGES

FY 2019 (FY 2018) Ranking	Company	FY2019[1] (Reported Currency)	FY2018[1]	FY2017[1]	% Change [2] (FY2019/ FY2018)
1 (2)	Bayer Crop Science [3]	10,374 (€9,263)	9,641	7,622	+ 7.6
2 (1)	Syngenta [4,5]	10,118 ($10,118)	9,909	9,244	+ 2.1
3 (3)	BASF [6]	7,123 (€6,360)	6,916	6,704	+ 3.0
4 (4)	Corteva [6]	6,256 ($6,256)	6,445	6,184	- 2.9
5 (5)	FMC	4,609.8 ($4,609.8)	4,285.3	2,531	+ 7.6
6 (7)	UPL[7]	4,461 (INR316,260)	2,688	2,296	+ 66.0
7 (6)	ADAMA[4]	3,611 ($3,611)	3,617	3,259	- 0.17
8 (8)	Sumitomo Chemical [8]	2,575 (-)	2,538	2,487	+ 1.5
9 (9)	Nufarm[9]	2,517 (Aus$ 3,536)	2,332	2,234	+ 7.9
10 (14)	Jiangsu Yangnong	1,251 (Yuan 8,639)	788	646	+ 58.8
11 (13)	Rainbow Chemical	880 (Yuan 6,074)	809	747	+ 8.8
12 (10)	Huapont Life Sciences	757 (Yuan 5,230)	935	900	- 19.0
13 (11)	Nanjing Red Sun	691 (Yuan 4,768)	891	710	- 22.4
14 (16)	Wynca Chemical	690 (Yuan 4,763)	665	623	+ 3.8
15 (12)	Kumiai Chemical [10]	663 (¥ 72,623)	881	693	- 24.7
16 (18)	Nissan Chemical [8]	655 (¥ 64,038)	571	517	+ 14.7
17 (19)	Lianyungang Liben Crop Science	617 (Yuan 4,261)	561	538	+ 10.0
18 (17)	Lier Chemical	586 (Yuan 4,044)	606	465	- 3.3
19 (15)	Fuhua Tongda	572 (Yuan 3,946)	721	639	- 20.7
20 (-)	Hubei Xingfa Chemicals	523 (Yuan 3,614)	509	-	+2.8

Notes:

1. *Based on the average dollar exchange rate in the initial report of the fiscal year*
2. *YOY rate of change sales in dollar*
3. *Excluding seed & trait and Environmental Science sales*
4. *Now belonging to Syngenta Group*
5. *Excluding turf, landscape and seed & trait business sales*
6. *Excluding seed and trait business sales*
7. *This list uses UPL's data for FY2020 and data FY2019, which are dated respectively as of March 31, 2020 and March 31, 2019 (because UPL completed its takeover of Arysta LifeScience in January 2019, the data for FY2019 only includes two months' sales data from Arysta LifeScience).*
8. *Sales of 2019 and 2018 fiscal years closed on the 31st March of 2020 and 2019 respectively.*
9. *Sales of 2019 and 2018 fiscal years closed on the 31st July of 2019 and 2018 respectively.*
10. *Sales of 2019 and 2018 fiscal years closed on the 31st October of 2019 and 2018 respectively.*

Source: (Yuan, 2020)

Figure 4 postulates the market conditions after these mergers and acquisitions mentioned above. There was severe competition for the two top positions in the agrochemical industry. In 2019, Bayer Crop Science was crowned as the leading company ($10,374 mil), followed closely by Syngenta ($10,118 mil). These two companies significantly lead the race with

BASF, the third company, selling ($7,123 mil.). The 2019 sales figures are interesting because, at the end of the 2018 financial year, Syngenta achieved top sales.

The competition standards between agricultural companies are severe, and as a result, research and development as a competitive advantage are on the rise. Besides, unique trademarks are established, patents on specific products are still applicable, and most of the chemicals are prone to price sensitivity. This makes access to specific suppliers, products, and product ranges very difficult to obtain. It can take years of trust and determination to build up specific relationships. Not everyone has access to all the suppliers and their specific product ranges.

This would mean that distribution company is unable to sell specific supplier companies product ranges, and also means that the distribution company does not have access to any of the supplier companies' intellectual property or research and development. When mergers and acquisitions happen, there is a lot of uncertainty whether or not a distribution company will have access to the newly formed company or not. Not only will this have a cost price implication on the products being sold to the farmer as the end-user, but it also implies that the distribution company will have to build new relationships with different suppliers. On the other hand, distribution companies can also be less fortunate and lose access to the newly formed supplier and the specific product ranges that they have been growing accustomed to, leading to new trials for different chemicals to achieve the same result, coming at an unnecessarily high cost.

In the last three years, the agricultural sector has had three major mergers and acquisitions, merging six of the biggest agricultural companies into four, this also faces its own set of challenges; there are only so many suppliers that produces and sells agricultural chemicals. This means that distributors and end-users will not have a variety of product ranges to choose from, stock availability and the ability to offset suppliers against each other. The end-user will now be competing with the rising costs of new products, new research and development fees and new intellectual property that comes at a higher cost because the newly formed company will most probably be a new multinational that will have its own challenges and sales target, as profit would remain their primary objective.

1.2 PROBLEM STATEMENT

One of the major impacts of mergers and acquisitions is the fact that they lead to higher cost of input for farmers because as the number of players in the agricultural industry reduces, it becomes easier to monopolise the prices and the variety in the product range (MacDonald, 2017). According to Clapp (2017), if these agricultural mergers and acquisitions are allowed to proceed, they will enormously effect on the agricultural input sector. Previous mergers and acquisitions have shown clear signs of concerns such as:

- The effects on competition and innovation.
- Fair pricing structures.
- The wellbeing of farmers autonomy.
- The environment and the conservation thereof.
- The distribution of political power.

(Clapp, 2017) further states that: “The current mergers and acquisitions only reinforce these concerns”.

Bryant *et al.* (2016) believe that the market power from newly formed agricultural companies make farmers pay higher prices for purchased input chemicals and seeds. Seed prices have increased the most percentage-wise compared to other farm inputs over the past few years. Clapp (2017) determined that seeds prices most likely be increased worldwide due the recent wave of mergers and acquisitions, with general seed prices increasing from 1.6% to 6.3%, Soy seeds prices increasing from 1.3% to 5.8% and Cottonseed process as much as 17.4% to 19.2% (Clapp, 2017).

A commonality of the authors mentioned above is that the exact extent of the problem has not yet been determined. However, a firm believe exists that if the regulating authorities do not closely monitor agricultural mergers and acquisitions, the effects thereof could collectively impact negatively on the cost-income plier effect and agri-input inflation (Clapp, 2017).

Hence, the core problem statement under investigation in this study has been identified as “To what extent can mergers and acquisitions in the agricultural supply sector affect the South African farmer as end-user financially?”

1.3 RESEARCH QUESTIONS

This study aims to analyse and provide answers to the following key research questions:

RQ1: *Are mergers and acquisitions of the agricultural supply companies beneficial to the end-users (farmers) in South Africa?*

RQ2: *Specifically, how will a newly formed agricultural supplier company affect the farmers?*

RQ3: *How does the effect of the mergers and acquisitions affect farmers financially.*

1.4 RESEARCH OBJECTIVES

1.4.1 Primary objective

The primary objective of this study is to determine the impact of financial and economic on the end-user (farmer) in South Africa agricultural mergers and acquisitions.

1.4.2 Secondary objective

The following secondary objectives that serve the primary objective are to:

1. Identify the main drivers for agricultural mergers and acquisitions.
2. Determine if the existing clients of both the companies have access to the post-merger company's newly formed product range.
3. Determine if the existing clients of both the companies have access to the post-merger company's newly formed research and development.
4. Examine if the existing clients of both the companies have access to the same level of technical support offered by the post-merger company.
5. Establish if the majority of the same level of product quality and standards are adhered to.
6. Investigate if the product and service prices changed as a result of the mergers and/or acquisition.
7. Measure if the same level of after-sales support is available to clients after the merger and/or acquisition.
8. Determine if there are adequate stock levels for customers to exercise choice in buying their products after the merger and/or acquisition.

1.5 RESEARCH DESIGN

1.5.1 Description of overall research design

This study follows a quantitative research design taking into account the following factors:

- The study will be following a deductive, empirical testing of theory (Principle Orientation).
- A natural science model is constructed to maintain particular positivism (Epistemological Orientation).
- The study is focused on objectivism (Ontological Orientation).
- The primary considerations of the study will be towards: measurement, causality, generalisation and replication all collected via numerical data.
- The study will be cross-sectional in nature.

The specific details about gathering data, the sample size and the population, are explained below.

1.5.2 Unit of analysis

The unit of analysis will include two main groups of respondents. They are the end-users or farmers of agricultural products and organisations who supply these inputs. The suppliers consist of two subgroups, namely the agents and the representatives of the agricultural suppliers who distribute products to farmers and agribusinesses. Although the main focus will be on the farmers, the views from the different suppliers in the agricultural chemical industry are also important.

The population, therefore, consists of:

- The ten biggest farmers in each province, as per the Wenkem SA's database (see Appendix D: Letter of approval to conduct research).
- All the suppliers consist of representatives and agents servicing these farmers, as per the Wenkem SA's database.

1.5.3 Sample selection and sample size

A convenience sampling strategy was used. The farmer sample will be stratified as per the size of their farming operations (bigger farming operations buy more farming inputs), and per geographical region. This stratification was developed because larger farms will be more severely affected by changes in the supply of these products). A stratified sample of the 100 largest farmers (as identified per agricultural inputs purchased per annum on the Wenkem SA's database) per each of the nine provinces was drawn. The sample size is, therefore, 90 farmers, and a 50% response rate was estimated. In addition, a total of 60 agents/representatives and another 15 suppliers were also selected randomly from the Wenkem SA database. In total the sample size consisted out of 165 participants. All these representatives, suppliers and agents supply farmers with agricultural products. In reality, 110 completed questionnaires were collected, signifying a response rate of 66.67%.

1.5.4 Nature of the data

Quantitative data will be collected using a 5-point Likert scale (1 [Strongly disagree], 2 [Disagree], 3 [Not sure], 4 [Agree], 5 [Strongly agree]). All the respondents will complete the same questionnaire. The data will be collected using an online questionnaire (SurveyMonkey).

The questionnaire consists of four parts:

1. Letter of Consent.
2. Screening questions.
3. Categorising the respondent (farmer, agent, supplier).
4. Survey questions dealing with the effect that mergers have on farmers' buying behaviour of agricultural products.

1.5.5 Process of collecting data

Data will be collected online via Survey Monkey. This is a suitable method to collect the data because the online booking requires computer-literate customers who chose to use electronic media as a booking option. It is therefore postulated that they had preferred an online survey instrument rather than any other means of response. The data collection consists of six steps. These are:

1. **Step 1:** Obtain permission from Wenkem SA to use the databases of their farmers and agents/representatives to do research.
2. **Step 2:** A letter of invitation to partake in the study will be provided to the IT managers of Wenkem SA to enable them to send a collective email to all the largest ten farmers per province and also to the representatives and agents selling their agricultural product to farmers. The letter of invitation explains the study.
3. **Step 3:** The letter of invitation also contains a live link on which the farmers and agents/representatives could click. By doing so, they were automatically transferred to the first page of the questionnaire (in Survey Monkey), where they will find the letter of consent.
4. **Step 4:** After reading the letter of consent, respondents agree to participate in the study by clicking on the "Yes" tick box. If they do, they continue onwards to the questionnaire. If they clicked on the "No" tick box, they will be thanked for their time and not receive the questionnaire to complete. Those who did not agree to participate were returned to the home page after the thank you message.
5. **Step 5:** If they agreed and gave consent for their data to be used, the questionnaire opened up, and the respondents continued to complete the questionnaire online after they passed the screening question. (Those failing the screening test, were returned to the home page and thanked for their willingness to participate).
6. **Step 6:** After completion, the data were automatically saved in the database as part of the other responses. It is not possible to identify any respondent (or IP address), or to connect any specific data entry to a specific respondent. The data remains anonymous. The database with all the responses was exported directly into IBM's Statistical Package for Social Sciences (Version 26) (IBM SPSS, 2020).

1.5.6 Data analysis

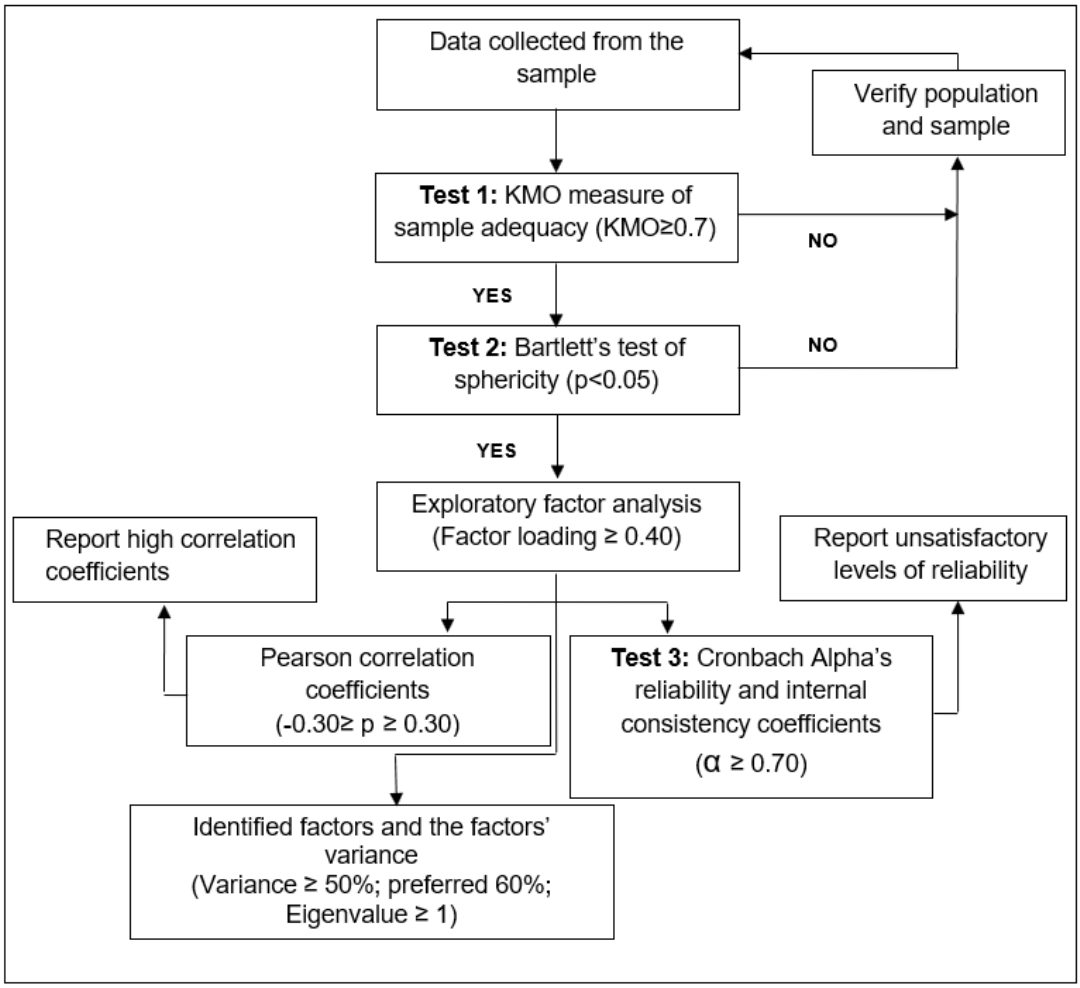
The quantitative data will be analysed using the IBM SPSS. (Morgan *et al.*, 2019; Pallant, 2016). The statistical analysis included the Kaiser-Meyer-Olkin (KMO) test to determine the adequacy of the sample size. Secondly, a test to determine the strength of the relationship among variables is required by calculating the significance levels ($p \leq 0.05$). In this case, Bartlett's test of sphericity was used to determine the strengths of the relationship between the variables. After both the KMO and Bartlett's tests have delivered satisfactory results, the

data analysis continued towards multivariate statistical analysis and specifically exploratory factor analysis.

Inferential statistics was also be used to analyse each of the questions in the questionnaire.

Lastly, the reliability of the data was determined using calculating the Cronbach's coefficient alpha (α). The data analysis flowchart explains the sequence and decision-criteria in Figure 5.

Figure 5: Data analysis flow chart



Source: Arbuckle (2012), Naidoo (2011:19) & Field (2009) as cited by (Asvat, 2019)

1.5.6.1 Kaiser-Meyer-Olkin (KMO)

The Kaiser-Meyer-Olkin (KMO) test is normally used to determine the sample adequacy of data that are to be used for factor analysis. The sample adequacy for each variable in the model will be measured, followed by the adequacy for the complete model. The KMO is

expressed as a value ranging between 0 and 1, and a larger value will indicate that the result is more reliable for factor analysis (Scholtz, 2014). KMO values higher than or equal to 0.7 means satisfactory sample adequacy to work with (Joubert, 2020).

1.5.6.2 Bartlett's test of sphericity

Bartlett's test of sphericity examines the significance of the study. It is an indication of the level of validity and suitability of the collected responses. The test measures the strengths of the relationship between variables which indicates if the data is suitable to analyses (Scholtz, 2014). Bartlett's test of sphericity return value should be ($p \leq 0.05$) to be classified as significance (Pallant, 2016:205-210).

1.5.6.3 Exploratory factor analysis (EFA)

Exploratory factor analysis (EFA) is a statistical technique, that when used, it can reduce a large number of variables to a smaller set of summary variables factors (Pallant, 2016:123). It summarises the underlying patters of correlation and by looking for groups of closely related items.

1.5.6.4 Cronbach's alpha reliability coefficient

Cronbach's alpha (α) is a measure of the internal consistency, and best used to determine if the data collected by the Likert scale surveys are reliable (Joubert, 2020). Cronbach's alpha is not a statistical test, but rather a coefficient of reliability or consistency. Values range from 0 to 1, with the closer the coefficients are to 1, the higher the level of data reliability. A Cronbach's alpha coefficient of 0.70 and higher signifies satisfactory reliability and internal consistency of the data (Pallant, 2016:23).

1.5.6.5 Effect size (Cohen's d-value)

Effect size is a quantitative measure that determines the size of the experimental effect. The bigger the effect size, the stronger the relationship between the variables. Effect size either measures differences between group means, or the size of the association between variables (Mcloud, 2019). Cohen suggests the following:

- d = 0.2 is seen as a small effect size.
- d = 0.5 is seen as a medium effect size.
- d = 0.8 is seen as a large effect size.

1.6 LAYOUT OF THE STUDY

This study consists of four chapters.

In Chapter 1 a brief introduction of the agricultural sector and the leading agricultural suppliers will be provided. The problem statement, the research questions an overview of the primary and secondary objectives of the study are presented.

Chapter 2 presents the literature study. This chapter provides a comprehensive literature study on agricultural products, buying behaviour and the supply of products to farmers.

In Chapter 3, the empirical study on agricultural mergers and its effect on farmers are conducted. The validity of the questionnaire, the reliability of the data, and the importance of different effects mergers have on farmers are determined. The chapter will also present the results from the exploratory factor analysis and culminates in an adapted model to explain the influence of mergers and acquisitions on farmers.

Chapter 4 is the final chapter of the study. It provides various conclusions and recommendations based on the theoretical analysis in chapter two and the empirical study in chapter three. This chapter also presents a final comprehensive summary of the study, and concludes with potential areas for future research.

1.7 ETHICAL CONSIDERATIONS

The North-West University's Scientific Committee, and after that, the Ethical Committee (Faculty Economic and Management Sciences) evaluated this study for scientific and ethical compliance. The committee approved the study and classified it as a low-risk study. The study-specific ethics number **NWU-00632-20-A4** was issued (see Appendix C: Ethics Approval Letter).

1.8 CONCLUSION

In this chapter, the nature and scope of the study were introduced. The chapter also highlighted the problem at hand and then proposed some research questions and presented the objectives. The data collection methodology and subsequent statistical analysis were also explained. The chapter finally described the study.

The next chapter deals with the literature relevant to this study.

CHAPTER 2

MERGERS AND ACQUISITIONS

2 INTRODUCTION

This chapter discusses the literature relevant to South Africa's agricultural chemical crop protection industry. According to Randolph (2009), a literature review is "a means of demonstrating the authors' knowledge about a particular field of study, including vocabulary, theories, key variables and phenomena, and its method and history. Conducting a literature review also informs the student of the influential researchers and research groups in the field".

This chapter will give an overview of the role of crop protection chemicals in the agricultural industry, the different role-players in the agricultural crop protection industry. The "Big 6" will be analysed pre-merger and acquisition, the effect of the mergers and acquisitions on these companies and the future possibilities of agricultural companies planning to merge or acquire.

2.1 ROLE OF CROP PROTECTION IN AGRICULTURE

The global agricultural crop protection market increased from $33 billion in 2007 to a current $60 billion. This means that there is an average growth rate of 7% per year. However, it is just mere estimates as information on the actual market size is not freely available. The South African component of the market size is estimated to be worth R7.4 billion, which is less than 0.5% of the total global market. In contradiction to the worldwide growth rate of 7%, South African markets grew by only 0.5% in 2018 (Nel, 2018).

In the agricultural sector, research and development, intellectual property and patents are precious to companies; this is ultimately a substantial competitive edge in the market. However, intellectual property and patents also come at a high cost. The advantages secured from thorough research and product development does not come cheap. According

to Nel (2018), the developments costs to successfully introduce an active ingredient into the crop protection markets, costs in the region of $250 million. This active ingredient will, however, usually be patented and protected by Intellectual Property Rights (IPR). According to (CHEManager, 2013), based on the IPR of an active ingredient, the market can be classified into three product types:

- *Patented or proprietary products* – This is where the active ingredient is protected by a granted patent. This is the current market situation of about 23% of products.
- *Proprietary off patented products* - This is the current market situation of about 18% of products.
- *Generic products* – Competition in the markets take place, and generic companies registered their own products based on their data obtained. This is the current market situation of about 59% of products.

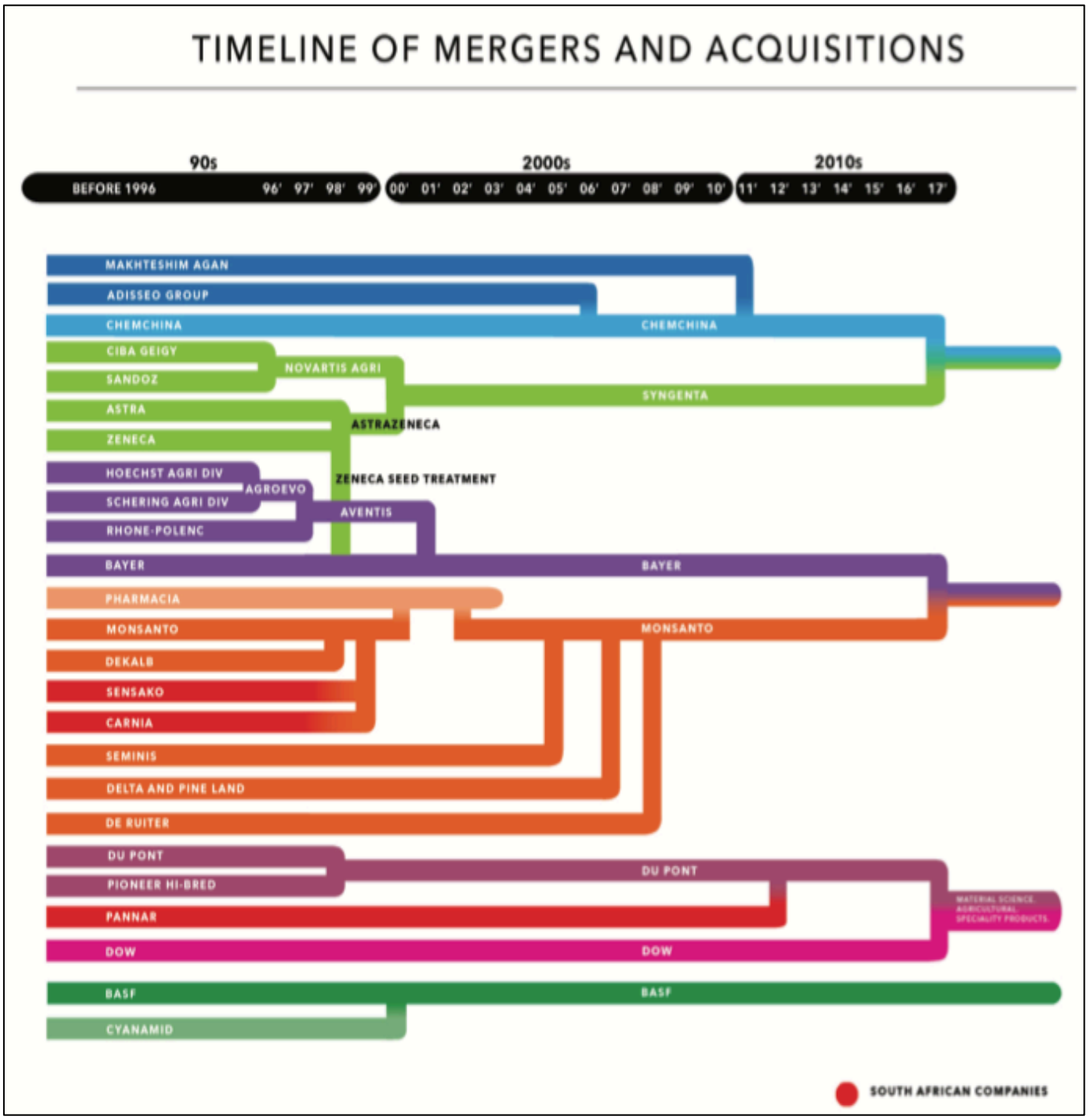
As gathered from the abovementioned data, crop protection chemicals can quickly become, and expensive expense, and it does not stop just at the cost thereof. Production companies will typically distribute their product (Generic or original) to distribution companies, who would have sales representatives selling the products on their behalf, add additional costs to the also rising costs of chemicals (Van Tonder & Nel, 2018). Van Tonder & Nel (2018), also describes it best, when they make the argument that competition between generic and original suppliers of agricultural crop protection chemicals can become fierce, as they are in direct competition to one and another. They want to win the loyalty of the sales representatives who pushes their product range.

With the constant increase in brands, formulations, active ingredient and trade names, the competition in the market sector also increases because of the fact they everyone is competing for the same type of customer. Suppliers become price-sensitive because all the other standards are already met, the quality is efficient, and the brand speaks for itself. The primary base of differentiation is the price to the end-user, and this gets determined by the marketing channel a product goes through (Nel, 2018).

2.2 HISTORY OF AGRICULTURAL CHEMICAL COMPANIES

Agricultural crop protection companies as we know them today did not always look the same as they do now. Figure 6 provides information on how these companies became who they are today.

Figure 6: Timeline of Mergers and Acquisitions



Source: (Biodiversity, 2017c)

Figure 6 shows that there have been more than just the occasional merger and acquisition in the agricultural crop protection sector over the last couple of years. If analysed in detail, one can see that over only 24 years these companies have either merged or have been acquired in quick succession. The original 25 companies have now become a mere four companies.

In Figure 7, the different categories of agricultural crop protection companies are shown. In the agricultural sector, there are mainly three categories of crop protection companies.

- *Research and development companies* - They are always on the lookout for the next “big” active ingredient. They are also mainly multinational companies and usually controlled by one of the “Big 4”.
- *Reformulation and production under licence* - These companies consist of multinational companies and domestic companies. They are called supplies in the agricultural crop protection sector.
- *Distributors* – They are mainly called sales representatives of distributors. They will typically buy the product from the suppliers (the reformation and production under licence category) and resell it to the end-user, which will typically be the farmers.

The list of active companies in each category constantly changes as new emerging companies join the agricultural crop protection market. The list is also amended when active role-players leave the agricultural crop protection market, or when new mergers and acquisitions take place in the agricultural crop protection market.

Figure 7: Agrochemical value chain and main actors

Node	Main actors
Research on new chemicals	***Multinationals:*** Arysta, Adama (ChemChina), BASF, Bayer, Dow, DuPont, FMC Chemicals, Land O'Lakes/Winfield, Monsanto, Sipcam, Sumitomo, Syngenta
Reformulation and production under licence	***Multinationals:*** Adama SA, Platform Speciality Products (incorporating Agriphar Crop Solutions and Arysta LifeScience SA), BASF SA, Bayer Cropscience, Advanced Biological Marketing, Cit Chem SA, Citrashine, Dow Agrosciences, Du Pont, Exportos (Villa Crop Protection/Land o' Lakes), Farm-Af International, FMC Chemicals, Illovo Sugar, Kannar Earth Science, Monsanto SA, Oro Agri SA, Philagro SA, Rotam South Africa, Sipcam SA, Syngenta SA, Total SA, Trical Crop Protection, Villa Crop Protection ***Domestic companies:*** Ag-Chem Africa (Rolfes), Agro-Organics, Avima, Azanchem, Chempac, Cropchem, Enviro Crop Protection, Farmkem, Harvest Chemicals, Hygrotech Seed, ICA International, Inline Trading 112/Nutrico, Insect Science, Kelp Products, Klub M5, MBF International, Medson Manufacturing, Meridian Agritech, Nialcor, Nulandis, Ortus Chemicals, Protek/Pee Bee Agri, SAGL, Scientific Supa-Kill, Siena Bionatec, Zetachem (Omnia)
Distribution	Agriplus Chemical Solutions, Agri-Chemies, Agrison, Baygro Central, Boschem, Coast and Country Agri, Destrimix/Noordchem, Ecoguard Distributors, Farmers Agri-Care, Inteligro, Kombat, Laeveld Agrochem, Loskop Kunsmis, Midchem, Nexus AG, Novon, Octu Chem, Oosvaal Landbou, Provento, PW Landboudienste, Remitto, Sharda Africa, Shiman, Silvix Forestry, The Co-op, Viking Marketing, Wenkem SA, Wilge Chem

Source: (Biodiversity, 2017a)

Figure 7 above provides an overview of all the main actors in the value chain when it comes to the agrochemical sector. Multinationals outside South Africa mostly conducts the research and development of new chemicals and active ingredients. The research and development process is a lengthily and costly process. According to (Biodiversity, 2017a), it takes on average, more than 11 years from the first synthesis of molecules to the actual sale of the product. This happens at an average cost of US$286M per product.

Domestic companies and domestic subsidiaries of multinational companies who are responsible for the manufacturing of agricultural chemicals in South Africa mostly import the active ingredient. The agrochemical distributors or agents will then distribute these said products to the end-user under the Fertilisers, Farm Feeds, Seed and Remedies Act (No. 36 of 1947) (SA, 1947).

There is a clear indication that most of these newly formed agricultural companies have been coming for quite some while, they have gone through a few mergers and acquisitions, and will probably still go through one or two mergers an acquisition in their lifetime. The competition is severe, and companies must try and keep their competitive advantage for as long as possible, perhaps this means that the “Big 6” will become the “Big 4” and the “Big 4” could even eventually become the “Big 2”. Evidently, the agricultural crop protection industry and agrochemical companies servicing the industry have not stabilised yet.

2.3 THE WORLD’S “BIG SIX” AGRICULTURAL CHEMICAL COMPANIES

As mentioned in Chapter 1, the “Big Six” companies are; BASF, Monsanto, Bayer, Dow, Syngenta and DuPont. According to MacDonald (2017), they are the companies that have focused on crop protection chemicals, seeds and farm machinery in the private sector. All of these firms combine their seeds and chemical departments to link both research and developments and marketing efforts to become more market competitive, always looking for a better and newer way to add services to their clients.

In support, Biodiversity (2017b) adds that in the modern agricultural chemical industry these “Big Six” mega seed and agrochemical corporations together control 75% of the global agrochemical market, 63% of the commercial seed market and over 75% of all private sector research and development in the sector. In this regard, back in 2012, Fuglie *et al.* (2012) stated that a concentration of six to three chemical supplier companies implies that farmers could end up paying higher prices for production inputs. This is because the merger costs could now also include the costs of their research and development investments which have to be recuperated in the pricing strategy of the newly formed merger’s products (Bryant *et al.*, 2016; Clapp, 2017).

2.3.1 Bayer & Monsanto

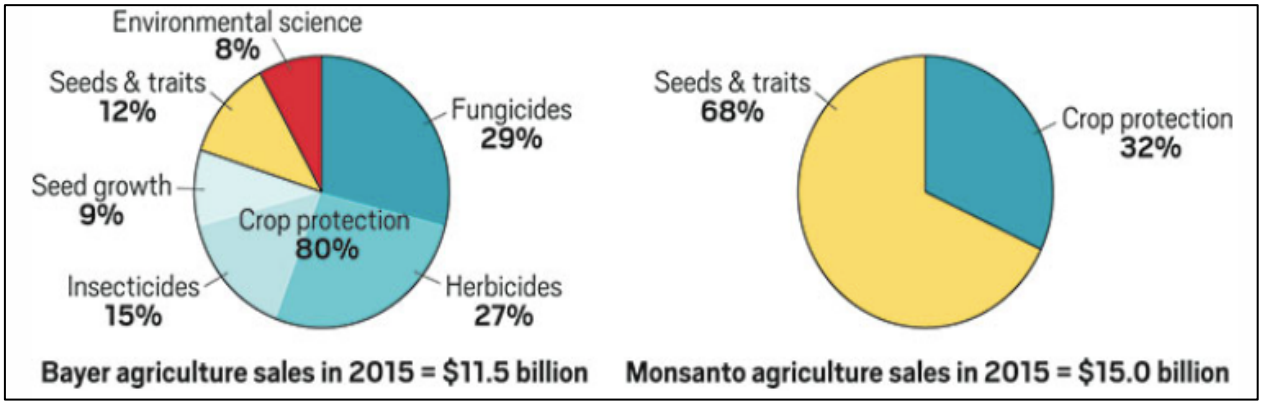
When looking at the focus areas of the two companies, one can clearly see a distinction between the two major companies, with Bayer Crop Science more specialised in crop protection chemicals and non-agricultural pest control remedies. Whereas Monsanto mostly specialises in the genetic modification of crops and pesticides. (The herbicide control product Roundup serves as an example here).

Monsanto is the largest maise seed company in South Africa concerning sales, and it also supplies 90% of the soybean planted commercially in South Africa. They are also seen as leaders when it comes to genetic modification technology. They also distribute their seeds for Alfalfa, Canola, Soybean, Corn, Sugar beets, Cotton, Sorghum and Wheat (Biodiversity, 2017b).

Bayer, on the other hand, has core segments in the fungicide, herbicide, growth regulators and insecticide spectrum of agricultural chemicals. They also divided their crop science division into two main areas, namely Environmental Science and Animal Health. The majority of their sales generated in the African continent are coming from South Africa, hence the reason why South Africa remains a core market for Bayer with regards to chemicals, agriculture, healthcare and consumer fields (Bayer, 2019).

If the Bayer/Monsanto mergers get approved, the newly merged company will have a global market share of almost 30% of the commercial seed markets and 25% of the agricultural chemical markets. In South Africa, they will have control of 30% of both the markets. This effectively makes them the world's largest supplier of agrochemicals and seed. The merger, however, would need approval by regulating authorities in more than 30 different countries (Biodiversity, 2017b).

Figure 8: Bayer and Monsanto Revenue - Pre-Merger



Source: (Bomgardner, 2016)

In Figure 8 above, Bayer AG's total agricultural sales amount to $11.5 billion, while Monsanto had a sales total of $15.0 billion, these figures represent pre-merger sales;

resulting in a combine agricultural sales revenue of $26.5 billion for these two companies. Figure 8 also clearly indicates that Bayer AG is more competitive in the crop protection sector, whereas Monsanto prefers the Seed and Traits sector.

In September 2016 Bayer offered Monsanto $66 billion in a purchase transaction, this was the largest ever overseas deal by a Germany company, it was also recorded as the largest cash buy out a deal on record (Kumar, 2019). This merger also made Bayer the single most significant supplier of crop protection chemicals and seed in the world.

2.3.2 Dow Chemical, DuPont & Corteva

According to MacDonald (2019), DuPont derived almost 70% of its agricultural sales from seeds and traits, was Dow derived nearly 80% of their agricultural sales from, crop protection chemicals.

Currently, DuPont has superior seed breeding capacities; they are currently the second biggest seed company with close to 21% of global seed sales. They also have access to pervasive plant generic material which they now use to continue research and product development on genetically engineered crops. Before purchasing Pioneer Hi-Bred in 1999, they were initially only focused on agricultural chemicals and only holds around 6% of the global pesticide market today (Clapp, 2017). Their headquarters are situated in Wilmington in the United States, and they have a global presence in more than 90 countries.

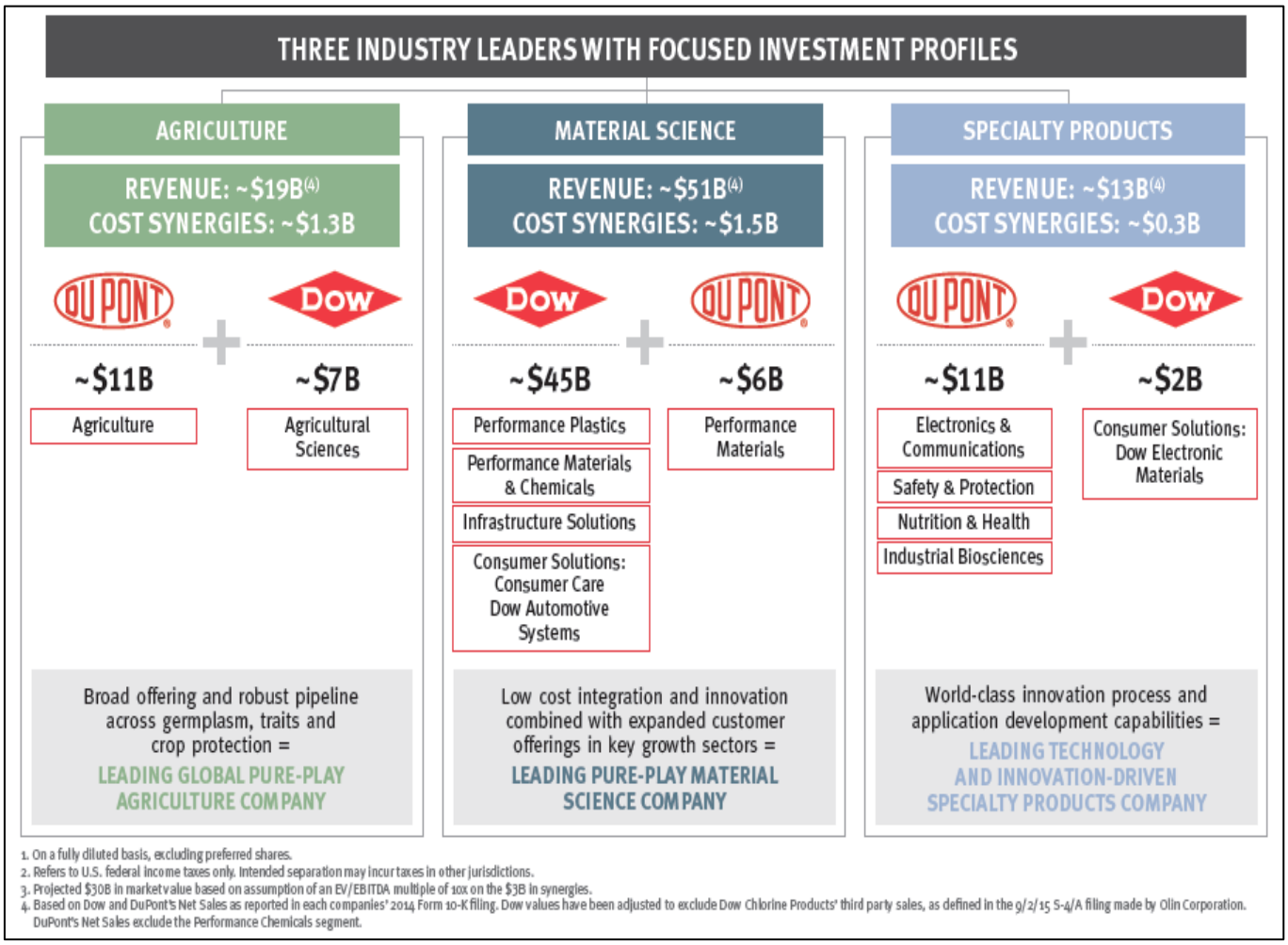
Dow Chemical Corporation, however, are more involved in the crop protection chemical market and holds 10% of global pesticides sales and only 4% of the seed. Dow Chemicals is a firm based in the United States, with their headquarters in Michigan. They have a global presence in about 180 different countries. They manufacture they more than 6000 products in 179 sites in 35 different countries across the globe. Their most important products are herbicides, and this accounts for more than 60% of their sales (Biodiversity, 2017c).

If this merger gets approved by the necessary regulating authorities, the post-market shares of the newly formed company will jump to 23% of the worldwide market in seeds, and to 15% in the worldwide market in agrochemicals (Clapp *et al.*, 2016).

According to Root (2019), if the merger gets approved, Dow-DuPont will be restructured strategically into three different companies (also see Figure 9). They will be:

- Dow – Commodities and Chemical production.
- DuPont - Speciality Chemical productions.
- Corteva – Agricultural Chemicals.

Figure 9: Dow Chemicals and DuPont Revenue - Pre-Merger



Source: (Alpha, 2016)

Figure 9 shows that Dow Chemicals had a sales revenue of $7 billion, while DuPont's sales revenue amounted to $11 billion. This resulted in a combined sales revenue of $19 billion. DuPont's investment in agriculture is 41% of its portfolio, while Dow Chemical's agricultural portfolio investment amounts to 13%.

Dow Chemical and DuPont's proposed a merger in December 2015 and they aim to later separate their joint research and development, agricultural chemicals and material science into three independent corporations (MacDonald, 2017). This merger created a combined estimated value of $130 billion (Biodiversity, 2017b).

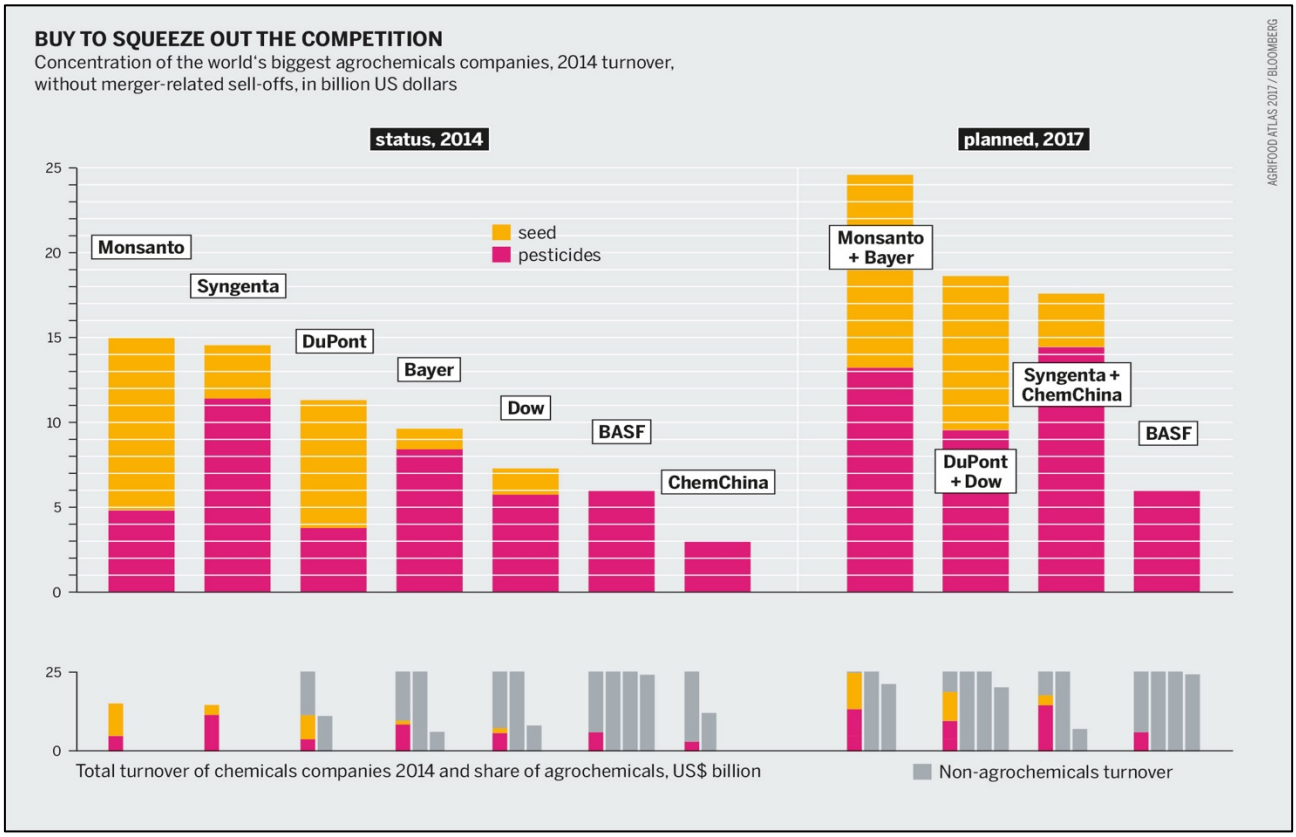
2.3.3 ChemChina & Syngenta

According to 2019 sales figures, Syngenta is the second-largest of the "Big 6" producers of agricultural crop protection chemicals, previously being number one in 2018. Syngenta has, over the years, built up and established themselves as holders of significant research and development patents and products in the agricultural biotechnology seed development market (Clapp, 2017). The firm was established in the year 2000 as a result of a merger between AstraZeneca PLC and Novartis AG agricultural businesses, and are now operating in 90 different countries, with their headquarters situated in Switzerland (Biodiversity, 2017c).

ChemChina is the largest producer of agricultural crop protection chemicals in China and produces generic pesticides through Adama. They do not partake in any seed business and did not invest heavily in research and development of their products (MacDonald, 2019). Their headquarters is situated in Beijing, and they own research and development, products and marketing systems in 150 different countries. ChemChina operates in South Africa through a company called Adama South Africa, and although ChemChina is the market leader in generic products, they also have their developed product range (Biodiversity, 2017c).

If this merger gets approved by the necessary regulating authorities, the market share of the newly formed company is expected jump to 8% of the worldwide market in seeds, and 25% in the worldwide agrochemicals market (Clapp *et al.*, 2016).

Figure 10: Concentration of the world's biggest agrochemical companies 2014 turnover



Source: (Modena, 2017)

In Figure 10, the total agricultural turnover for ChemChina was $3 billion in 2014, while the total agricultural turnover for Syngenta was $14.5 billion for their seed and pesticide divisions combined. The merger's combined turnover would have been $17.5 billion in 2014 if they had already merged. This figure also shows that the merged company combined sales turnover would now slot them into the third largest agricultural crop protection company, with the possibility of becoming number two in the future.

In February 2016, the state-owned company ChemChina offered Syngenta an amount of $43 billion to merge with them (MacDonald, 2017). This merge will also mean that ChemChina will now have a global market share of 19% when it comes to the pesticides and agrochemical markets (Copping, 2016).

ChemChina renamed its China Chemical Agricultural Technology subsidiary as Syngenta Group. According to Jia (2020), after the merger, the new Syngenta Group will cover seeds,

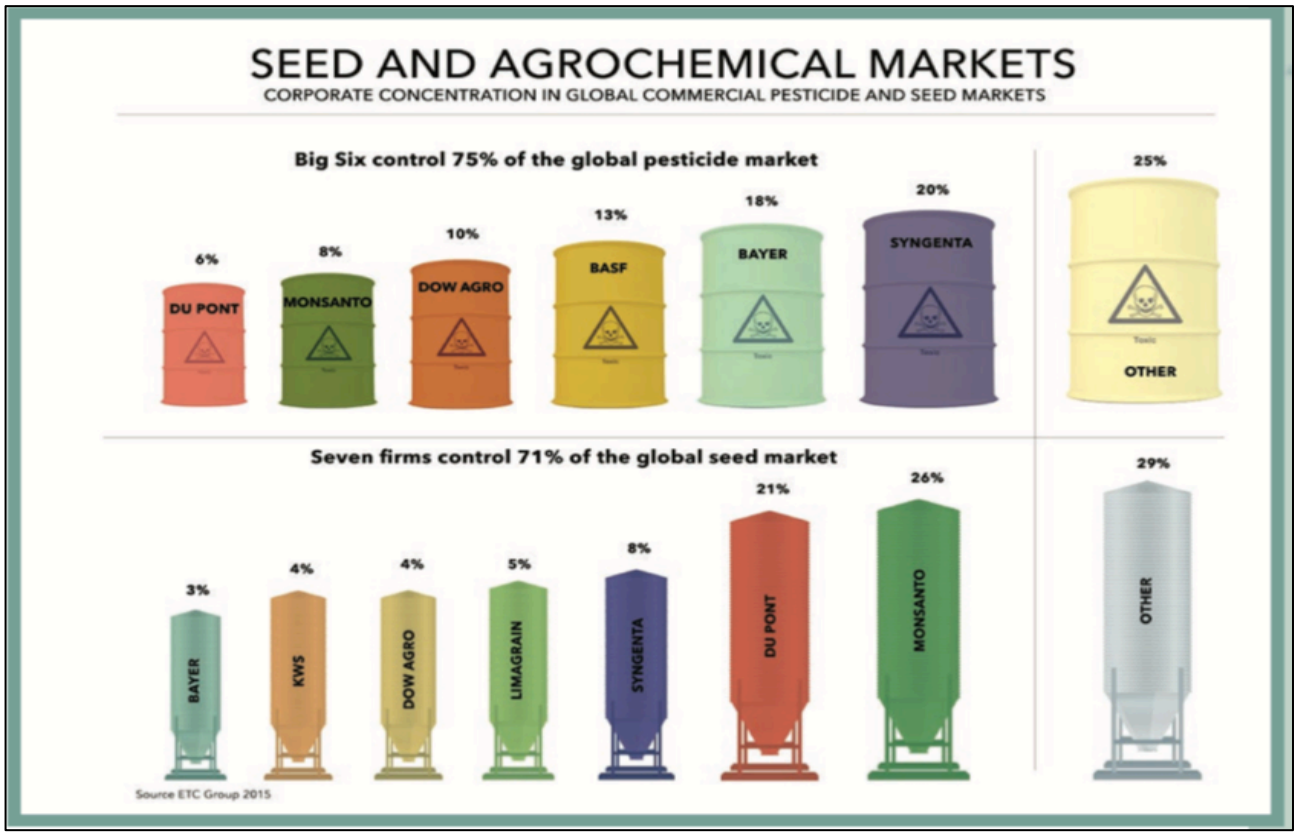
fertilisers, pesticides and agricultural development. Its annual sales can turn in the region of $27 billion.

2.3.4 BASF & Bayer

BASF sits at number three with 13% of the global agrochemical markets in its possession. Their primary market sector includes a majority of crop protection chemicals and very little of the seed market sector. BASF also being the only one of the “Big 6” that does not involve any mergers or acquisitions in this round of mega-merger waves.

BASF was established in 1865, and have customers in more than 171 countries and have production sites in 41 different countries (BASF, 2020). BASF headquarters are situated in Germany, and they have been doing business for more than 150 years.

Figure 11: Seed and agrochemical markets



Source: (Biodiversity, 2017c)

Figure 11 illustrates that BASF falls under the top three crop protection markets in the globe but that they are not a significant player in the seed markets. It also indicates that the “Big

6” companies control 75% of the global pesticide markets, and 71% of the worldwide seed markets, leaving only a handful of opportunities to the rest of the competing companies. Without any major mergers or acquisitions, BASF has still done well to secure a top 3 spot with regards to the pesticide markets.

Although BASF did not acquire Bayer as a whole, they did acquire some of Bayer’s assets in April 2018 to the value of EUR 7.6 billion (BASF, 2018). Some of the vital research and development includes the following:

- Glufosinate – ammonium business.
- Seeds business – Trials, breading abilities and research.
- Row crop trademarks in selected markets.
- Vegetable seed business.
- Range of seed treatment products.
- A research and development platform for hybrid wheat.

If the Monsanto/Bayer merger gets approved, Bayer would have to divest some of their assets to BASF. BASF would have to acquire Bayer’s soybean, cotton and vegetable seed business. They will also have to take some of the cotton business and research and development capabilities for specific herbicide business (MacDonald, 2019).

In Figures 12 to 15 the agrochemical market is envisaged if the “Big 6” becomes the “Big 4”. Figure 12 indicates the newly formed revenue, global sees market share, global pesticide market share and the total size of the deal. Figure 13 shows the amount of active ingredient each company bring to the table pre-merger. Figure 14 represents the global summary of what each company portfolio’s looks like with regards to seed and agrochemicals, and lastly, Figure 15 indicates what the newly formed “Big 4” will be called in the agricultural market segment.

Figure 12: Three Giant Mergers: The Big Six Plus ChemChina

Company	Bayer	Monsanto	Dow	Dupont	ChemChina	Syngenta	BASF
Size of deal	$66bn (acquisition)		$130bn (merger)		$43bn (acquisition)		Not applicable
Sales (2015)	€46.3bn	US$15bn	US$49bn	US$25bn	US$45bn	US$13.4bn	€70.4bn
Employees	116,800	20,000+	53,000	52,000	140,000	28,704	112,435
Country	Germany	US	US	US	China	Switzerland	Germany
% of Global Seed Market in 2013	3%	26%	4%	21%	Not available	8%	Not applicable
% of Global Pesticide Market in 2013	18%	8%	10%	6%	Not available	20%	13%

Source: (Clapp, 2017)

Figure 13: Registered active ingredients, 2016

	Herbicides	Insecticides	Fungicides	Plant growth regulators	Total
Monsanto	7	0	0	3	10
Bayer	10	16	32	7	65
Dow	41	15	10	3	69
Du Pont	10	3	9	0	22
Adama/Makhteshim-Agan (ChemChina)	51	23	20	2	96
Syngenta	34	13	22	6	75
BASF	13	8	26	4	51

Source: (Biodiversity, 2017a)

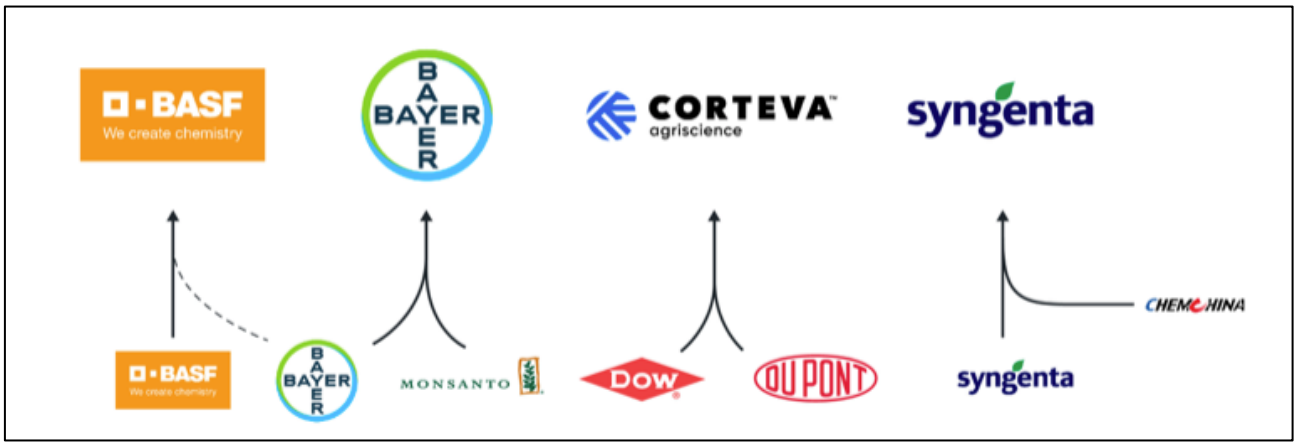
Figure 14: Summary of global seed and agrochemical portfolios

	Agrochemicals	Seed
Monsanto	Insecticides, fungicides, herbicides, most notably Roundup. Other brands are Bullet, Harness, Guardian Max, Monitor.	Maize, cotton and oilseeds (soybeans and canola) – hybrids and genetically modified. Also vegetable seeds.
Bayer	Insecticides, fungicides, herbicides, and seed growth products.	Cotton, oilseed (rape/canola) and rice – hybrids and genetically modified and vegetable seeds. Plans to expand into soya and wheat seed.
Syngenta	Fungicides, herbicides, insecticides and seed treatment, adjuvants and plant growth regulators.	Cereals (especially wheat and white maize), legumes and oilseeds (especially soybean and sunflower) – hybrids and genetically modified. Sugarcane, fruit and vegetable (especially potatoes).
ADAMA (ChemChina)	Non-patented fungicides, herbicides, insecticides, adjuvants and plant growth regulators.	None.
DuPont Pioneer	Insecticides (45% of sales in 2015), followed by herbicides and fungicides (Agrow, 2016b).	Maize, soybeans (hybrids and genetically modified) wheat, canola, sunflower, alfalfa and sorghum.
Dow AgroSciences	Herbicides, which account for 60% of sales, followed by insecticides and fungicides (Agrow, 2016b).	Biggest sellers are maize, followed by soybeans (hybrids and genetically modified), oilseeds and cotton (Agrow 2016b).

Source: (Biodiversity, 2017c)

Based on the information presented by Figures 12-15, it is evident that the six big agricultural chemicals and seed companies play a vital role in the agricultural sector. Further, mergers and acquisitions will have a significant impact in the agricultural markets, and will, without a doubt, also have a considerable effect on specifically the South African agricultural sector. These newly formed agricultural corporations will now control 75% of the global agrochemical markets, 63% of the commercial seed markets and 75% of all private sector research and development (Biodiversity, 2017c).

Figure 15: The Newly Formed Big 4



Source: (Woodruff, 2019)

From 2018 onwards the "Big 6" as we knew it, would have successfully merged and acquired each other, and will now be replaced with the newly formed "Big 4". Figure 15 indicates how the transition from "Big 6" to Big 4" has been achieved.

It is noteworthy that although they do not fall under the "Big 6", there are two other big mergers and acquisitions in the agrochemical crop protection industries that have also taken place:

- UPL has acquired Arysta LifeScience for $4.2 billion and was signed in July 2018 (Limited, 2019). This means that UPL will have access to patented products, that they did not have access to in the past, and they will also have access to much-needed research and development capabilities (Markets, 2018).
- FMC acquired Cheminova A/S in 2015 for a $1.8 billion cash deal. Cheminova's product range is highly complementary, and they consist of a broad geographic footprint (Corporation, 2015; Technology, 2014).

This is yet another indication that smaller firms can merge and acquire each other if necessary; it all depends on what the two parties want to achieve with the said merger or acquisition.

2.4 FUTURE MERGERS AND ACQUISITIONS

Root (2019) explains that there have been a lot of mergers and acquisitions in the agricultural sector because companies are seeing the value of combining seeds and chemical franchises. One of the main reasons for these mergers and acquisitions to reduce research and development costs, and it helps keeps competitors competitive. Usually, when a few big role-players make sudden moves like combining seeds and chemicals, there will often be more firms to follow.

2.4.1 International mergers and acquisitions

Pratt (2019) states, regarding mergers and acquisitions that a group of independent Canadian agriculture retailers has linked up other international independent retailers to establish an international agrochemical company This company called AgLink Canada joined forces with AgLink Australia, International Agribusiness Professionals in the United States and AgriRede in Brazil to create AgLink International to compete against the “Big 4 companies”. This merger shows that more than just one or two companies, located in multiple countries, can merge in an attempt to remain competitive, albeit new challenges and the foreign currencies between these countries. This new merger could result in an interesting competitive environment against the “Big 4” companies’ dominance.

Partners (2019), furthermore, identified several possible new mergers and acquisitions in the near future. These are:

- Nutrien is busy reaching an agreement to purchase Actago, LLC for $340 million. “This acquisition allows Nutrien to leverage Actagro’s strong relationships and track record for developing quality products, and further strengthens Nutrien’s role in providing high-quality crop inputs and solutions” (Partners, 2019).
- Elders are busy acquiring Australian Independent Rural Retailers (AIRR) for a whopping $187 million.
- Telus are in the process of acquiring Decisive Farming for its precision agronomy and crop marketing. This transaction is bound to take place for an undisclosed amount of money.

- Sumitomo Chemical is purchasing Nufarm's South American crop protection and seed treatment assets for over $805 million. This acquisition will put Sumitomo Chemicals into a better position in the overall revenue rankings.
- Syngenta is also in the process of acquiring the Cropio Group – They are recognised as one of the frontrunners in digital agriculture in Eastern Europe. This will strengthen Syngenta's digital partnership.
- Pop Vriend Seeds is acquiring KWS' – both companies are strong in supplying spinach seeds and vegetable seed, and they are actively involved in breeding activities and organic growth.
- Marrone Bio Innovation is acquiring a Finland baes company Pro Farm Technologies. This acquisition is planned to take place for $31.8 million. This will improve both companies plant health solutions.
- Pinnacle Agriculture Holdings LLC are being acquired by J.R. Simplot effectively unifying two giants of the crop input industry. "Pinnacle adds a domestic presence to Simplot's portfolio, adding over 1400 employees and hundreds of crop advisor and retail locations across the United States" (Partners, 2019).
- Plant Response and Koch Biological Solutions is planned to merge as soon as possible; they are targeting research and development and are planning to roll out 12 product lines over the next three years.
- CropX acquires New Zealand precision effluent and smart irrigation decision start-up. According to Stine (2020), the acquisition marks CropX's charge into the New Zealand markets.
- Corteva Agriscience is in the process of acquiring PhytoGen Seed," Cotreva, Inc. today announced the company signed an agreement with J.G. Boswell Co. to purchase its ownership interest in PhytoGen Seed Company, LLC – a joint venture between the two companies" (Newswire, 2020).

These abovementioned potential mergers and acquisitions can have a few possible implications for the agricultural sector in South Africa. According to Biodiversity (2017a), some of the implications includes:

- It can lead to the reduction of competition in the South African seed and chemical markets. American seed markets have shown ample evidence that changes of this size will change key parameters of the seeds market in general.

- Furthermore, the South African seed markets and the American seed markets have shown that an increase in seed prices would be likely.
- The choice and differentiation of available inputs will decrease.
- Efficiency arguments made by boards members that might lead to benefits for their shareholders, cannot be expected to flow over to external groups like farmers and food consumers.
- Lastly, Biodiversity (2017a) believe that South Africa will become the strategic dumping hub for old genetically modify technologies for which they no longer have any use.

2.4.2 Local mergers and acquisition in South Africa

The most recent merger and acquisition of the Suider Paarl Landboukoöperasie by Die Koöperasie-groep indicated that long-term survival could be the reason for a well-established entity to merge with its competition in its 75 years of business. According to Derek Clift, Chairman of the Suider Paarl Landboukoöperasie, the merger was a strategic decision that aims to offer their clients a wider product range (Express, 2019).

The competition tribunal is currently looking into the possible merger between Senwes Group of Klerksdorp and the Suidwes Group of Leeudoringstad. As part of the negotiations, both parties must undertake to enhance their current offering to emerging farmers. According to Weekly (2020), Senwes will provide productions loans to emerging farmers to the value of R20 million annually, and will be allocated over a three-year period that will amount to R60 million in total. This production loans will only be available to farmers in the Senwes and Suidwes operational areas.

According to News (2020), the Government Employee Pension Fund (GEPF) has acquired a minority stake in Alzu Agri (Pty) Ltd. Alzu Agri is a prominent player in the agricultural sector, they specialise in animal feed, maise, pigs and livestock breeding. It is currently still unclear whether the transaction was for a stake in the entire Alzu Agriculture Group or just in two of its subsidiaries. The commission found that the transaction is unlikely to substantially prevent or lessen competition an any of the markets as mentioned earlier.

Senwes (2019) also states that they are currently looking to buy out KLK Landbou Limited, and are in the proses of offering R18.50 per KLK share in the form of a cash deal. With this Senwes Group shareholders will now hold more than 57% of the issued shares in KLK.

According to Senwes (2020), Senwes will also hold the alone right to Hinterland from the 1st of October 2020, after the competition tribunal approved this dissolution. They are currently standing on 58 branches in six different provinces. They will be separate back to the original entities, and Senwes will keep their original branches, and Afgri will keep their original branches.

The evidence is clear that there will always be mergers and acquisition. This is a fact that no one can argue with. However, it is accompanied by a lot of positives and negatives, and South African farmers must try and accommodate these sort of business transactions so that they are beneficial for all parties involved.

2.5 IMPLICATIONS OF INNOVATION, COMPETITION AND PRICING

The analysis discussed earlier in this chapter indicates that agrochemical companies in the agricultural market have changed from big agricultural businesses to giants as a result of the plentiful mergers and acquisitions. In the last four years, the agricultural sector had experienced six of the world's largest agricultural companies merging into three. These mergers and acquisitions have a lot of responsibilities. Management of these companies needs to make the right decisions at the right time to ensure optimal food security, public safety and dealing with hazardous chemicals responsibly in a complicated business environment.

The most pertinent five advantages and disadvantages concerning the mergers and acquisitions of agrochemical companies are summarised in Table 1. Each of these advantages and disadvantages originated from sound scientific sources; they are also listed in the table adjacent to the specific advantage or disadvantage.

Table 1: Advantages and Disadvantages of mergers and acquisitions

ADVANTAGES	SOURCE
Research and development Mergers and Acquisitions in the agricultural sector led to a decrease in research and development cost, as the consolidation of companies allows for horizontal spreading of expenses.	(Biodiversity, 2017a; Biodiversity, 2017b; Biodiversity, 2017c; Clapp, 2017; Clapp, 2018; Clapp *et al.*, 2016; DuPont, 2017; Fuglie *et al.*, 2012; Gullickson, 2019a; Gullickson, 2019b; Koeleman, 2019; Leclerc, 2019; MacDonald, 2017; Markets, 2018; Root, 2019; Smith, 2017; Times, 2018; Times, 2019; UPL, 2018; Varinsky, 2018; Vogt, 2017)
Product range Mergers and Acquisitions in the agricultural sector can lead to an expansion of the current product range.	(BASF, 2018; Biodiversity, 2017c; Corporation, 2015; Fickling, 2020; Griffiths, 2019; Markets, 2018; Times, 2019; UPL, 2018; Vogt, 2017)
Competition Mergers and acquisitions in the agricultural sector can lead to the first-mover advantage, thus beating your competition.	(Corporation, 2015; Griffiths, 2019; Kumar, 2019; Nel, 2018; Smith, 2017)
Technology Mergers and acquisitions in the agricultural sector led to newer technology, and can also lead to other technology that the company did not have access to pre-merger.	(Koeleman, 2019; Markets, 2018; Technology, 2014; UPL, 2018; Vidal, 2016)
Innovation Mergers and acquisitions in the agricultural sector led to more and newer innovation.	(George, 2017; Griffiths, 2019; MacDonald, 2017; MacDonald, 2019; Markets, 2018; Nel, 2018; Summerfield, 2017; UPL, 2018; Wang, 2019)

DISADVANTAGES	SOURCE
Pricing Mergers and acquisitions in the agricultural sector led to an increase in prices due to fewer companies controlling the market.	(Agrawal, 2019; Biodiversity, 2017a; Biodiversity, 2017b; Biodiversity, 2017c; Bryant *et al.*, 2016; Clapp, 2017; Clapp, 2018; Clapp *et al.*, 2016; DiStefano, 2019; Fuglie *et al.*, 2012; Koeleman, 2019; Limited, 2019; MacDonald, 2017; MacDonald, 2019; Mangan, 2018; Ram, 2019; Varinsky, 2018; Walljasper, 2019; Wang, 2019; Whitfield, 2014; Whiting, 2017)
Product range Mergers and acquisitions in the agricultural sector led to lesser varieties and choices to choose from for the farmers.	(Biodiversity, 2017a; Biodiversity, 2017b; Biodiversity, 2017c; Clapp, 2017; Clapp, 2018; Clapp *et al.*, 2016; George, 2017; Koeleman, 2019; MacDonald, 2017; MacDonald, 2019; Mangan, 2018; Reuters, 2017; Trager, 2017; Walljasper, 2019)
Competition Mergers and acquisitions in the agricultural sector led to a decrease in competition as four significant corporations now control 80% of the agricultural markets.	(Biodiversity, 2017a; Biodiversity, 2017b; Biodiversity, 2017c; Bryant *et al.*, 2016; Bunge, 2019; Clapp, 2017; Clapp, 2018; Clapp *et al.*, 2016; Gullickson, 2019a; Gullickson, 2019b; MacDonald, 2017; MacDonald, 2019; Trager, 2017; Vidal, 2016; Wang, 2019)
Input cost Mergers and acquisitions in the agricultural sector led the rise of input costs.	(Biodiversity, 2017a; Biodiversity, 2017b; Biodiversity, 2017c; Clapp, 2017; Clapp, 2018; Clapp *et al.*, 2016; Fuglie *et al.*, 2012; Leclerc, 2019; MacDonald, 2017; MacDonald, 2019; Mangan, 2018; Phillips, 2018; Vidal, 2016; Wang, 2019; Whiting, 2017)

DISADVANTAGES	SOURCE
Public image Mergers and acquisitions in the agricultural sector can be a result of past bad encounters.	(Daniels, 2018; DW, 2020a; DW, 2020b; Neri, 2018; Trager, 2017; Weinland, 2019)

The most important advantage of mergers and acquisitions in the agricultural sector is that it leads to a decrease in research and development cost. Innovation, competition, technology and product range all have a vital part in the argument for mergers and acquisitions in the agricultural sector.

However, when considering the disadvantages of mergers and acquisitions in the agricultural supply sector, pricing, and more specifically the increase in the product prices post-merger, plays a critical role on the farmers as end-users in mergers and acquisitions. Input cost, public image, competition and product range all contributes to the argument against mergers and acquisitions in the agricultural sector.

It is also noteworthy that the arguments against mergers and acquisition in the agricultural supply sector related to the post-merger price increases, higher input costs, and the decrease in the competitive environment are regarded to be the most important critiques. More researchers and agricultural journalists now note these disadvantages than ever before.

2.6 SUMMARY

In this chapter the literature relevant to the agrochemical market was introduced, the general role of crop protection chemical in the agricultural industry was explained, and the history of the different agricultural chemical companies was introduced, the “Big 6” companies: Bayer, Monsanto, Dow, Du Pont, BASF and Syngenta was explained. This included an overview of historic achievements and how the “Big 6” companies are becoming the “Big 4” (Bayer, Corteva, BASF and Syngenta). The chapter also touched on future mergers and acquisitions, and the construction of the envisaged merger-deal was explained. Lastly, the

top five advantages and disadvantages of the in the crop protection industry was explained and supported by the necessary sources.

The next chapter presents the research methodology and results of the study.

CHAPTER 3

RESEARCH METHODOLOGY AND FINDINGS

3 INTRODUCTION

Chapter 3 describes the research in methodological steps. In doing so, the chapter also deals with the research problem, the research design, sampling procedure and adequacy, data collection methodology, data analysis, interpretation, reporting and finally concludes with the findings discovered in the study.

3.1 RESEARCH METHODOLOGY

The following sections provide more detail on the steps followed in this study.

3.1.1 Variable selection

This is the first step in any segmentation study. Identify and select the appropriate segmentation variables. In this study, the variables were chosen based on assumptions, judgments, experience and market research in the agricultural chemical industry. The variable selection was based on a combination of feedback received from experienced Wenkem SA management and a detailed literature review.

3.1.2 Questionnaire

This is an original questionnaire, created specifically for this study. The final questionnaire consisted of four sections, and it took the respondents on average, approximately 20 minutes to complete. The first section of the questionnaire contains the informed consent section; this provided a guarantee of anonymity and was followed by the screening section to make sure the respondent is part of the right targeted population. Next, the instructions followed and then the Sections A to D for completion. The questionnaire ultimately ended with a “Thank you for participating and contributing to the study”.

Quantitative data was collected by using a 5-point Likert scale (1 [Strongly disagree], 2 [Disagree], 3 [Not sure], 4 [Agree], 5 [Strongly agree]). All of the respondents completed the same questionnaire. The data was collected using an online questionnaire platform (SurveyMonkey).

The questionnaire consists of four parts:

1. **Letter of Consent** – Here respondents gave consent that their information may be used in this study. (see Appendix A: Letter of Consent)
2. **Screening questions** – This was added to ensure that the respondent do indeed form part of the targeted population.
3. **Categorising Question** (Section A) was added to categorise the respondent as a farmer, agent or supplier.
4. **Likert-scaled questions** dealing with the effect that mergers have on farmers' buying behaviour of agricultural products summarised into three main subdivisions (see Appendix B: Survey Monkey Questionnaire):
    a. Section B – Relationship information with regards to the chemical supplier and/or agent.
    b. Section C – Product and service standards and quality.
    c. Section D – Prices, mergers and acquisitions.

3.1.3 Unit of analysis

The unit of analysis included two main groups of respondents. They are the end-users or farmers of agricultural products and organisations who supply these inputs. The suppliers consist of two subgroups, namely the agents and the representatives of the agricultural suppliers who distribute products to farmers and agribusinesses. Although the main focus will be on the farmers, the views from the different suppliers in the agricultural chemical industry are also important.

The population, therefore, consisted of two distinct groups. They are:

- The ten most prominent farmers in each province, as per the Wenkem SA's database (see Appendix D: Letter of approval to conduct research).

- Suppliers, representatives and agents who service these prominent farmers (as per the Wenkem SA's database).

3.1.4 Sample selection and sample size

Convenience sampling was used. In addition, the farmer sample was stratified per the size of their farming operations because bigger farming operations buy more agricultural chemical inputs. This stratification was developed because larger farms will be more severely affected by changes in the supply of these products. A stratified sample of the ten largest farmers (as identified per agricultural inputs purchased per annum on the Wenkem SA's database) in each of the nine provinces was drawn. The sample size is, therefore, 90 farmers from which a 50% response rate was estimated. In addition, a total of 60 agents/representatives and 15 suppliers were also selected randomly from the Wenkem SA database. The sample size of the two groups, cumulatively, consisted of 165 participants. All these representatives, suppliers and agents supply farmers with agricultural products. An excellent response rate realised. In reality, 110 completed questionnaires were collected, signifying a response rate of 66.67%. This consisted of 77 farmers (70.2%), 20 agent/representatives (17.3%) and 13 suppliers (12.5%).

3.1.5 Process of collecting data

The *Survey Monkey* electronic platform was used to collect the data. This method of data collection was selected. it requires computer-literate customers who chose to use electronic media as a preference. It was, therefore, postulated that they would prefer an online survey instrument rather than any other means of response. The data collection consisted of several steps. These are:

1. **Step 1:** I obtained permission from Wenkem SA to use their database, as it consists of farmers and agents/representatives.
2. **Step 2:** I sent a letter of invitation to partake in the study to the IT managers of Wenkem SA to enable them to send a collective email to all the largest ten farmers per province and also to the representatives and agents selling their agricultural product to farmers. The letter of invitation explained the study.
3. **Step 3:** The letter of invitation also contains a live link on which the farmers and agents/representatives could click. Once they clicked, they were transferred

automatically to the first page of the questionnaire (in Survey Monkey), where they found the letter of consent.

4. **Step 4:** After reading the letter of consent, the respondents had to agree to participate in the study by clicking on the "Yes" tick box. If they did not click on the "Yes" tick box, they could continue with the questionnaire. If they clicked on the "No" tick box, they would have been thanked for their time and would not have received the questionnaire to complete. Those who did not agree to participate were returned to the home page after the thank you message.
5. **Step 5:** If they agreed and gave consent for their data to be used, the questionnaire opened up, and the respondents could continue to complete the questionnaire online after they passed the screening question. (Those failing the screening test, were returned to the home page and thanked for their willingness to participate).
6. **Step 6:** After completion, the data were automatically saved in the database as part of the other responses. It is not possible to identify any respondent (or IP address) or to connect any specific data entry to a particular respondent. The data remains anonymous. The database with all the responses was exported directly into the Statistical Package for Social Sciences (Version 26) IBM SPSS, 2020).

3.1.6 Data analysis

The quantitative data from all the questionnaires were then imported and analysed using the IBM SPSS. 2020. I also made use of the North-West University's Statistical Consultation Services (see Appendix E: SCS Letter), where Dr. Erika Fourie analysed the data and assisted with the interpretation of the results. Dr. Erika Fourie advised that the KMO test had to perform to determine the adequacy of the sample size. Secondly, she tested the strength of the relationship among variables by calculating the levels of significance and association between the variables at the 95% confidence interval ($p \leq 0.05$). In this case, Bartlett's test of sphericity was used to determine the strengths of the relationship between the variables. After both the KMO and Bartlett's tests have delivered satisfactory results, the data analysis continued towards multivariate statistical analysis and specifically exploratory factor analysis.

Inferential statistics were also used to analyse each of the questions in the questionnaire.

Lastly, the reliability of the data was determined by calculating the Cronbach's coefficient alpha (α). The results showed that all three the categories exceeded the required coefficient of 0.7, and two of the categories have excellent alpha coefficients that are above 0.9. It is thus safe to assume that the data mentioned above is appropriate and seen as reliable (Field, 2013:668).

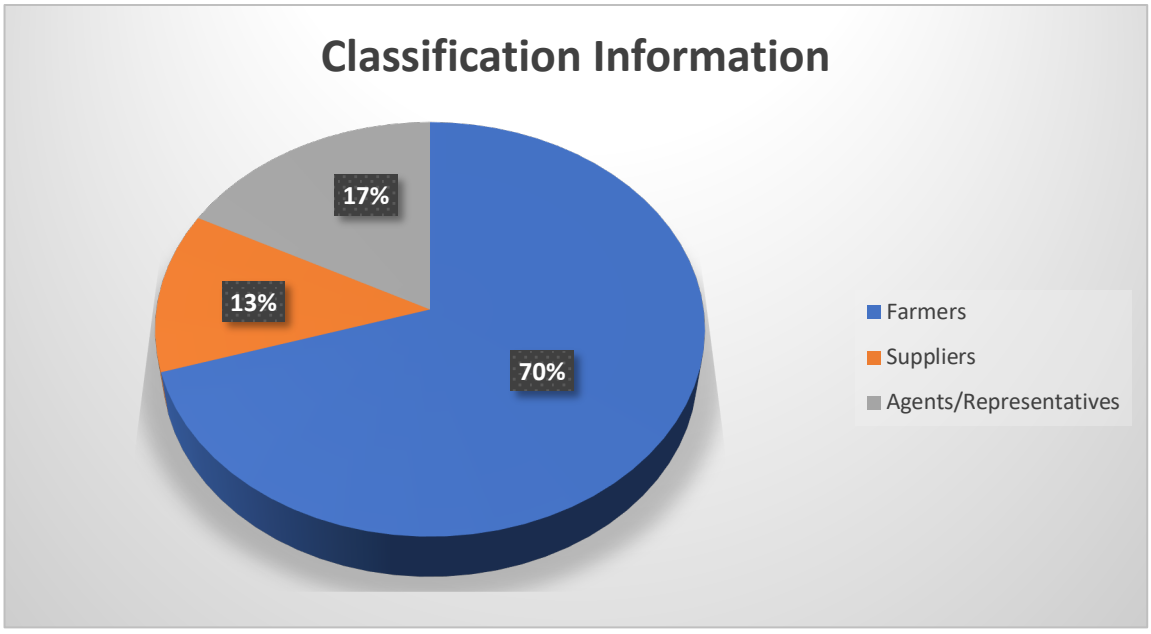
3.2 EMPIRICAL RESULTS

The empirical results of this study are divided into two sections. They are described as the demographic profile and quantitative analysis. The demographic Section will only consist out of one question, and this is labelled as a classification question.

3.2.1 Demographic profile

Figure 16 below shows that the majority of the population targeted was mainly farmers, but not only limited to them. Farmers completed 70% of the questionnaires, while suppliers and agents/representatives completed 13% and 17% of the questionnaires individually. The completed questionnaires, therefore, complied with the identified targeted population as per the research methodology.

Figure 16: Classification information of the respondents



3.2.2 Quantitative analysis

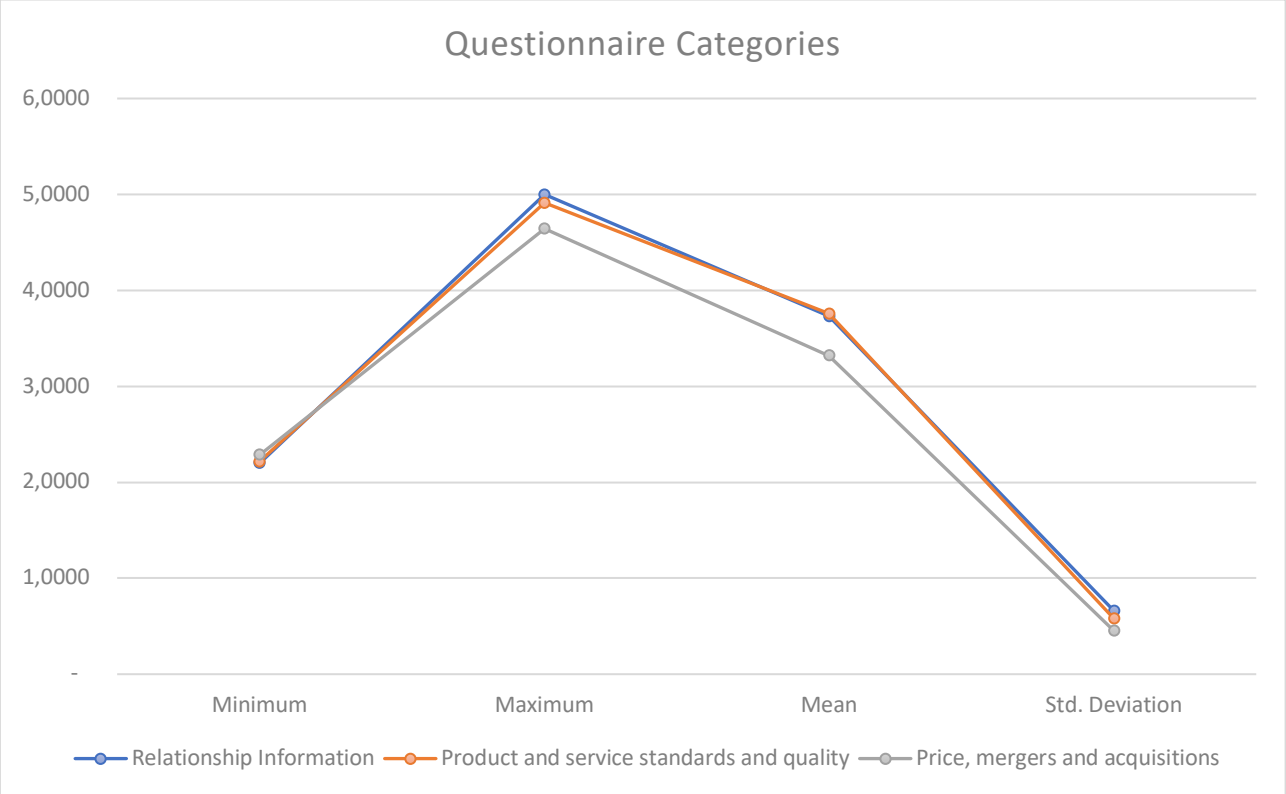
3.2.2.1 Mean, standard deviation and Cronbach's alpha (α)

As discussed in the research methodology, a Likert-scaled was used to document feedback from the questions posed in the questionnaire. The questionnaire was divided into three main categories to ultimately determine the effect that mergers and acquisitions will have on farmers in the agricultural supply sector.

Table 2: Mean and Standard Deviation of the questionnaire categories

Questionnaire Categories	Minimum	Maximum	Mean	Std. Deviation
Relationship information	2,2000	5,0000	3,7298	0,6613
Product and service standards and quality	2,2174	4,9130	3,7571	0,5795
Price, mergers and acquisitions	2,2857	4,6429	3,3211	0,4527

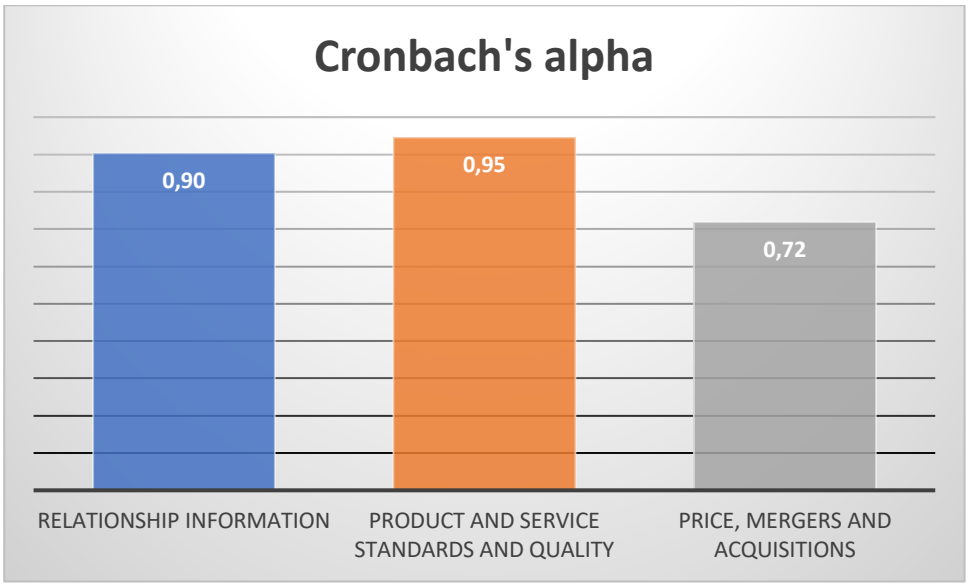
Figure 17: Mean and Standard Deviation of the questionnaire categories



From the above Table 2 and Figure 17, it is evident that Section 2 of the questionnaire, the product and service standards and quality section, obtained the highest mean at 3.75 and that section three of the questionnaire, the price, merger and acquisition section, obtained the lowest mean at 3.32. It is also noteworthy that all three sections have a mean above 3.3.

When it comes to the standard deviation of the questionnaire mentioned above categories, Section 3 (the price, merger and acquisition section) has scored the lowest standard deviation with a figure of 0.45 and that Section 1, the relationship information section, has scored the highest standard deviation of 0.66. All three sections had achieved a standard deviation of less than one, with section three being answered in the same manner.

Figure 18: Cronbach's alpha (α) of the questionnaire categories



From Figure 18, it is clear that all three categories of the questionnaire have scored a Cronbach's alpha (α) coefficient of above 0.7. A Cronbach's alpha coefficient of 0.70 and higher is regarded as appropriate and reliable (Pallant, 2016:23).

- **Category 1** – The relationship information category scoring a Cronbach alpha coefficient of 0.90.
- **Category 2** – The product and service standards and quality category are scoring a Cronbach alpha coefficient of 0.95.
- **Category 3** – The price, mergers and acquisition category scoring a Cronbach alpha coefficient of 0.72.

Cronbach's alpha (α) coefficient is interpreted, as shown in the next table.

Figure 19: Cronbach's alpha (α) coefficient interpretation

Cronbach's alpha coefficient	Interpretation
α >0.9	Excellent
0.8 < α <0.9	Good
0.7 < α <0.8	Acceptable
0.6 < α <0.7	Questionable
0.5 < α <0.6	Poor
α <0.5	Unacceptable

Source: (Joubert, 2020; Scholtz, 2014)

With all three of the categories scoring a coefficient of above 0.7 and two out of the three scorings are above 0.9. It is safe to assume that the data, as mentioned above, is appropriate and seen as reliable. This indicates the following:

- That a person who is completing the questionnaire on two different occasions in time should get the same score for each of the questions each time if all other things stay equal.
- That two people who are the same in terms of constructs being measure by the questionnaires, will both get similar scores for the asked questions.

3.2.2.2 Outliers - Mean and Standard Deviation per category

Table 3: Outlier – Questions per category

No	Statement	Mean	Standard Deviation
C12	I try only using one supplier/agent/distributor.	3,05	1,14
C13	I try and maintain a long-term relationship with the supplier/agent/distributor.	4,10	0,72
C17	Have a wide product range.	4,16	0,79
C18	Provides constant product quality over time.	3,98	0,65
C33	Adds value beyond selling products, spraying programs and calibrations programs.	3,75	1,13
C35	Helps get new products into the market faster.	3,31	0,93
C42	I have done price comparisons against other supplier/agent/distributor's.	3,86	0,93
C44	I know what percentage of the sales value goes to the supplier/agent/distributor's.	2,85	1,31
C47	Mergers and acquisitions helps the flow of new products into the market.	3,27	0,74

Table 4: Outliers – Mean and Standard Deviation per category

Question Categories	Questions	Highest Mean	Lowest Mean	Highest SD	Lowest SD
Relationship Information	Q4 - Q13	Q13 @ 4,10	Q12 @ 3,05	Q12 @ 1,14	Q13 @ 0,72
Product and service standards and quality	Q14 - Q36	Q17 @ 4,16	Q35 @ 3,31	Q33 @ 1,13	Q18 @ 0,65
Price, mergers and acquisitions	Q37 - Q50	Q42 @ 3,86	Q44 @ 2,85	Q44 @ 1,31	Q47 @ 0,74
Overall	Q4 - Q50	Q17 @ 4,16	Q44 @ 2,85	Q44 @ 1,31	Q18 @ 0,65

Table 3 and 4 indicates the highest and lowest mean and standard deviation statistics per category, as well as overall. The highest overall mean (4.16) for the questionnaire was for question 17, which asked the question: *Have you supplier/agent a wide product range?* The lowest mean (2.85) however came from question 44, which asked the question: *I know what percentage of the sales value goes to the supplier/distributor.*

When looking at the standard deviation of the overall questionnaire, the highest overall standard deviation (1.31) came from question 44, which asked the question: *I know what percentage of the sales value goes to the supplier/distributor*. The lowest standard deviation (0.65) is constant came form question 18, which asked the question, *does your supplier/agent provide consistent product quality over time?*

This information plays a vital role when looking at the research objective as a whole, and two of the secondary research objectives can be answered from the results mentioned above, namely;

- *Determine if the existing clients of both the companies have access to the newly formed product range.*
- *Establish if the majority of the same level of product quality and standards are adhered to.*

The results obtained from question 17 can be used to motivate why the first secondary question is acceptable, as the mean of question 17 is 4.16 (highest) out of a possible 5. This indicates that 83.2% of respondents indicated that they believe they will have access to the newly formed product range.

The results obtained from question 18 can be used to motivate why the second secondary question is acceptable, as the standard deviation of question 18 is 0.65 (Lowest). This indicates that the date from the question is the least scattered and that most of the people

have answered this question in the same manner. Hence, we can believe that the quality and standard will remain the same over this period.

3.2.2.3 Primary and secondary research objectives

The primary objective of this study is to determine the impact of financial and economic on the end-user (farmer) in South Africa agricultural mergers and acquisitions.

Table 5: Primary research objective

No	Statement	% Strongly disagree	% Disagree	% Not sure	% Agree	% Strongly Agree	Mean	Standard Deviation
C42	I have done price comparisons against other supplier/agent/distributor's.	2,11	6,32	18,95	48,42	24,20	**3,86**	**0,93**
C45	Mergers and acquisitions have an impact on the price I receive.	2,11	4,21	40,00	37,89	15,79	**3,61**	**0,88**

From the results obtained out of question 42 and 45, it is evident that:

- Farmer (end-users), do make price comparisons in the market, with 72.62% of the respondents either agreeing or strongly agreeing with the statement made in question 42. It also has a strong mean at 3.86 and a standard deviation of 0.93. This indicates that most of the people have answered the question similarly. It is noteworthy that only 8.43% of the respondents do not agree with the statement made in question 42.
- Farmer (end-users) believe that mergers and acquisitions ultimately have an impact on the end price they will receive, with 53.68% of the respondents either agreeing or strongly agreeing with the statement made in question 45. It also has a strong mean at 3.61, a bit lower than question 42, but still above 3, and a standard deviation of 0.88 with is lower that question 42, indicating that most of the people have answered the question in the same manner. Some 40% of the respondent currently does not know if mergers and acquisitions will impact prices, but 53.68% believe it will happen in the near future. It is also noteworthy that only 6.32% of the respondents disagree with the statement that mergers and acquisitions have an impact on the price I receive (question 45).

Table 6: Secondary research objectives

No	Statement	Mean	Standard Deviation
C17	Have a wide product range.	4,16	0,79
C18	Provides constant product quality over time.	3,98	0,65
C42	I have done price comparisons against other supplier/agent/distributor's.	3,86	0,93
C44	I know what percentage of the sales value goes to the supplier/agent/distributor's.	2,85	1,31
C45	Mergers and acquisitions have an impact on the price I receive.	3,61	0,88
C46	Mergers and acquisitions will limit my product range availability.	3,07	0,94
C47	Mergers and acquisitions helps the flow of new products into the market.	3,27	0,74
C48	Mergers and acquisitions impacts the quality level of the product range.	3,16	0,75
C49	Mergers and acquisitions impacts the technical support I receive.	3,22	0,76
C50	Mergers and acquisitions affects the personal connection that I have with the supplier/agent/distributor's.	3,40	0,95

Table 6 indicates the highest and lowest mean and standard deviation statistics for questions relating to the primary and secondary research objectives. When looking at the figure mentioned above it is impressive to note that there is only one question (Question 44), with a mean below 3, the rest are all above 3, with one (Question 17) being above 4.

When looking at the secondary research objectives, five of the eight secondary research objectives can be answered from the results mentioned above, namely;

- *Determine if the existing clients of both the companies have access to the newly formed product range.*
- *Establish if the majority of the same level of product quality and standards are adhered to.*
- *Examine if the existing clients of both the companies have access to the same level of technical support offered by the post-merger company.*
- *Investigate if the product and service prices changed as a result of the mergers and/or acquisition.*
- *Determine if there are adequate stock levels for customers to exercise choice in buying their products after the merger and/or acquisition.*

The first and second bullet point has been analysed and answered in Section 3.2.2.2.

The results obtained from question 49 motivate why the third secondary question is acceptable, as the mean of question 49 is 3.22 out of a possible 5. This indicates that 36.84% of respondents indicated that they believe they will have access to the same level of technical support they have had pre-merger. Some 47.37% of respondents do not know what to expect when it comes to this question, and they selected “Not sure” as a response.

The fourth bullet point has been analysed and answered in this section under primary objective, by analysing questions 42 and 44 thoroughly.

The results obtained from question 17, 46 and 47 can be used to motivate why the last secondary question is acceptable, as the mean of question 17, 46 and 47 is 4.16, 3.07 and 3.27 individually. This indicates that 81.82% believes that they will have access to a broader product range as per question 17. Question 46 clearly shows that 31.59% of the respondents think that they will only have a limited product range if a merger and acquisition get completed. Some 38.95% of respondents indicated that they believe they mergers and acquisitions will help with the flow of new products into the market as per question 47.

3.2.2.4 The importance of research variables

The questionnaire used a 5-point Likert scale to determine whether or not agricultural mergers and acquisitions have a financial and economic impact on the end-user (farmer) in South Africa.

Table 7: **The 5-point Likert scale**

Strongly Disagree	1
Disagree	2
Not Sure	3
Agree	4
Strongly Agree	5

The Likert scale values can also be converted into mean values to interpret the results (Bisschoff & Lotriet, 2009), and then interpreted as follows:

- **< 60% :** Lower importance. Dissatisfactory and needs immediate action.
- **60% - 75% :** Important. Satisfactory and needs to be developed to become excellent.
- **> 75% :** Very Important. Very satisfied/excellent and needs to be maintained to stay on top.

Lastly, the standard deviation serves and an additional measurement that indicates to what extent respondents have agreed to a statement. A standard deviation of less than 1, indicates that respondents agree to the statement.

Table 8: Questionnaire - 5-point Likert scale

No	Statement	% Strongly disagree	% Disagree	% Not sure	% Agree	% Strongly Agree	Mean %	Standard Deviation
C4	The supplier/agent/distributor is sincere and honest.	0,00	9,62	15,38	59,62	15,38	**76,15%**	**0,81**
C5	The supplier/agent/distributor keeps his promises.	0,00	7,69	16,35	61,54	14,42	**76,54%**	**0,77**
C6	The supplier/agent/distributor informs me of any problems which might affect me.	1,92	14,42	19,23	51,92	12,50	**71,73%**	**0,95**
C7	The supplier/agent/distributor is concerned about me and my interests.	4,81	11,54	32,69	36,54	14,42	**68,85%**	**1,03**
C8	The information the supplier/agent/distributor gives me is reliable.	0,00	4,81	30,77	50,00	14,42	**74,81%**	**0,76**
C9	The supplier/agent/distributor is an expert in the product range being sold.	0,00	6,73	19,23	50,00	24,04	**78,27%**	**0,84**
C10	I am very committed to the relationship with my supplier/agent/distributor.	0,96	5,77	16,35	45,19	31,73	**80,19%**	**0,90**
C11	I am very faithful to the supplier/agent/distributor.	2,88	8,65	17,31	45,19	25,96	**76,54%**	**1,01**
C12	I try only using one supplier/agent/distributor.	6,73	34,62	13,46	37,50	7,69	**60,96%**	**1,14**
C13	I try and maintain a long-term relationship with the supplier/agent/distributor.	0,00	3,85	9,62	59,62	26,92	**81,92%**	**0,72**
C14	Provides higher quality products.	0,00	4,04	20,20	46,46	29,29	**80,20%**	**0,81**
C15	Provides products that meets the quality and standards better.	0,00	2,0	18,2	57,58	22,22	**80,00%**	**0,70**
C16	Offers more reliable products.	0.00	3,03	31,31	51,52	14,14	**75,35%**	**0,73**
C17	Have a wide product range.	0.00	3,03	15,15	44,44	37,38	**83,23%**	**0,79**
C18	Provides constant product quality over time.	0.00	1,01	19,19	60,61	19,19	**79,60%**	**0,65**
C19	Has fewer variations in product quality.	0.00	14,14	26,26	49,49	10,11	**71,11%**	**0,86**
C20	Provides customer service and product support.	2,02	8,08	12,12	47,47	30,31	**79,19%**	**0,97**
C21	Provides the necessary technical information and support.	3,03	8,08	15,15	46,46	27,28	**77,37%**	**1,01**
C22	Turnaround time is good.	1,01	4,04	25,25	53,54	16,16	**75,96%**	**0,80**
C23	Meets the due dates when applicable.	1,01	6,06	21,21	56,57	15,15	**75,76%**	**0,81**
C24	Always have enough stock to adhere to my requirements.	1,01	18,18	26,26	46,46	8,09	**68,48%**	**0,92**
C25	Takes into account label registrations.	2,02	2,02	13,13	52,53	30,3	**81,41%**	**0,84**
C26	Have to correct product range to adhere to my requirements.	1,01	6,06	29,29	45,45	18,19	**74,75%**	**0,86**
C27	Have the necessary after sales support.	2,02	8,08	18,18	46,46	25,26	**76,97%**	**0,96**
C28	Has fewer delivery errors.	0,00	7,07	19,19	59,60	14,14	**76,16%**	**0,77**
C29	Deliver the correct products at the agreed prices.	0,00	3,03	11,11	65,66	20,2	**80,61%**	**0,66**
C30	Makes me feel like I am an important client.	4,04	5,05	18,18	45,45	27,28	**77,37%**	**1,01**
C31	Can improve on current product range.	1,01	2,02	49,49	36,36	11,12	**70,91%**	**0,76**
C32	Can deliver more new product registrations.	3,03	4,04	39,39	34,34	19,20	**72,53%**	**0,94**
C33	Adds value beyond selling products, spraying programs and calibrations programs.	4,04	12,12	18,18	36,36	29,30	**74,95%**	**1,13**
C34	Knows how to provide assistance in new product development.	2,02	11,11	30,30	43,43	13,14	**70,91%**	**0,93**
C35	Helps get new products into the market faster.	4,04	13,13	37,37	38,38	7,08	**66,26%**	**0,93**
C36	Have the necessary knowledge (know-how) of the product range.	0,00	1,01	19,19	53,54	26,26	**81,01%**	**0,71**
C37	The supplier/agent/distributor's margin levels is on par with the level in the sector.	3,16	8,42	41,05	40,00	7,37	**68,00%**	**0,87**
C38	Research and development inside the supplier/agent/distributor's company leads to price increases.	0,00	6,32	56,84	27,37	9,47	**68,00%**	**0,75**
C39	I receive price list on a regular basis.	13,68	22,11	14,74	35,79	13,68	**62,74%**	**1,29**
C40	I receive price increases on a regular basis.	6,32	17,89	22,11	46,32	7,36	**66,11%**	**1,05**
C41	I do receive price support and price rebates.	8,42	28,42	22,11	34,74	6,31	**60,42%**	**1,11**
C42	I have done price comparisons against other supplier/agent/distributor's.	2,11	6,32	18,95	48,42	24,20	**77,26%**	**0,93**
C43	My delivery is included in my price.	3,16	12,63	16,84	37,89	29,48	**75,58%**	**1,10**
C44	I know what percentage of the sales value goes to the supplier/agent/distributor's.	21,05	18,95	25,26	23,16	11,58	**57,05%**	**1,31**
C45	Mergers and acquisitions have an impact on the price I receive.	2,11	4,21	40,00	37,89	15,79	**72,21%**	**0,88**
C46	Mergers and acquisitions will limit my product range availability.	1,05	29,47	37,89	24,21	7,38	**61,47%**	**0,94**
C47	Mergers and acquisitions helps the flow of new products into the market.	1,05	11,58	48,42	36,84	2,11	**65,47%**	**0,74**
C48	Mergers and acquisitions impacts the quality level of the product range.	2,11	13,68	51,58	31,58	1,05	**63,16%**	**0,75**
C49	Mergers and acquisitions impacts the technical support I receive.	1,05	14,74	47,37	34,74	2,1	**64,42%**	**0,76**
C50	Mergers and acquisitions affects the personal connection that I have with the supplier/agent/distributor's.	2,11	17,89	26,32	45,26	8,42	**68,00%**	**0,95**

3.2.2.5 Mean percentage

Out of the 47 quantitative questions asked in the questionnaire mentioned above, there was only one questioned that did not get a means the percentage of above 60% (Question 44). This indicates that there are only one questions results that are dissatisfactory and that needs immediate action (this is 2.12% of the questionnaire). There are 23 questions in the

60% - 75% bracket, that is satisfactory, and that needs development to become excellent (this is 48.94% of the questionnaire). Lastly, there are 23 questions exceeding the percentage of 75%. Resultantly, they are very satisfied, and that they need to be maintained to stay on top (this is 48.94% of the questionnaire).

3.2.2.6 Standard deviation

Out of the 47 quantitative questions asked in the questionnaire mentioned above, there was only 11 questions had a standard deviation above 1 (representing 23.40% of the questionnaire), with an additional three scoring 1.01. This means that in 36 of the 47 questions, a standard deviation below one was recorded (representing 76.60% of the questionnaire). Question 44 scored the highest standard deviation of 1.31. This question is also the only question where the average percentage was lower than 60%.

Table 9: Question 45

No	Statement	Means %	Standard Deviation
C45	Mergers and acquisitions have an impact on the price I receive.	72,21%	0,88

Question 45 scored in a means percentage of 72.21% and has a standard deviation of 0.88. This question plays a vital role concerning the primary objective of the research study and would be unjustified if not noted.

3.2.2.7 Inter-item correlation matrix

The correlation coefficients between variables are presented in Table 10. Each of the cells in the table shows the correlation between the two variables. In Tables 10, 12 and 14, each of the categories has been grouped in separate correlation matrix tables and addressed individually.

Table 10: Inter-item correlation matrix - Relationship information

	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13
Q4	1,000	0,831	0,636	0,692	0,732	0,688	0,495	0,409	0,250	0,365
Q5	0,831	1,000	0,618	0,660	0,634	0,625	0,551	0,474	0,330	0,418
Q6	0,636	0,618	1,000	0,702	0,519	0,515	0,448	0,441	0,313	0,400
Q7	0,692	0,660	0,702	1,000	0,727	0,618	0,467	0,419	0,327	0,309
Q8	0,732	0,634	0,519	0,727	1,000	0,709	0,429	0,319	0,370	0,312
Q9	0,688	0,625	0,515	0,618	0,709	1,000	0,492	0,407	0,319	0,402
Q10	0,495	0,551	0,448	0,467	0,429	0,492	1,000	0,774	0,349	0,647
Q11	0,409	0,474	0,441	0,419	0,319	0,407	0,774	1,000	0,470	0,747
Q12	0,250	0,330	0,313	0,327	0,370	0,319	0,349	0,470	1,000	0,385
Q13	0,365	0,418	0,400	0,309	0,312	0,402	0,647	0,747	0,385	1,000

Table 10, is the correlation matrix table of the first category, relationship information. This category consisted of ten questions, and the analysis indicated that there are seven correlation matrix coefficients above 0.7 in the table. A correlation coefficient of above 0.7 indicates a very strong positive correlation between the two questions. The highest correlation in this category was 0.831; this very strong correlation was between question 4 and 5.

Table 11: Questions 4 and 5

No	Statement	Mean %	Standard Deviation
C4	The supplier/agent/distributor is sincere and honest.	**76,15%**	**0,81**
C5	The supplier/agent/distributor keeps his promises.	**76,54%**	**0,77**

It is evident from the analysis above that the respondents who thought that their supplier/agent or distributor was sincere and honest, also firmly believed that their supplier/agent or distributor keeps his or her promises.

Table 12: Inter-item correlation matrix - Product and service standards and quality

	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	Q33	Q34	Q35	Q36
Q14	1,000	0,788	0,712	0,631	0,632	0,167	0,518	0,537	0,507	0,497	0,350	0,494	0,540	0,510	0,380	0,321	0,524	0,025	0,231	0,458	0,546	0,466	0,639
Q15	0,788	1,000	0,743	0,534	0,713	0,407	0,557	0,666	0,550	0,575	0,446	0,488	0,456	0,500	0,476	0,485	0,550	-0,038	0,247	0,517	0,628	0,484	0,558
Q16	0,712	0,743	1,000	0,563	0,699	0,405	0,567	0,614	0,448	0,556	0,334	0,515	0,455	0,621	0,415	0,461	0,530	-0,010	0,155	0,526	0,644	0,470	0,581
Q17	0,631	0,534	0,563	1,000	0,519	0,227	0,381	0,488	0,474	0,499	0,397	0,645	0,510	0,461	0,338	0,322	0,462	0,012	0,054	0,549	0,420	0,497	0,680
Q18	0,632	0,713	0,699	0,519	1,000	0,528	0,643	0,523	0,600	0,703	0,491	0,581	0,532	0,595	0,522	0,520	0,569	0,039	0,087	0,546	0,572	0,428	0,643
Q19	0,167	0,407	0,405	0,227	0,528	1,000	0,187	0,262	0,330	0,434	0,359	0,356	0,226	0,214	0,303	0,347	0,238	-0,141	0,020	0,272	0,268	0,124	0,172
Q20	0,518	0,557	0,567	0,381	0,643	0,187	1,000	0,696	0,626	0,612	0,307	0,432	0,475	0,815	0,596	0,544	0,759	0,192	0,084	0,729	0,717	0,624	0,571
Q21	0,537	0,666	0,614	0,488	0,523	0,262	0,696	1,000	0,604	0,615	0,482	0,569	0,417	0,706	0,497	0,481	0,607	-0,015	0,098	0,672	0,689	0,674	0,541
Q22	0,507	0,550	0,448	0,474	0,600	0,330	0,626	0,604	1,000	0,755	0,567	0,359	0,457	0,653	0,556	0,497	0,680	0,170	-0,074	0,546	0,579	0,595	0,564
Q23	0,497	0,575	0,556	0,499	0,703	0,434	0,612	0,615	0,755	1,000	0,603	0,504	0,618	0,729	0,624	0,525	0,678	0,141	-0,091	0,565	0,575	0,560	0,589
Q24	0,350	0,446	0,334	0,397	0,491	0,359	0,307	0,482	0,567	0,603	1,000	0,467	0,413	0,467	0,482	0,332	0,404	0,160	0,020	0,421	0,385	0,464	0,440
Q25	0,494	0,488	0,515	0,645	0,581	0,356	0,432	0,569	0,359	0,504	0,467	1,000	0,337	0,457	0,436	0,420	0,363	-0,067	0,150	0,409	0,370	0,377	0,513
Q26	0,540	0,456	0,455	0,510	0,532	0,226	0,475	0,417	0,457	0,618	0,413	0,337	1,000	0,553	0,556	0,389	0,500	0,028	0,066	0,559	0,396	0,382	0,625
Q27	0,510	0,500	0,621	0,461	0,595	0,214	0,815	0,706	0,653	0,729	0,467	0,457	0,553	1,000	0,570	0,456	0,843	0,165	0,061	0,735	0,653	0,633	0,583
Q28	0,380	0,476	0,415	0,338	0,522	0,303	0,596	0,497	0,556	0,624	0,482	0,436	0,556	0,570	1,000	0,677	0,590	0,064	0,112	0,558	0,450	0,357	0,548
Q29	0,321	0,485	0,461	0,322	0,520	0,347	0,544	0,481	0,497	0,525	0,332	0,420	0,389	0,456	0,677	1,000	0,496	-0,089	0,084	0,462	0,388	0,332	0,478
Q30	0,524	0,550	0,530	0,462	0,569	0,238	0,759	0,607	0,680	0,678	0,404	0,363	0,500	0,843	0,590	0,496	1,000	0,119	0,055	0,806	0,612	0,631	0,556
Q31	0,025	-0,038	-0,010	0,012	0,039	-0,141	0,192	-0,015	0,170	0,141	0,160	-0,067	0,028	0,165	0,064	-0,089	0,119	1,000	-0,572	0,064	0,021	0,143	0,147
Q32	0,231	0,247	0,155	0,054	0,087	0,020	0,084	0,098	-0,074	-0,091	0,020	0,150	0,066	0,061	0,112	0,084	0,055	-0,572	1,000	0,073	0,154	0,100	0,029
Q33	0,458	0,517	0,526	0,549	0,546	0,272	0,729	0,672	0,546	0,565	0,421	0,409	0,559	0,735	0,558	0,462	0,806	0,064	0,073	1,000	0,698	0,667	0,658
Q34	0,546	0,628	0,644	0,420	0,572	0,268	0,717	0,689	0,579	0,575	0,385	0,370	0,396	0,653	0,450	0,388	0,612	0,021	0,154	0,698	1,000	0,708	0,581
Q35	0,466	0,484	0,470	0,497	0,428	0,124	0,624	0,674	0,595	0,560	0,464	0,377	0,382	0,633	0,357	0,332	0,631	0,143	0,100	0,667	0,708	1,000	0,487
Q36	0,639	0,558	0,581	0,680	0,643	0,172	0,571	0,541	0,564	0,589	0,440	0,513	0,625	0,583	0,548	0,478	0,556	0,147	0,029	0,658	0,581	0,487	1,000

Table 12, is the correlation matrix table of the first category, product and service standards and quality. This category consisted of 23 questions, and the analysis indicated that there are 15 correlation matrix coefficients above 0.7 in the table. A correlation coefficient of above 0.7 indicates a very strong positive correlation between the two questions. The highest correlation in this category was 0.843; this very strong correlation was between question 27 and 30.

Table 13: Question 27 and 30

No	Statement	Mean %	Standard Deviation
C27	Have the necessary after sales support.	76,97%	0,96
C30	Makes me feel like I am an important client.	77,37%	1,01

With the above analysis drawn, it is evident that the respondents who thought that their supplier/agent or distributor gives them the necessary after-sales support, also firmly believed that their supplier/agent or distributor makes them feel like an important client.

Table 14: Inter-item correlation matrix - Price, mergers and acquisitions

	Q37	Q38	Q39	Q40	Q41	Q42	Q43	Q44	Q45	Q46	Q47	Q48	Q49	Q50
Q37	1,000	0,046	0,282	0,098	0,223	0,055	0,216	0,286	-0,073	-0,181	0,260	0,246	0,155	-0,157
Q38	0,046	1,000	-0,079	0,073	-0,049	0,202	-0,008	-0,015	0,061	0,155	0,069	0,038	0,217	0,132
Q39	0,282	-0,079	1,000	0,524	0,539	0,016	0,253	0,532	0,150	0,035	0,139	0,252	0,153	0,180
Q40	0,098	0,073	0,524	1,000	0,322	-0,011	0,269	0,395	0,245	0,052	0,138	0,168	0,181	0,196
Q41	0,223	-0,049	0,539	0,322	1,000	0,013	0,082	0,374	0,161	0,152	0,110	0,098	0,083	0,133
Q42	0,055	0,202	0,016	-0,011	0,013	1,000	0,115	-0,147	0,168	-0,062	0,164	0,215	-0,017	0,087
Q43	0,216	-0,008	0,253	0,269	0,082	0,115	1,000	0,249	0,141	-0,087	0,272	0,056	-0,055	0,146
Q44	0,286	-0,015	0,532	0,395	0,374	-0,147	0,249	1,000	0,309	0,130	0,108	0,251	0,278	0,218
Q45	-0,073	0,061	0,150	0,245	0,161	0,168	0,141	0,309	1,000	0,320	-0,014	0,240	-0,045	0,303
Q46	-0,181	0,155	0,035	0,052	0,152	-0,062	-0,087	0,130	0,320	1,000	-0,446	0,089	0,261	0,349
Q47	0,260	0,069	0,139	0,138	0,110	0,164	0,272	0,108	-0,014	-0,446	1,000	0,384	0,081	-0,037
Q48	0,246	0,038	0,252	0,168	0,098	0,215	0,056	0,251	0,240	0,089	0,384	1,000	0,499	0,225
Q49	0,155	0,217	0,153	0,181	0,083	-0,017	-0,055	0,278	-0,045	0,261	0,081	0,499	1,000	0,436
Q50	-0,157	0,132	0,180	0,196	0,133	0,087	0,146	0,218	0,303	0,349	-0,037	0,225	0,436	1,000

Table 14, is the correlation matrix table of the first category, price, mergers and acquisitions. This category consisted of 14 questions, and the analysis indicated that there are three correlation matrix coefficients above 0.5 or -0.5 in the table. A correlation coefficient of above 0.5 or -0.5 is still regarded to be a strong correlation between the two questions. The highest correlation in this category was 0.539; this strong correlation was between questions 39 and 41.

Table 15: Questions 39 and 41

No	Statement	Mean %	Standard Deviation
C39	I receive price list on a regular basis.	62,74%	1,29
C41	I do receive price support and price rebates.	60,42%	1,11

With the above analysis drawn, it is clear that the respondents who receive their price lists regularly, also believe that they receive price support and price rebates.
Table 16, below indicates a negative correlation.

Table 16: Questions 46 and 47

No	Statement	Mean %	Standard Deviation
C46	Mergers and acquisitions will limit my product range availability.	61,47%	0,94
C47	Mergers and acquisitions helps the flow of new products into the market.	65,47%	0,74

It is noteworthy that the highest negative correlation exists between questions 46 and 47 (r= -0.446), indicating that the same respondents who thought that mergers and acquisitions would limit their products range availability, also believed that mergers and acquisitions would help the flow of new products into the market.

3.2.2.8 Group statistics and independent sample testing

Table 17: Group statistics

		Mean	Std. Deviation	Std. Error Mean	Sig. (2-tailed)	Effect size
Relationship Information	Farmers	3,6493	0,66377	0,07769	0.053	0,41
	Suppliers & Agent/Representative	3,9194	0,62526	0,11230		
Product and service standards and quality	Farmer	3,6982	0,57723	0,06949	0.126	0,34
	Suppliers & Agent/Representative	3,8928	0,57121	0,10429		
Price, mergers and acquisitions	Farmer	3,2088	0,41155	0,05105	0.001	0,79
	Suppliers & Agent/Representative	3,5643	0,44837	0,08186		

With Table 17 above, we can indicate the p-values (Sig. 2-tailed), I did not have a random sample, and do not need to interpret the p-values, but have included this section for completeness sake. Since the results from suppliers and agents/representative are small

compared to farmers, I have combined the suppliers and agents/representative for this analysis.

The interpretation of practical significant differences will be based on Cohen's effect size (where $0 \leq d \leq 1$). The cut-off values are interpreted holistically. This means that, for example, a d-value of 0.48 is considered to be a medium practical visible difference since it strives towards 0.5. (A strong practical difference would be 0.70 and above) (Field, 2013:784). From the table mentioned above, it is evident that *Category 1: Relationship information* strives towards a medium practical difference (d=0.41), and that *Category 3: Price, mergers and acquisitions* has a strong practical difference (d=0.79). This means that the farmers (when considering the mean values of each respondent group) were more unsure regarding the statements in these categories than the response group consisting of suppliers and agents/representative who leaned more towards agreeing with the statements investigated.

3.2.2.9 Factor analysis

As per Chapter 1, the KMO measure of sampling adequacy and the Bartlett test of sphericity was used to determine the adequacy of the sample and the suitability of employing factor analysis (Mutambara *et al.*, 2015).

Table 18: Sample adequacy and sphericity

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		**.812**
Bartlett's Test of Sphericity	Approx. Chi-Square	3858.499
	df	1081
	Sig.	**.000**

The KMO value is 0.812. This is significant because the KMO determines statistically that the sample is adequate. A KMO value above 0.7 indicates that an adequate sample exists. The results from Bartlett's test of sphericity [$X^2(1081) = 3858.499$, $p \leq 0.05$] (Field, 2013:671) show that multicollinearity should not be a problem because there are no undesirable clusters in the data. This means that the relationships between the variables are normal and the data is suitable for further analysis.

Table 19: Factor analysis – Total variance explained

Component	Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %
1	6.518	**13.868**	13.868
2	6.503	**13.836**	27.704
3	3.778	**8.037**	35.741
4	3.517	**7.484**	43.225
5	2.922	**6.217**	49.442
6	2.686	**5.714**	55.156
7	2.303	**4.901**	60.057
8	2.187	**4.653**	64.710
9	2.172	**4.622**	69.332
10	1.667	**3.547**	72.880
11	1.528	**3.251**	**76.131**

In Table 19 mentioned above, it is evident that the exploratory factor analysis (Varimax rotation) identified 11 factors. (Varimax is an orthogonal rotation method that attempts to maximize the dispersion of factor loadings by loading a smaller factor resulting in more interpretable cluster factors) (Field, 2013:672). The factors cumulatively explain 76.131% of the variance; this is good because it is higher than the desired 60%percentage of variance explained. The data is, therefore, deemed to be “good fit” (Field, 2013:673).

Table 20: Factor analysis – Rotated component matrix

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Helps get new products into the market faster.	.759										
Turnaround time is good.	.746										
Always have enough stock to adhere to my requirements.	.679										
Meets the due dates when applicable.	.634										
Have the necessary after-sales support.	.624										
Makes me feel like I am an important client.	.619										
Adds value beyond selling products, spraying programs and calibrations programs.	.602										
Knows how to provide assistance in new product development.	.570										
Provides the necessary technical information and support.	.566										
Provides customer service and product support.	.506										
Have the necessary knowledge (know-how) of the product range.	.501										

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
The information the supplier/agent/distributor gives me is reliable.		.833									
The supplier/agent/distributor is sincere and honest.		.823									
The supplier/agent/distributor is concerned about me and my interests.		.798									
The supplier/agent/distributor is an expert in the product range being sold.		.738									
The supplier/agent/distributor keeps his promises.		.714									
The supplier/agent/distributor informs me of any problems which might affect me.		.615									
Has fewer variations in product quality.		.504									
The supplier/agent/distributor's margin levels is on par with the level in the sector.		.410									
Provides higher quality products.			.739								
Provides products that meets the quality and standards better.			.632								
Have a wide product range.			.577								
Offers more reliable products.			.555								
My delivery is included in my price.			.525								
Takes into account label registrations.			.496								
Provides constant product quality over time.			.436								

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
I am very faithful to the supplier/agent/distributor.				.804							
I try and maintain a long-term relationship with the supplier/agent/distributor.				.769							
I am very committed to the relationship with my supplier/agent/distributor.				.731							
I try only using one supplier/agent/distributor.				.543							
I receive price increases on a regular basis.					.759						
I receive price list on a regular basis.					.717						
I do receive price support and price rebates.					.669						
Mergers and acquisitions have an impact on the price I receive.						.808					
Can deliver more new product registrations.						.769					
Can improve on current product range.						.760					
I have done price comparisons against other supplier/agent/distributor's.						.419					
Mergers and acquisitions impacts the technical support I receive.							.840				
Mergers and acquisitions impacts the quality level of the product range.							.760				
Mergers and acquisitions affects the personal connection that I have with the supplier/agent/distributor's.							.579				

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Mergers and acquisitions helps the flow of new products into the market.								.834			
Mergers and acquisitions will limit my product range availablity.								-.664			
Deliver the correct products at the agreed prices.									.663		
Has fewer delivery errors.									.636		
Research and development inside the supplier/agent/distributor's company leads to price increases.										.793	
I know what percentage of the sales value goes to the supplier/agent/distributor's.											.594
Have the correct product range to adhere to my requirements.											.471

Table 20 shows that all 47 statements loaded onto 11 factors. None of the statements was loading strongly on more than one factor simultaneously. All have factor loadings exceeding the required 0.40 minimum loading specified for this study and considered to be significant and are used in the analysis (Mutambara *et al.*, 2015).

- **Factor 1 (Key selling points):** a total of 11 statements, namely 20, 21, 22, 23, 24, 27, 30, 33, 34, 35 and 36 loaded on factor 1. These factors all can identify with using the main selling points to your advantage. All of the statements have achieved a factor loading of above 0.4, with seven of the eleven scoring above 0.5. Factor 1 is the most important factor and explains a variance of 13.868%.

- **Factor 2 (General satisfaction form supplier/agent/distributor):** a total of eight statements, namely 4, 5, 6, 7, 8, 9, 19 and 37 loaded on factor 2. This factor lies emphasis on the importance of client satisfaction for any supplier/agent and distributor. All of the statements achieved a factor loading higher than 0.4, with seven

out of the eight scoring above 0.5. In close second place, factor 2 had a variance of 13.836%, making it almost just as important as factor 1.

- **Factor 3 (Product specifications):** a total of seven statements, namely 14, 15, 16, 17, 18, 25 and 43 loaded on factor 3. All of the statements have achieved a factor loading of above 0.4, with five out of the seven scoring above 0.5. The factor explains 8.037% of the variance.

- **Factor 4 (Relationship satisfaction):** a total of four statements, namely 10, 11, 12 and 13 loaded on factor 4. All of the factors have achieved a loading factor of above 0.4, with all four scoring above 0.5 and three scoring above 0.7. Factor 4 explains 7.484% of the variance.

- **Factor 5 (Price specifications):** a total of three statements, namely 39, 40 and 41 loaded on factor 5. The statements all consider the price as the main theme. All of the statements have achieved a factor loading of above 0.4, with all three scoring above 0.6. The factor explains 6.217% of the variance.

- **Factor 6 (Product improvements):** a total of four statements, namely 31, 32, 42 and 45 loaded on factor 6. All of the statements have achieved a factor loading of above 0.4, with three out of the four scoring above 0.7. The factor explains 5.714% of the variance.

- **Factor 7 (After merger and acquisition satisfaction):** a total of three statements, namely 48, 49 and 50 loaded on factor 7. This factor takes into account the satisfaction after the merger and acquisition took place. All of the statements have achieved a factor loading of above 0.5. Factor 7 considers 4.901 of the variances.

- **Factor 8 (After merger and acquisition products):** a total of two statements, namely 46 and 47 loaded on factor 8. All of the statements have achieved a factor loading of above 0.6. The factor explains 4.653% of the variance.

- **Factor 9 (Delivery):** a total of two statements, namely 28 and 29, loaded on factor 9. All of the statements have achieved a factor loading of above 0.6. Factor 9 explains 4.622% of the variance.

- **Factor 10 (Research and development):** only one statement, namely 38 loaded on factor 10. The statement has achieved a factor loading of above 0.7. Factor 10 is the second-least important and explains 3.547% of the variance.

- **Factor 11 (Sales Requirement):** a total of two statements, namely 11 and 44 loaded on factor 11. Both the statements have achieved a factor loading of above 0.4. The variance explained accounts for 3.251%.

The 11 factors together accumulate to 76.131%, which is above the standard norm of 60%.

3.3 SUMMARY

This chapter focused on the research methodology of the study and the empirical analysis of the results obtained from the questionnaires. It involved testing the reliability of the data by determining the Cronbach alpha coefficient, measuring the sample adequacy by using the KMO method, validation of the questionnaires using Bartlett's test of sphericity. The means, standard deviation and significant 2-tailed correlations were used in the analyses.

Chapter 4 concludes this study and provides more insights by giving a detailed conclusion, accurate recommendations and areas for future research opportunities.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

4 INTRODUCTION

Chapter 4 is the last chapter in this research study; it reaches different conclusions from the research results obtained in Chapter 3 and the theoretical literature study presented in chapter 2. This chapter also makes appropriate recommendations based on the conclusions reached. This chapter ultimately ends off by stating limitations occurred during this study, and suitable recommendations for future research.

4.1 CONCLUSIONS

The following conclusions can be made with regards to the reliability of the questionnaire and the validity of the data. The conclusions are discussed in relation to the primary and secondary objectives.

4.1.1 Conclusion 1 - Validity and reliability

According to Mutambara *et al.* (2015), the KMO measure of sampling adequacy and the Bartlett test of sphericity has proved to be a suitable measure to determine the adequacy of the sample and the suitability of employing factor analysis. The KMO value is 0.812. this is significant, and it statistically determines that the sample is adequate and above the recommended 0.7 value. The Bartlett's test of sphericity returned a value of.000, determining that the strengths of the relationship among variables is excellent, as the value should be below 0.05. With this in mind, the data was regarded as adequate for analysis, and specifically for exploratory factor analysis.

4.1.2 Conclusion 2 – Factor loadings

Factor analysis was used to determine the factors, and loading margin was set for this study. The factor loading was overall high, and thus very satisfactory. All of the statements have achieved a factor loading higher than 0.4.

4.1.3 Conclusion 3 – Cronbach's Alpha (α)

The Cronbach's alpha (α) coefficient was used to determine the reliability of the data. With all three of the categories scoring a coefficient of above 0.7 and two out of the three scorings are above 0.9. It is safe to assume that the data, as mentioned above, is appropriate and seen as reliable.

A Cronbach's alpha coefficient of 0.70 and higher is regarded as appropriate and reliable (Pallant, 2016:23).

- **Category 1** – The relationship information category scoring a Cronbach alpha coefficient of 0.90.
- **Category 2** – The product and service standards and quality category are scoring a Cronbach alpha coefficient of 0.95.
- **Category 3** – The price, mergers and acquisition category scoring a Cronbach alpha coefficient of 0.72.

It can, therefore, be concluded that the overall data is reliable, and safe to use in this research study.

4.1.4 Conclusion 4 – Secondary objective 3 & 5

When looking at research Objectives 3 and 5, respectively:

- *Determine if the existing clients of both the companies have access to the newly formed product range.*
- *Establish if the majority of the same level of product quality and standards are adhered to.*

The results obtained in Section 3.2.2.2 from question 17 can be used to motivate why the first secondary question is acceptable, as the mean of question 17 in Section 3.2.2.2 is calculated at 4.16 (highest) out of a possible 5. This indicates that 83.2% of respondents indicated that they believe they will have access to the newly formed product range.

The results obtained from question 18 can be used to motivate why the second secondary question is acceptable, as the standard deviation of question 18 is calculated to be 0.65 (lowest). This indicates that the date from the question is the least scattered and that most

of the people have answered this question in the same manner. Hence, we can believe that the quality and standard will remain the same over a period of time.

4.1.5 Conclusion 5 – Secondary objective 4, 6 & 8

Table 6 in Section 3.2.2.3 indicates the highest and lowest mean and standard deviation statistics for questions relating to the primary and secondary research objectives.

When looking at research Objectives 4, 6 and 8 namely;

- *Examine if the existing clients of both the companies have access to the same level of technical support offered by the post-merger company.*
- *Investigate if the product and service prices changed as a result of the mergers and/or acquisition.*
- *Determine if there are adequate stock levels for customers to exercise choice in buying their products after the merger and/or acquisition.*

The results obtained from Section 3.2.2.3 question 49 can be used to motivate why the fourth secondary question is acceptable, as the mean of question 49 is calculated at 3.22 out of a possible 5. This indicates that 36.84% of respondents indicated that they believe they will have access to the same level of technical support they have had pre-merger. Some 47.37% of respondents do not know what to expect when it comes to this question and has answered not sure as a response.

The results obtained from Section 3.2.2.3, question 17, 46 and 47 can be used to motivate why the last secondary question is acceptable, as the mean of question 17, 46 and 47 is calculated at 4.16, 3.07 and 3.27 individually. This indicates that 81.82% believes that they will have access to a wider product range as per question 17. Question 46 as per this section clearly indicates that 31.59% of the respondents think that they will only have a limited product range if a merger and acquisition get completed. 38.95% of respondents indicated that they believe they mergers and acquisitions will help with the flow of new products into the market as per question 47.

4.1.6 Conclusion 6 – Primary objective

From the results obtained in Section 3.2.2.3, out of question 42 and 45, it is evident that:

- Farmer (end-users), do make price comparisons in the market, with 72.62% of the respondents either agreeing or strongly agreeing with the statement made in question 42. It also has a strong mean at 3.86 and a standard deviation below one at 0.93, indicating that most of the people have answered the question in the same manner. It is noteworthy that only 8.43% of the respondents do not agree with the statement made in question 42.
- Farmer (end-users) believe that mergers and acquisitions ultimately have an impact on the end price they will receive, with 53.68% of the respondents either agreeing or strongly agreeing with the statement made in question 45. It also has a strong mean at 3.61, a bit lower than question 42, but still above 3, and a standard deviation below one at 0.88 with is lower that question 42, indicating that most of the people have answered the question in the same manner. Also, some 40% of the respondent currently does not know if mergers and acquisitions will impact prices, but it can improve 53.68% in the near future. It is noteworthy that a very low 6.32% of the respondents do not agree with the statement made in question 45.

4.2 RECOMMENDATIONS

The following recommendation corresponds to the conclusions made above. Hence the reason is that the same number is used for matching recommendations and conclusions. This means that *Recommendation 1* then relates to *Conclusion 1*, and so forth.

4.2.1 Recommendation 1, 2 & 3

From conclusion 1, 2 & 3 it is recommended that the questionnaire can be used to obtain the data needed to make adequate recommendations with regards to the effect of mergers and acquisitions in the agricultural supply sector in South Africa. The questionnaire is indeed reliable and will return valid data if the sample size is adequate. Recommended sample sizes of 110 upwards are recommended. It is also recommended that the sample size adequacy is determined by the KMO test and that Bartlett's test of sphericity is used to determine if the date is suitable for factor analysis. Lastly is recommended to use factor

analysis to assess the validity of the research questionnaire and the Cronbach's alpha (α) coefficient to measure the reliability of the data at hand.

It is also recommended that the data be analysed by a professional statistical software programme like (IBM SPSS) before the researcher analysis the data.

4.2.2 Recommendation 4 – Secondary objective 3 & 5

When looking at the conclusion to the secondary objective 3 & 5, it is evident that most of the farmers, suppliers, agents and distributors will have access to the newly formed company's product range and that the product quality and standards will be adhered to, it is, however, vital to make the necessary arrangements, and make sure the following is in place:

- Make sure that there is a secure and stable secondary supplier in place that can accommodate your current product range.
- Make sure they have adequate stock levels, and that they are priced in range.
- Insist on regular testing to be done on the products. By doing so, they can assure that the necessary quality and standards are met.
- Make sure that the correct accreditation and registrations are in place with regards to the product and newly form formulations.

4.2.3 Recommendation 5 – Secondary objective 4, 6 & 8

When looking at the conclusion to the secondary objective 4, 6 & 8, it is evident that most of the farmers, suppliers, agents and distributors will have access to the same level of technical support and that they will have ample levels of stock to choose from. It is, however, true that some prices may change as a result of mergers and acquisitions, but not all products will be affected. When dealing with these situations, one must:

- Make sure that adequate stock levels are maintained at all times.
- Stock systems must be put in place to determine when new stock needs to be bought.
- Make sure that the technical advisor knows you need his assistance.
- Involve your technical assistant, so that he is familiar with your surroundings.
- Make sure that he has the necessary qualifications to make specific recommendations.

- Keep an accurate record of pricing, insist on monthly price lists.
- Ask for an adequate explanation on the increase and decrease, for better understanding.
- Monitor the service that you receive, as this will have an impact on the price you pay for the product.

4.2.4 Recommendation 6 – Primary objective

When looking at the conclusion to the primary objective, it is evident that most of the farmers, suppliers, agents and distributors believe that mergers and acquisitions will have a price effect on the products. This price increases may be directly linked to the mergers and acquisitions, or indirectly. This is not the ideal situation, but measures can be initiated to limit the level of price fluctuation:

- Make sure that the competition commission knows of the intended merger and acquisition, and bring pricing complications to their attention.
- Offset, or play different agricultural chemical companies against each other, so that you get the best prices to work with.
- Unity in numbers, if you can't bargain for better prices as an individual, start a buying group in the community and get all the small role-players involved, soon you will become the majority.
- Buy bulk and in volume, argue for settlement deals and negotiate for better payment terms, this will all ease the burden of price increases.
- Don't settle for the first deal, always renegotiate, and if they can budge on price, make the throw in something else to seal the deal. Transport is an excellent example.

4.3 LIMITATIONS

The following limitations have been identified as possible limitations regarding both the literature review in Chapter 2 and the empirical data in Chapter 3.

- When it came to the literature study and the compiling of accountable sources, it was difficult to obtain good and reliable sources. There seemed to be a limited number of

relevant studies to use. Specifically, those studies looking into the effect that mergers and acquisitions had in South Africa's agriculture.

- Because there are little to none prior research on this topic, I had to make use of individuals in the crop protection industries knowledge and experience for completeness sake.
- With regards to the questionnaire and the collecting of data, Covid-19 made it difficult with the restrictions implemented during this timeframe. This forced the researcher to make use of emailed responses, and this can limit the number of results received back.
- Time and budgetary constraints also played a vital role in the completion of this study.
- A specifically targeted population was chosen to complete the questionnaire; hence this is not a complete spectrum result. Some geographical regions also contributed more than others.
- The questionnaire was also sent out via email, and in English, this made it challenging to access local farmers that do not have access to email, or that does not understand English.

4.4 SUGGESTIONS FOR FUTURE RESEARCH

The following suggestions are made towards future research studies:

- Expanding this study to include not only the crop protection chemicals and seed data, but to look at the whole agricultural sector, which may also include fertilisers, crop protection, seed and machinery.
- Expansion of this study to not only include South Africa, but to have a look at the effect mergers and acquisitions have on Africa as a continent, or on the world.
- Refine the results, and make the data more accurate. Here, using a larger population may be useful.
- A study that ultimately focuses on the effect that mergers and acquisitions have on the end-user, namely the farmer. Such a future study can investigate the impact that merger and acquisitions have on the sales representatives, agents and suppliers.

- An investigation into the main drivers that leads to the decision by agricultural companies to acquire or merge with other companies could also be fascinating.

4.5 SUMMARY

Chapter 1 contained a brief introduction of the agricultural supply sector and the leading agricultural suppliers in the industry. The problem statement, the research questions an overview of the primary and secondary objectives of the study was presented. It also elaborated on the structure of the rest of the study, and described the research methodology followed.

Chapter 2 presented the literature study. This chapter provided a comprehensive literature study on agricultural products, buying behaviour and the supply of products to farmers.

Chapter 3 presented the research methodology, as well as the analysis of the empirical study on agricultural mergers and its effect on farmers are conducted. The validity of the questionnaire, the reliability of the data, and the importance of different effects mergers have on farmers are determined.

Chapter 4, which is the final chapter of the study, provides various conclusions and recommendations based on the theoretical analysis in Chapter 2 and the empirical study in Chapter 3. This chapter also presents a final comprehensive summary of the study, and concludes with potential areas for future research.

LIST OF REFERENCES

Agrawal, R. 2019. *UPL Q4 earnings: Operational metrics sound, takeover cost dents profit*. https://www.moneycontrol.com/news/business/moneycontrol-research/upl-q4-earnings-operational-metrics-sound-takeover-cost-dents-profitability-3994061.html Date of access: 1 Sep. 2020.

Alpha, S. 2016. *The DowDuPont agricultural company: A new Ag giant in the making.* https://seekingalpha.com/article/3902056-dowdupont-agricultural-company-new-ag-giant-in-making Date of access: 23 Oct. 2020.

Asvat, R. 2019. *Developing a model to measure business performance for private business schools.* (Thesis - PhD). Potchefstroom: North-West University.

BASF. 2018. *BASF signs agreement to acquire significant parts of Bayer's seed and non-selective herbicide businesses*. Ludwigshafen: BASF.

BASF. 2020. *Welcome to BASF agricultural solutions South Africa.* https://www.agro.basf.co.za/en/ Date of access: 24 Oct. 2020.

Bayer. 2019. *About Bayer in Africa*. https://www.bayer.co.za/en/about-bayer/bayer-in-southern-africa/ Date of access: 23 Oct. 2020.

Biodiversity, A.C.F. 2017a. *African Centre for Biodiversity submission to the South African Competition Commission on Bayer-Monsanto merger*. Johannesburg: African Centre For Biodiversity.

Biodiversity, A.C.F. 2017b. *The Bayer-Monsanto merger: Implications for South Africa's agricultural future and its smallholder farmers.* Johannesburg: African Centre For Biodiversity.

Biodiversity, A.C.F. 2017c. *The three agricultural input mega-mergers: Grim reapers of South Africa's food and farming systems.* Johannesburg: African Centre For Biodiversity.

Bisschoff, C. & Lotriet, R. 2009. Die dienskwaliteit van die PUK rugby instituut. *Tydskrif vir Geesteswetenskappe*, 49(2):266-286.

Bomgardner, M.M. 2016. Monsanto rejects $62 billion takeover bid by Bayer. *Global Enterprize*, 94(22):12.

Brown, J.C. 2016. *Current major agricultural-chemicals mergers under review*. https://slideplayer.com/slide/10288275/ Date of access: 1 Sep. 2020.

Bryant, H., Maisashvili, A., Outlaw, J. & Richardson, J. 2016. *Effects of proposed mergers and acquisitions among biotechnology firms on seed prices.* http://www.afpc.tamu.edu/pubs/0/675/WP_16-2.pdf Date of access: 9 Jan. 2020.

Bunge, J. 2019. *Corteva debut caps years of seed company consolidation.* https://www.wsj.com/articles/corteva-debut-caps-years-of-seed-company-consolidation-11559554201 Date of access: 13 Oct. 2020.

CHEManager. 2013. *Agrochemical's role in creating world peace.* https://www.chemanager-online.com/en/topics/chemicals-distribution/agrochemicals-role-creating-world-peace Date of access: 25 Oct. 2020.

Choi, M. 2017. *Farmers fear price increases as Bayer, Monsanto push for merger.* https://theeagle.com/townnews/commerce/farmers-fear-price-increases-as-bayer-monsanto-push-for-merger/article_9d4c61ac-d4bd-11e7-9af5-bb7b704dc740.html Date of access: 14 Nov. 2020.

Clapp, J. 2017. *Bigger is not always better: The drivers and implications of the recent agribusiness megamergers*. University of Waterloo: Waterloo.

Clapp, J. 2018. Mega-mergers on the menu: corporate concentration and the politics of sustainability in the global food system. *Global Environmental Politics*, 18(2):12-33.

Clapp, J., Hunt, C. & Hayes, C. 2016. *Bigger isn't always better: what the proposed agribusiness mega mergers could mean for Canada.* https://foodsecurecanada.org/resources-news/news-media/big-6-agribusiness-mega-mergers-canada Date of access: 23 Oct. 2020.

Copping, L.G. 2016. Syngenta and Chemchina. *Outlook on Pest Management*, 27(2):95.

Corporation, F. 2015. *FMC corporation completes acquisition of Cheminova A/S.* https://www.prnewswire.com/news-releases/fmc-corporation-completes-acquisition-of-cheminova-as-300069188.html Date of access: 14 Oct. 2020.

CropLife, S.A. 2020. *Croplife: Who we are.* https://croplife.co.za/ Date of access: 16 Sep. 2020.

Daniels, J. 2018. *Germany's Bayer closes $63 billion Monsanto takeover, plans to drop US company's name*. https://www.cnbc.com/2018/06/07/germanys-bayer-closes-monsanto-deal-plans-to-drop-us-companys-name.html Date of access: 17 Sep. 2020.

DiStefano, J.N. 2019. *DowDuPont is heading for a historic split. Early results have been poor. Will these massive spin-offs work?* https://www.inquirer.com/business/dupont-dow-merger-edward-breen-stock-hedge-fund-robber-barons-20190526.html Date of access: 16 Sep. 2020.

DuPont. 2017. *DuPont completes acquisition of Cheminova*. https://www.prnewswire.com/news-releases/fmc-corporation-completes-acquisition-of-cheminova-as-300069188.html. https://corporate.dow.com/en-us/news/press-releases/dupont-agreement-fmc.html Date of access: 15 Sep. 2020.

DW. 2020a. *Bayer Roundup settlement: $11 billion deal at risk of collapse.* https://www.dw.com/en/bayer-roundup-settlement/a-54722670 Date of access: 03 Jul. 2020.

DW. 2020b. *Will Bayer Roundup settlement end its Monsanto nightmare?* https://www.dw.com/en/will-bayer-roundup-settlement-end-its-monsanto-nightmare/a-53938735 Date of access: 14 Sep. 2020.

Express, K. 2019. Suider Paarl koöperasie nou deel van Die Koöperasie-groep. *Kouga Express,* 13 Jun. 2019. https://www.netwerk24.com/ZA/Kouga-Express?p=173 Date of access: 10 Nov. 2020.

Fickling, D. 2020. China's Chemicals Mega-Merger May Have Come Too Late. https://www.bloomberg.com/opinion/articles/2020-09-07/chemchina-sinochem-merger-could-now-face-sanctions-hurdle Date of access: 15 Sep. 2020.

Field, A. 2013. Discovering statistics using IBM SPSS statistics. London: Sage.

Fuglie, K.O., King, J.L., Heisey, P.W. & Schimmelpfennig, D.E. 2012. Rising concentration in agricultural input industries influences new farm technologies. *AgEcon Research*, Online. Doi: 10.22004/ag.econ.142404

George, V. 2017. *DuPont in asset deal with FMC, delays close of Dow merger.* https://www.reuters.com/article/us-du-pont-m-a-dow-fmc/dupont-in-asset-deal-with-fmc-delays-close-of-dow-merger-idUSKBN1721AS Date of access: 10 Oct. 2020.

Green, A. & Willingham, Z. 2019. *A fair deal for farmers.* https://www.americanprogress.org/issues/economy/reports/2019/05/07/469385/fair-deal-farmers/ Date of access: 12 Nov. 2020.

Griffiths, C. 2019. *Year after merger, BASF has big plans.* https://www.agprofessional.com/article/year-after-merger-basf-has-big-plans Date of access: 17 Sep. 2020.

Gullickson, G. 2017. *In a down agricultural economy, firms look to mergers and acquisitions to gain efficiencies.* https://www.agriculture.com/news/business/10-mergers-and-acquisitions-for-2017 Date of access: 22 Aug. 2020.

Gullickson, G. 2019a. *What BASF bought does Bayer.* https://www.agriculture.com/news/crops/what-basf-bought-from-bayer Date of access: 16 Sep. 2020.

Gullickson, G. 2019b. *What Corteva Agriscience's CEO sys farmers can expect from the new firm*. https://www.agriculture.com/news/business/what-corteva-agriscience-s-ceo-says-farmers-can-expect-from-the-new-firm Date of access: 16 Oct. 2020.

Howard, P.H. 2015. Intellectual property and consolidation in the seed industry. *Crop Science*, 55(6):2489-2495.

IMB SPSS. 2020. *IBM Statistical Package for Social Sciences*. Version 26. Seattle, WA: IBM.

Joubert, H. 2020. *Measuring the brand loyalty of customers towards online booking platforms.* (Dissertation - MBA). Potchefstroom: North-West University.

Koeleman, E. 2019. *Merger wave: Effect on crop seed prices.* https://www.allaboutfeed.net/Raw-Materials/Articles/2019/1/Merger-wave-Effect-on-crop-seed-prices-380255E/ Date of access: 14 Oct. 2020.

Kumar, B.R. 2019. *Bayer's acquisition of Monsanto. Wealth creation in the world's largest mergers and acquisitions: Integrated case studies.* Champaigne, IL: Springer International.

Leclerc, M. 2019. *Corteva spinoff an unfamiliar gem for DowDuPont shareholders.* https://www.forbes.com/sites/greatspeculations/2019/06/28/corteva-spinoff-an-unfamiliar-gem-for-dowdupont-shareholders/#475590296ef9 Date of access: 17 Sep. 2020.

Limited, U. 2019. *UPL completes the acquisition of Arysta LifeScience.* https://www.prnewswire.com/news-releases/upl-completes-the-acquisition-of-arysta-lifescience-300788116.html Date of access: 14 Oct. 2020.

MacDonald, J.M. 2017. Mergers and competition in seed and agricultural chemical markets. *Economic Research Service*, 4:1-10, April.

MacDonald, J.M. 2019. Mergers in seeds and agricultural chemicals: What happened? The Economics of food, farming, natural resources, and rural America. *Economic Research Service*, 2:1-7, February.

Mangan, D. 2018. *US forces Germany's Bayer to shed $9 billion in ag business in biggest ever antitrust sell-off.* https://www.cnbc.com/2018/05/29/bayer-will-sell-basf-9-billion-in-assets-to-allow-monsanto-purchase.html Date of access: 14 Sep. 2020.

Markets, E. 2018. *UPL acquires Arysta LifeScience in $4.2 billion cash deal.* https://economictimes.indiatimes.com/markets/stocks/news/upl-acquires-arysta-lifescience-in-4-2-billion-cash-deal/articleshow/65073004.cms Date of access: 14 Oct. 2020.

Mcloud, S. 2019. *What does effect size tell you?* https://www.simplypsychology.org/effect-size.html Date of access: 09 Dec 2020.

Modena, C. 2017. *The situation is critical: Reflections on the agrifood atlas.* https://www.slowfood.com/situation-critical-reflections-agrifood-atlas/ Date of access: 25 Oct. 2020.

Morgan, G.A., Barrett, K.C., Leech, N.L. & Gloeckner, G.W. 2019. I*BM SPSS for introductory statistics: Use and interpretation*. New York, NY: Routledge.

Mutambara, E., Botha, C. & Bisshoff, C. 2015. Perceptions of organizational politics at a national electricity provider in Southern African Development Community (SADC). *Journal of Economics*, 6(3):291-301.

Nel, C. 2018. *Identifying factors that predict business-to-business customer loyalty towards suppliers of crop protection solutions.* (Dissertation - MBA). Potchefstroom: North-West University.

Neri, V. 2018. *Monsanto is now the property of Bayer, and its name has ceased to exist. Agriculture is in the hands of a few large corporations now more than ever, with dire consequences for people and the environment*. https://www.lifegate.com/bayer-monsanto-agriculture Date of access: 22 Aug. 2020.

Newswire, P. 2020. *Corteva Agriscience acquires full ownership of PhytoGen Seed.* https://www.croplife.com/crop-inputs/corteva-agriscience-acquires-full-ownership-of-phytogen-seed/ Date of access: 16 Sep. 2020.

Nishimoto, R. 2019. Global trends in the crop protection industry. *Journal of Pesticide Science,* 44(3):D19-D101.

Pallant, J. 2016. *A step by step guide to data analysis using IBM SPSS.* 6th edition. New York, NY: McGraw Hill Education.

Partners, V. 2019. Global food and agribusiness. *M&A Review*, Online. https://www.verdantpartners.com/post/2019-global-food-and-agribusiness-m-a-review Date of access: 10 Nov. 2020.

Phillips, L. 2018. *BASF completes purchase of Bayer's divested businesses.* https://www.farmersweekly.co.za/agri-news/south-africa/basf-completes-purchase-bayers-divested-businesses/ Date of access: 15 Sep. 2020.

Plecher, H. 2020. *Gross domestic product (GDP) distribution across economic sectors South Africa 2019.* https://www.statista.com/statistics/371233/south-africa-gdp-distribution-across-economic-sectors/ Date of access: 15 Oct. 2020.

Ram, S.R. 2019. *UPL: Arysta LifeScience acquisition done, focus now shifts to synergies.* https://www.livemint.com/market/mark-to-market/upl-arysta-lifescience-acquisition-

done-focus-now-shifts-to-synergies-1558375985615.html Date of access: 15 Sep. 2020.

Reuters. 2017. *ChemChina Clinches Its $43 Billion Takeover of Syngenta.* https://fortune.com/2017/05/05/chemchina-syngenta-deal-acquisition/ Date of access: 15 Oct. 2020.

Robb, B. 2017. *Yes, Ag industry mergers could increase commodity seed prices.* https://www.farmprogress.com/cotton/yes-ag-industry-mergers-could-increase-commodity-seed-prices Date of access: 15 Nov. 2020.

Root, A. 2019. *DowDuPont is splitting into 3 companies. Here's everything you need to know*. https://www.barrons.com/articles/dowdupont-spinoff-dow-dupont-corteva-51556552428 Date of access: 22 Aug. 2020.

Statistics South Africa (SSA). 2018. *General Household Survey 2017 (Statistical Release P0318)*. *Pretoria: Stats SA*.

Statistics South Africa (SSA). 2019. *General Houshold Survey 2018 (Statistical Release P0318). Pretoria: Stats SA*.

Statistics South Africa (SSA). 2020. *Steep slump in GDP as COVID-19 takes its toll on the economy*. http://www.statssa.gov.za/?p=13601 Date of access: 13 Jul. 2020.

Scholtz, L.M. 2014. *Measuring brand loyalty in the hospitality industry in South Africa.* (Dissertation - MBA). Potchefstroom: North-West University.

Schreuder, F.A. 2002. *An investigation into global distribution systems in the crop protection industry and the development of distribution system management model for a particular application in South Africa and Australia.* (Dissertation - MSc). Stellenbosch: Stellenbosch University.

Smith, P. 2017. *DuPont divests interests to FMC, swaps for others.* https://www.dtnpf.com/agriculture/web/ag/news/business-

inputs/article/2017/03/31/dupont-divests-interests-fmc-swaps Date of access: 16 Sep. 2020.

South Africa (SA). 1947. *Fertilizers, Farm Feeds, Seed and Remedies Act (No. 36 of 1947)*.

Summerfield, R. 2017. *BASF to buy Bayer assets for $7bn.* https://www.financierworldwide.com/basf-to-buy-bayer-assets-for-7bn#.X23c5C1h1hE Date of access: 17 Sep. 2020.

Technology, P.C. 2014. *FMC Corporation announced that it has signed a definitive agreement to acquire Cheminova A/S, a wholly-owned subsidiary of Auriga Industries A/S.* https://www.pctonline.com/article/fmc-acquires-cheminova/ Date of access: 14 Sep. 2020.

Times, T.E. 2018. *UPL acquires Arysta LifeScience in $4.2 billion cash deal.* https://m.economictimes.com/markets/stocks/news/upl-acquires-arysta-lifescience-in-4-2-billion-cash-deal/articleshow/65073004.cms Date of access: 2020.

Times, T.E. 2019. *UPL completes acquisition of Arysta LifeScience for $4.2 billion.* https://economictimes.indiatimes.com/markets/stocks/earnings/upl-completes-acquisition-of-arysta-lifescience-for-4-2-billion/articleshow/67836964.cms?from=mdr Date of access: 16 Aug. 2020.

Trager, R. 2017. *Farmers sue to block Syngenta–ChemChina merger.* https://www.chemistryworld.com/news/farmers-sue-to-block-syngenta-chemchina-merger/3007241.article Date of access: 16 Oct. 2020.

UPL. 2018. *UPL + Arysta: Creating a global leader in agricultural solutions*. https://www.uplonline.com/pdf/Arysta_Acquisition%20-%20Investor_Presentation.pdf Date of access: 12 Aug. 2020.

Van Tonder, E. & Nel, C. 2018. Validating relationship marketing factors predicting B2B customer loyalty towards crop protection suppliers. *Journal of Contemporary Management*, 15(1):224-249.

Varinsky, D. 2018. *The $66 billion Bayer-Monsanto merger just got a major green light — but farmers are terrified.* https://www.businessinsider.com/bayer-monsanto-merger-has-farmers-worried-2018-4?IR=T Date of access: 12 Oct. 2020.

Vidal, J. 2016. *Farming mega-mergers threaten food security, say, campaigners*. https://www.theguardian.com/global-development/2016/sep/26/farming-mega-mergers-threaten-food-security-say-campaigners Date of access: 14 Oct. 2020.

Vogt, W. 2017. *Deal includes insecticide business, cereal broadleaf herbicides and future R&D pipeline.* https://www.farmprogress.com/crop-protection/fmc-corporation-buys-dupont-crop-protection-business Date of access: 16 Sep. 2020.

Walljasper, C. 2019. *DowDuPont split off its agriculture business; here's what to kow about Corteva Agriscience.* https://investigatemidwest.org/2019/06/12/dowdupont-split-off-its-agriculture-business-heres-what-to-know-about-corteva-agriscience/ Date of access: 14 Sep. 2020.

Wang, A. 2019. *Agricultural Mergers: Implications on innovation, farming, and politics.* https://therising.co/2019/05/24/agricultural-mergers-implications-on-innovation-farming-and-politics/ Date of access: 17 Aug. 2020.

Weinland, D. 2019. *China close to abandoning ChemChina and Sinochem merger.* https://www.ft.com/content/ef1ef3f6-fad0-11e9-a354-36acbbb0d9b6 Date of access: 21 Sep. 2020.

Whitfield, P. 2014. *Chemicals maker FMC has agreed to buy crop-protection products maker Cheminova from holding company Auriga Industries for just over $1.8 billion*. https://www.thestreet.com/markets/mergers-and-acquisitions/fmc-to-buy-aurigas-cheminova-12870134 Date of access: 12 Sep. 2020.

Whiting, A. 2017. *Mega-mergers will squeeze farmers, push up food prices, experts warn*. https://www.reuters.com/article/us-food-m-a/mega-mergers-will-squeeze-farmers-push-up-food-prices-experts-warn-idUSKBN1CI1X9 Date of access: 12 Oct. 2020.

Woodruff. 2019. *Change is the name of the game.* https://www.wearewoodruff.com/blog/agriculture/agriculture-industry-leaders-consolidate/ Date of access: 23 Oct. 2020.

Yuan, G. 2020. *Ranking list of 2019 Top 20 Global Agrochemical Companies recomposed, graced by 11 Chinese players.* http://news.agropages.com/News/NewsDetail---36626.htm Date of access: 12 Oct. 2020.

APPENDIX A: LETTER OF CONSENT

Private Bag X6001, Potchefstroom
South Africa 2520
Tel: +2718 299-1111/2222
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INFORMED CONSENT DOCUMENTATION

Title of the research study: Determining the effect of mergers and acquisitions in the agricultural supply sector.

Post graduate student: Nicolaas Johannes Smith

Contact number: 084 245 2459

You are being invited to take part in a **research study** that forms part of Masters in Business Administration. Please take some time to read the information presented here, which will explain the details of this study. Please ask the researcher or person explaining the research to you any questions about any part of this study that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research is about and how you might be involved. Also, your participation is **entirely voluntary** and you are free to say no to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part now.

This study has been approved by the North-West University Education, Management and Economic Sciences, and will be conducted according to the ethical guidelines and principles of Ethics in Health Research: Principles, Processes and Structures (DoH, 2015) and other international ethical guidelines applicable to this study. It might be necessary for the research ethics committee members or other relevant people to inspect the research records.

HOW WILL YOUR CONFIDENTIALITY BE PROTECT AND WHO WILL SEE YOUR FINDINGS?

- Anonymity of your findings will be protected at all times. Your privacy will be respected. Your results will be kept confidential by Nicolaas Johannes Smith. Only the researchers will be able to look at your findings. Findings will be kept safe by locking hard copies in locked cupboards in the researcher's office and for electronic data it will be password protected. (As soon as data has been transcribed it will be deleted from the recorders.) Data will be stored for five years.

Is there anything else that you should know or do?

- You can contact **Nicolaas Johannes Smith** at **084 245 2459** if you have any further questions or have any problems.
- You can also contact the North-West University Education, Management and Economic Sciences, Ethics Committee via **Prof Christo Bisschoff** at 018 299 1411 or christo.bisschoff@nwu.ac.za if you have any concerns that were not answered about the research or if you have complaints about the research.
- You may request a copy of this information and consent form for your own purposes.

APPENDIX B: SURVEY MONKEY QUESTIONNAIRE

Nicolaas Johannes Smith MBA: Determining the effect of mergers and acquisitions in the agricultural supply sector.

1. INFORMED CONSENT

By ticking the below box, you agree to take part in the research study titled: Determining the effect of mergers and acquisitions in the agricultural supply sector.

I declare that:

- **I have read this information in a language with which I am fluent and comfortable.**
- **The research was clearly explained to me in the letter.**
- **I have received contact details to ask any questions regarding the consent, as well as the researcher and any of the questions to be answered.**
- **I understand that taking part in this study is voluntary and I have not been pressurised to take part.**
- **I may choose to leave the study at any time and will not be handled in a negative way if I do so.**
- **I may be asked to leave the study before it has finished, if the researcher feels it is in the best interest, or if I do not follow the study plan, as agreed to.**
- **The study is anonymous and data cannot be identified within the data-set.**
- **I have read the attached PDF document, named "Invitation Letter and Informed Consent Form", and understand the document in full.**

* 1. Please indicate that:

- [ ] You have read and understand the information provides above.
- [ ] You give your consent to participate in the study on voluntary basis.

* 2. Screening Question : Do you farm actively or are employed by a company that supplies or distributes agricultural products to farmers?

- [ ] Yes
- [ ] No

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Nicolaas Johannes Smith MBA: Determining the effect of mergers and acquisitions in the agricultural supply sector.

2. INSTRUCTIONS

- **The study will take approximately 10-20 minutes to complete.**
- **Please answer all the questions as honestly and objectively as possible.**
- **Please select the most applicable option.**

Nicolaas Johannes Smith MBA: Determining the effect of mergers and acquisitions in the agricultural supply sector.

3. SECTION A: CLASSIFICATION INFORMATION

* 3. I am a:

- 1) Farmer, buying agricultural products.
- 2) Agent, supplying agricultural products to the agri-sector.
- 3) Representative, supplying agricultural products to farms.

Nicolaas Johannes Smith MBA: Determining the effect of mergers and acquisitions in the agricultural supply sector.

4. SECTION B: RELATIONSHIP INFORMATION WITH REGARDS TO CHEMICAL SUPPLIER/AGENT.

To what extent do you agree or disagree with the following statement?

Please respond to each question by selecting 1 to 5 on the options on the following 5-levels.

Likert scale: 1 [Strongly disagree], 2 [Disagree], 3 [Not sure], 4 [Agree], 5 [Strongly agree].

* 4. The supplier/agent/distributor is sincere and honest.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 5. The supplier/agent/distributor keeps his promises.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 6. The supplier/agent/distributor informs me of any problems which might affect me.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 7. The supplier/agent/distributor is concerned about me and my interests.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 8. The information the supplier/agent/distributor gives me is reliable.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 9. The supplier/agent/distributor is an expert in the product range being sold.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 10. I am very committed to the relationship with my supplier/agent/distributor.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 11. I am very faithful to the supplier/agent/distributor.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

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* 12. I try only using one supplier/agent/distributor.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 13. I try and maintain a long-term relationship with the supplier/agent/distributor.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

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Nicolaas Johannes Smith MBA: Determining the effect of mergers and acquisitions in the agricultural supply sector.

5. SECTION C: PRODUCT AND SERVICE STANDARDS AND QUALITY.

To what extent do you agree or disagree with the following statement?

Please respond to each question by selecting 1 to 5 on the options on the following 5-levels.

Likert scale: 1 [Strongly disagree], 2 [Disagree], 3 [Not sure], 4 [Agree], 5 [Strongly agree].

My Chemical Agent/Supplier/Distributor...

* 14. Provides higher quality products.
  - 1. Strongly Disagree
  - 2. Disagree
  - 3. Not Sure
  - 4. Agree
  - 5. Strongly Agree

* 15. Provides products that meets the quality and standards better.
  - 1. Strongly Disagree
  - 2. Disagree
  - 3. Not Sure
  - 4. Agree
  - 5. Strongly Agree

* 16. Offers more reliable products.
  - 1. Strongly Disagree
  - 2. Disagree
  - 3. Not Sure
  - 4. Agree
  - 5. Strongly Agree

* 17. Have a wide product range.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 18. Provides constant product quality over time.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 19. Has fewer variations in product quality.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 20. Provides customer service and product support.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 21. Provides the necessary technical information and support.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

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* 22. Turnaround time is good.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 23. Meets the due dates when applicable.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 24. Always have enough stock to adhere to my requirements.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 25. Takes into account label registrations.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 26. Have to correct product range to adhere to my requirements.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

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* 27. Have the necessary after sales support.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 28. Has fewer delivery errors.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 29. Deliver the correct products at the agreed prices.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 30. Makes me feel like I am an important client.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 31. Can improve on current product range.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

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* 32. Can deliver more new product registrations.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 33. Adds value beyond selling products, spraying programs and calibrations programs.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 34. Knows how to provide assistance in new product development.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 35. Helps get new products into the market faster.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 36. Have the necessary knowledge (know-how) of the product range.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

Nicolaas Johannes Smith MBA: Determining the effect of mergers and acquisitions in the agricultural supply sector.

6. SECTION D: PRICES, MERGERS AND ACQUISITIONS.

To what extent do you agree or disagree with the following statement?

Please respond to each question by selecting 1 to 5 on the options on the following 5-levels.

Likert scale: 1 [Strongly disagree], 2 [Disagree], 3 [Not sure], 4 [Agree], 5 [Strongly agree].

* 37. The supplier/agent/distributor's margin levels is on par with the level in the sector.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 38. Research and development inside the supplier/agent/distributor's company leads to price increases.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 39. I receive price list on a regular basis.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 40. I receive price increases on a regular basis.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 41. I do receive price support and price rebates.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 42. I have done price comparisons against other supplier/agent/distributor's.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 43. My delivery is included in my price.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 44. I know what percentage of the sales value goes to the supplier/agent/distributor's.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 45. Mergers and acquisitions have an impact on the price I receive.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 46. Mergers and acquisitions will limit my product range availablity.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 47. Mergers and acquisitions helps the flow of new products into the market.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 48. Mergers and acquisitions impacts the quality level of the product range.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 49. Mergers and acquisitions impacts the technical support I receive.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

* 50. Mergers and acquisitions affects the personal connection that I have with the supplier/agent/distributor's.

- 1. Strongly Disagree
- 2. Disagree
- 3. Not Sure
- 4. Agree
- 5. Strongly Agree

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7. Conclusion

Thank you for participating in the study, your contribution is highly appreciated.

APPENDIX C: ETHICS APPROVAL LETTER

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

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South Africa 2520

Tel: 018 299-1111/2222
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Economic and Management Sciences Research
Ethics Committee (EMS-REC)

24 April 2020

Prof CA Bisschoff
Per e-mail
Dear Dr Bisschoff

EMS-REC FEEDBACK: 24042020
Student: Smith, NJ (22134417)(NWU-00632-20-A4)
Applicant: Prof CA Bischoff - MBA

Your ethics application on, *Determining the effect of mergers and acquisitions in the agricultural supply sector,* which served on the EMS-REC meeting of 24 April 2020, refers.

Outcome:

Approved as a minimal risk study. A number NWU-00632-20-A4 is given for one year of ethics clearance.

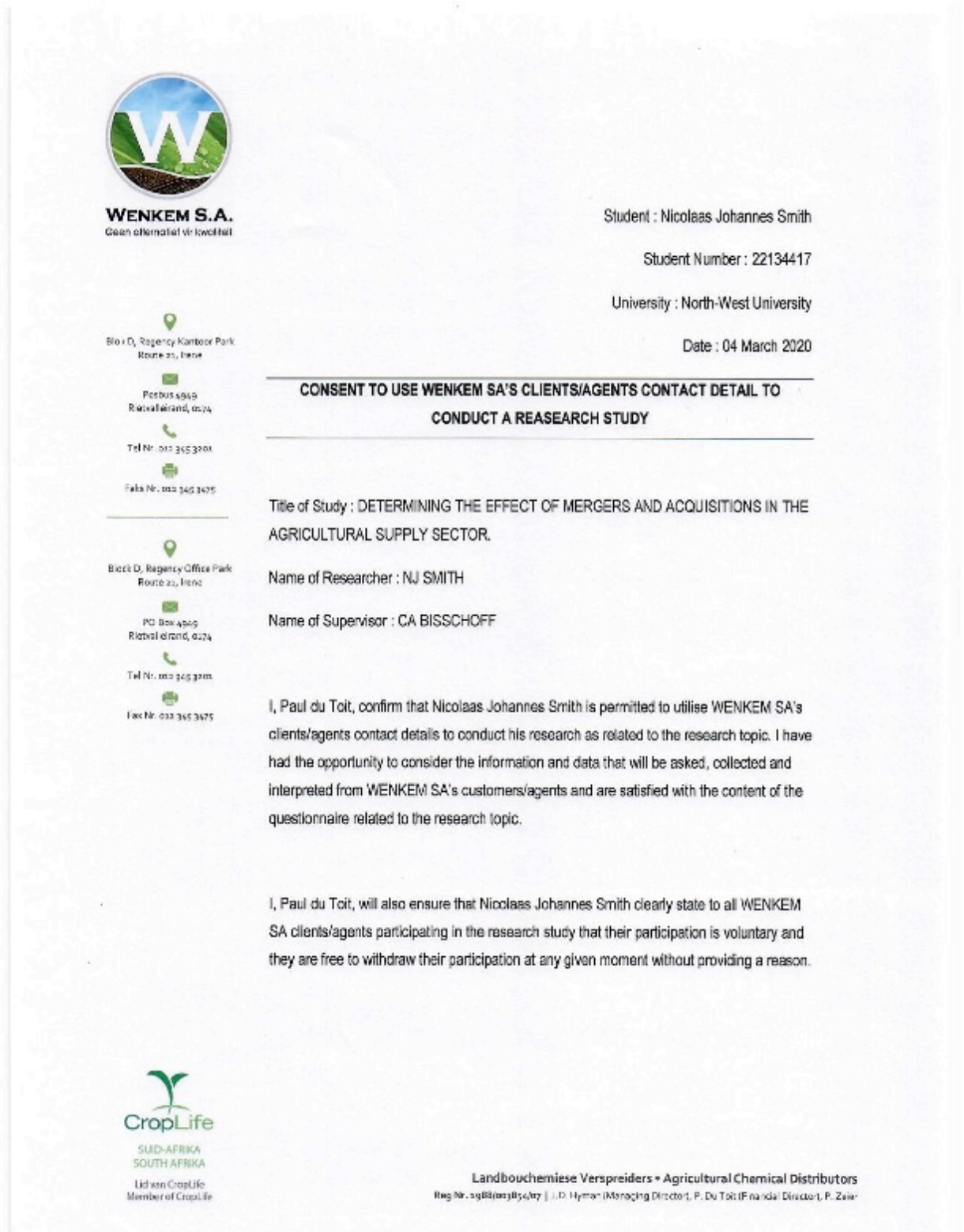
Kind regards,

Mark Rathbone

Digitally signed by Mark Rathbone
DN: cn=Mark Rathbone, o=North-West University, ou=Business management, email=mark.rathbone@nwu.ac.za, c=ZA
Date: 2020.05.21 05:39:49 +02'00'

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

APPENDIX D: WENKEM SA'S APPROVAL LETTER



WENKEM S.A.
Geen alternatief vir kwaliteit

Block D, Regency Kantoor Park
Route 21, Irene

Postbus 4949
Rietvallei rand, 0174

Tel Nr. 012 345 3201

Faks Nr. 012 345 3475

Block D, Regency Office Park
Route 21, Irene

PO Box 4949
Rietvallei rand, 0174

Tel Nr. 012 345 3201

Fax Nr. 012 345 3475

CropLife
SUID-AFRIKA
SOUTH AFRIKA
Lid van CropLife
Member of CropLife

Student : Nicolaas Johannes Smith

Student Number : 22134417

University : North-West University

Date : 04 March 2020

CONSENT TO USE WENKEM SA'S CLIENTS/AGENTS CONTACT DETAIL TO CONDUCT A REASEARCH STUDY

Title of Study : DETERMINING THE EFFECT OF MERGERS AND ACQUISITIONS IN THE AGRICULTURAL SUPPLY SECTOR.

Name of Researcher : NJ SMITH

Name of Supervisor : CA BISSCHOFF

I, Paul du Toit, confirm that Nicolaas Johannes Smith is permitted to utilise WENKEM SA's clients/agents contact details to conduct his research as related to the research topic. I have had the opportunity to consider the information and data that will be asked, collected and interpreted from WENKEM SA's customers/agents and are satisfied with the content of the questionnaire related to the research topic.

I, Paul du Toit, will also ensure that Nicolaas Johannes Smith clearly state to all WENKEM SA clients/agents participating in the research study that their participation is voluntary and they are free to withdraw their participation at any given moment without providing a reason.

Landbouchemiese Verspreiders • Agricultural Chemical Distributors
Reg Nr. 1988/003854/07 | J.D. Hyman (Managing Director), P. Du Toit (Financial Director), P. Zaiser

APPENDIX E: STATISTICAL CONSULTATION SERVICES LETTER

Private Bag X6001, Potchefstroom
South Africa 2520

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

Statistical Consultation Services
Tel: +27 18 299 2651
Fax: +27 0 87 231 5294
Email: erika.fourie@nwu.ac.za

21 September 2020

Re: Thesis, Mr NJ Smith, student number: 22134417
Determining the effect of mergers and acquisitions in the agricultural supply sector

We hereby confirm that the Statistical Consultation Services of the North-West University analysed the data of the above-mentioned student and assisted with the interpretation of the results. However, any opinion, findings or recommendations contained in this document are those of the author, and the Statistical Consultation Services of the NWU (Potchefstroom Campus) do not accept responsibility for the statistical correctness of the data reported.

Kind regards

Dr E Fourie
Senior Consultant: Statistical Consultation Services

APPENDIX F: LANGUAGE EDITOR'S LETTER

Dynamic Language & Translation Specialists

Antoinette Bisschoff
71 Esselen Street,
Potchefstroom
Tel: 018 293 3046
Cell: 082 878 5183
Language@dlts.co.za
CC No: 1995/017794/23

Thursday, 10 December 2020

To whom it may concern

Re: Confirmation of language edit, typography and technical precision

The MBA dissertation by **NJ Smith, "Determining the effect of mergers and acquisitions in the agricultural supply sector"** was edited for language, typography and technical precision. The referencing and sources were checked and comply to the Harvard guidelines specified by the 2020 NWU Reference guide.

Final, last minute corrections remain the responsibility of the author.

Antoinette Bisschoff

BA Languages (UPE – now NMU); MBA (PU for CHE – now NWU); Translation and Linguistic Studies (NWU)

Officially approved language editor of the NWU since 1998
Member of SA Translators Institute (no. 100181)

Precision ... to the last letter