Common restrictions faced by automation suppliers in the Vaal Triangle manufacturing industry

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ABSTRACT

The primary objective of this study was to identify and investigate the main restrictions automation suppliers encounter when attempting to promote and sell their products into the local Vaal Triangle manufacturing industry.

Through the literature study that was conducted, a general investigation into the supply chains of some of the most prominent manufacturing industries within the geographical demarcation were analysed. Two manufacturing industries were chosen namely Sasol and Rand Water. The different criteria upon which they qualify their suppliers were identified and the reasoning behind it discussed. The identified criteria included product compliance restrictions; commercial restrictions as well as limitations placed on suppliers by the consumer themselves where suppliers are restricted to only a few per product or service. The commercial restrictions were identified as the only restrictions the supplier has total control over and for this reason, was investigated in detail. These commercial restrictions included the supplier's NOSA, ISO and CIDB rating, as well as their BBBEE status.

After the literature review, an empirical study was conducted by making use of a questionnaire which was developed alongside the conduction of the literature study. This questionnaire was sent out to the top management of the identified local automation suppliers to be filled out. The completed questionnaires were analysed by the Statistical Consultation Services of the North-West University (Potchefstroom campus). After the reliability and validity of the questionnaire had been determined, the basic demographical information of the respondents was analysed. An assessment of the 12 constructs measured in the study was done and the relationships between the demographic variables and the constructs were identified.

Following the detailed analysis, conclusions on the demographic information of the respondents as well as between all the demographic variables and the constructs measured which had practical significance were discussed. Practical recommendations regarding compliance to the commercial restriction studied were made. The success of the study was determined mainly based on the achievement of the primary and secondary objectives. The study concluded by making suggestions for further research on the topic at hand.

Keywords: Supply chain, Vaal Triangle, restrictions, promote, automation, suppliers, manufacture, industry, product, service, commercial, compliance, Porter's Five Forces, NOSA, ISO, BBBEE, CIDB.

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List of abbreviations

BBBEE.....Broad Based Black Economic Empowerment

BEE.....Black Economic Empowerment

BSR.....Business for Social Responsibility

CE.....Conformité Européenne

CIDB.....Construction Industry Development Board

DIFR.....Disabling Incident Frequency Rate

DTI.....Department of Trade and Industry

EC.....European Council

EEA.....European Economic Area

EMS.....Environment Management System

ESMG.....Electrical Supplier Management Group

EU.....European Union

IA.....Intrinsically Safe

IEC.....International Electrotechnical Commission

ISA.....International Society of Automation

ISO.....International Organization for Standardisation

JSE.....Johannesburg Stock Exchange

LCD.....Liquid Crystal Display

MCDM.....Multiple-Criteria Decision-Making

MD.....Managing Director

MFST.....Multi Functional Sourcing Team

MSA.....Measure of Sample Adequacy

NOSA.....National Occupational Safety Association

NOSCAR.....Natural Orifice Consortium for Assessment and Research

OEM.....Other Equipment Manufacturer

OHSAS.....Occupational Health and Safety Assessment Series

PC.....Personal Computer

SABS.....South African Bureau of Standards

SANS.....South African National Standards

SHE.....Safety Health and Environment

SMG.....Supplier Management Group

SMME.....Small, Medium and Micro Enterprises

SMS.....Short Message Service

SWOT.....Strengths, Weaknesses, Opportunities and Threats

UK.....United Kingdom

UL.....Underwriters Laboratories

UN.....United Nations

USA.....United States of America

QMS.....Quality Management System

CHAPTER 1

NATURE AND SCOPE OF THE STUDY

1.1. INTRODUCTION

In today's business, with competition becoming greater every day as a result of more choices in products and services being offered to the consumer, it is crucial for manufacturers and their channel partners alike to get a decent share of the available market in order for them to stay in business.

For a company, the essence of their strategy formulation is to cope with its competition. It is however, easy to view competition too narrowly, as well as too pessimistically. Executives sometimes complain to the contrary, but intense competition in an industry is neither a coincidence nor is it bad luck.

In the fight for a market share, competition is not only evident in the opposition. It is rather rooted in its underlying economic and competitive forces that go well beyond the established competitors in a particular industry. Depending on the industry, suppliers, customers, potential new entrants and substitute products are all competitors that may be more or less prominent or active (Porter, s.a:87). Companies are therefore, forced to continuously change and develop in an attempt to sustain and ultimately advance in the competitive environment. It especially holds true for companies in the even more competitive high-tech industries (Law, 2009:31).

On the other hand, within the company itself different aspects need consideration in order to reduce costs and therefore, to be able to present the final product at a competitive price to the consumer (Cochran & Ramanujam, 2006:826). These include things like the following.

- Efficient and ergonomically planned production facilities and processes.
- The possible use of third party logistics and transportation, storage facilities and services which are becoming standard practice.
- The choice of whether or not to contract other value-added services.
- The choice of packaging.
- Marketing.
- Required profit margins.

- Choice of supply channel structures.
- Channel mark-ups etc.

With the current economic crisis, this is even more so for those manufacturers whose products are mainly technical and application specific. Because of the technicality and highly expensive cost of these products, their target market is mainly focussed on the manufacturing industry which is extremely results driven and not so much price orientated. It is therefore, crucial for competing suppliers to place themselves attractively against their direct competition mainly regarding quality and service in order to gain a competitive advantage. Price of course always plays an important role, even within the industry. The consumer will however, only consider prospective suppliers who can supply to their requirements before they will consider the price.

1.2. BACKGROUND TO THE STUDY (MOTIVATION)

Even with the greatest idea for a product or service, it will come to nothing if there is not a need for it. It is therefore, crucial for the supplier to create the need in order to establish a market. Once the need has been created, or even when a supplier just joins the race to supply a product or service within the targeted market, certain obstacles exist which make it difficult to supply into this intended market.

In this study the emphasis will lie with automation suppliers supplying to the manufacturing industry. For the purpose of this study, automation suppliers are defined as the manufacturers and suppliers of electrical and instrumentation equipment and/or services.

These suppliers are typically presented with a number of obstacles when supplying their product and/or services into the industry. These include obstacles in dealing with both existing customers as well as with new prospective customers.

This is not a widely discussed problem, and therefore, this investigation should add a lot of value to the topic at hand.

1.3. PROBLEM STATEMENT

In this study an investigation will be done into the restrictions an automation supplier faces when attempting to break into their local industrial market. This study will be restricted to the borders of the Vaal Triangle situated just south of Johannesburg.

Unfortunately, for suppliers to do business with these possible industrial clients, it is not as easy as creating a demand, receiving an order and delivering the product. Apart from the normal problems presented from direct competition, like product functionality and quality, price, availability, service etc, there are also obstacles directed from the customers. In this case those customers are the manufacturing industry. Many of these top manufacturing organisations have specific criteria upon which they qualify their suppliers. These include criteria related directly to the supplier as a company, as well as to the product and/or service they provide. The obvious reason why organisations need to implement strategies like this is to reduce their costs and achieve higher quality and shorten lead times to maintain a competitive position within their market (Amid *et al*. 2007:323). One of the most critical activities of purchasing management in a supply chain is therefore supplier selection. The reason for this is because of the key role a supplier's performance plays on cost, quality, service and delivery in achieving the objectives of the supply chain. Hence, selecting the right suppliers is a critical component of these strategies. According to Amid *et al*. (2007:323) this supplier selection process is a multiple-criteria decision-making (MCDM) problem being affected by a number of conflicting factors depending on the purchasing situations.

All these restrictions make it increasingly difficult for a supplier to be able to supply their product and/or service to their intended market. This study supports the significant correlations between the manufacturing industry's internal operation and their relationship with their supply chain partners. According to Law (2009:38), it implies that improved communication with supply chain partners, results in better operation performance and as a result, better team commitment could often be realised.

For a supplier to understand all these forces at work in the overall industry, is an important component for effective strategic planning. An industry analysis can be used to facilitate these companies in the understanding of their position relative to

other companies supplying similar services or in the production or supply of similar products (Small Business Encyclopaedia, 2010?). This will enable small business owners to identify the threats and opportunities facing their business and to focus all their available recourses on developing unique capabilities which could lead to the creation of a competitive advantage.

Once these restrictions have been overcome, it becomes much easier to be successful as the competition becomes fewer and are known amongst each other. Thus a more focussed SWOT analysis is possible to determine your own position in the market and hopefully, to establish a niche market for yourself. The main threat therefore, becomes losing this favourable position by giving up your position as a preferred supplier to outside competition.

1.4. OBJECTIVES OF THE STUDY

1.4.1. Primary objectives

The primary objective of this study is to identify and investigate the main restrictions automation suppliers encounter when attempting to promote and sell their products into their local manufacturing industry.

1.4.2. Secondary objectives

Certain secondary objectives need to be addressed in order to accomplish the primary objective discussed above. These secondary objectives include the following.

- The different criterion upon which the local manufacturing industry qualifies their suppliers needs to be identified.
- The main reasoning behind the required criteria needs to be investigated.
- The identified standardisation restrictions must be compared amongst each other in terms of supplier awareness.
- The identified standardisation restrictions must be compared amongst each other in terms of effects/implications on the supplier.

1.5. SCOPE OF THE STUDY

This study will be conducted in the field of Operational Management with regards to common restrictions automation suppliers of products and/or services face when attempting to supply their products into the manufacturing industry.

The geographical demarcation will be restricted to the borders of the Vaal Triangle which is a triangular area of land bounded by the city of Vereeniging and the towns of Vanderbijlpark and Sasolburg. Together, these towns comprise a substantial urban complex in South Africa. Meyerton, situated just north of Vereeniging, is also generally included within this complex.

Residents of the greater Sebokeng, Sharpeville, Boipatong, Bophelong and Zamdela townships, together with the towns of Heidelberg and Potchefstroom, also generally tend to consider themselves as part of the Vaal Triangle.

For the purpose of this study, only the following towns will be included.

- Sasolburg.
- Vanderbijlpark.
- Vereeniging.
- Meyerton.

The towns as indicated above are situated in close proximity, and as a result, suppliers within this area basically compete for the same business at the same industries.

Those towns excluded from the list are either geographically removed or don't really fall within the scope of this study, i.e. don't have much industry resulting in little if any industrial suppliers.

The Vaal Triangle straddles the Vaal River and is a major industrial region with the major industries being ArcelorMittal and Sasol 1. Other significant industries include Rand Water, Eskom, Cape Gate, AfriSam, Nampak, Air Products, Natref, Omnia and many more.

Figure 1.1 below indicates the geographical area within the Vaal Triangle which will be used to conduct the study at hand.

Figure 1.1: Geographical map of the Vaal Triangle

Source: Vaal Meander (2010)

Because the industry is such a major force, and because so many suppliers compete for their business, it was decided to investigate the criteria of a supplier as required by the industry. The target population will therefore, include some of the most prominent manufacturing industries, as well as suppliers of automation equipment to those industries. For the purpose of this study, an investigation upon only two of the manufacturing industries will be conducted. It will include an industry within the private sector as well as an organ of state which is stricter regarding legislative requirements (Rand Water, 2008:43). The reasoning behind this was to attempt to get different reasoning behind their supply chain requirements. The final choice fell on Sasol and Rand Water because they were the only ones prepared to share the required information. Regarding the supply side, various types of automation suppliers were identified which will be included within the study. They include the following.

- Local Vaal Triangle sales offices of South African and international automation equipment manufacturers.
- Local channel partners to such manufacturers.
- Resellers of similar products and services.

These suppliers will be investigated in order to determine their awareness, compliance as well as the effects of these restrictions on their businesses.

1.6. RESEARCH METHODOLOGY

In order to reach the objectives of the study, a research methodology comprising of the following needs to be conducted.

- Firstly a literature study will be done regarding supply chain management in general.
- Thereafter a more specific study will be done on the two identified manufacturing industries, namely Sasol and Rand Water, in an attempt to identify some of their major screening criteria when deciding upon suppliers.
- Thirdly an empirical study will be conducted where questionnaires will be forwarded to automation suppliers within the borders of the Vaal Triangle. The aim will be to gather their practical experience regarding their awareness, as well as the effects the identified commercial restrictions have on them.
- Lastly the practical information gathered, will be tested against the theory and certain conclusions will be made.

1.6.1. Literature/theoretical study

The North-West University's library will be used as a main source to gather information to conduct this study. It consists of a large database of information crucial to this study, as not much research was done in the past concerning this topic.

Other sources of information which could be used will include books on the topic at hand, magazines, articles, the internet and information gathered from some of the major firms in the study area.

1.6.2. Empirical study

The target population will cover the manufacturing industry within the Vaal Triangle geographical area, as well as automation suppliers dealing with those industries. Two manufacturers within this geographical area were chosen, namely Sasol and Rand Water. The suppliers include the channel partners of automation equipment manufacturers, their local Vaal Triangle branches and resellers of similar products and services.

A questionnaire will be compiled alongside the conduction of a literature study which will be distributed to the Owner, the Managing Director (MD), the Member or to the Vaal Triangle Branch Manager of the supplier to be filled out. This questionnaire will consist of five sections namely the following.

- Demographic information.
- Awareness of the identified restrictions.
- Advantages to the company.
- Disadvantages to the company.
- General.

The completed questionnaires will be analysed by the Statistical Consultation Services of the North-West University (Potchefstroom campus). Descriptive statistics will be used to measure the perception of the respondents with regard to the constructs which measure the effects of the mentioned restrictions to put their product into the intended market. Means will be used to measure the central tendency while the standard deviation will be used to measure the scatter of the data around the mean.

Independent t-tests will be performed to determine if any statistical significant relationship between the demographical variables and the constructs exists. Interpretations will be conducted on effect sizes (*d*-values) which will give an

indication if there are any practical significant differences between any of the demographical variables regarding the constructs.

The reliability of the questionnaire will be assessed by calculating the Cronbach Alpha coefficients. Cronbach Alpha coefficients of 0.7 or higher will be regarded as acceptable levels of reliability.

Confirmatory factor analyses will be done by taking into account Kaiser's measure of sample adequacy (MSA), percentage variation explained and variation of communalities.

1.7. LIMITATIONS OF THE STUDY

The objective of the study is to identify the restrictions faced by automation suppliers when attempting to do business with the manufacturing industry, as well as the implications of each of these restrictions on the supplier.

There are however, certain limitations to this study, namely the following.

- The study will be limited to national restrictions only where problems like international trade restrictions, government subsidies and import and export taxes etc are omitted.
- Furthermore, it will be limited to the boundaries of the Vaal Triangle only as this area is a major industrial region with a high number of automation suppliers and therefore, many possible participants to this study. It should also result in a higher percentage of questionnaires to be retrieved as the area is geographically small and as a result within easy reach to visit with these possible participants in an effort to motivate their participation.
- It will not include discussions on the solutions to the mentioned restrictions.

1.8. LAYOUT OF THE STUDY

Table 1.1 below comprises a summary of the layout of the rest of the mini-dissertation.

Table 1.1: Study layout

Chapter	Main Headings	Goal
Chapter one	Introduction to the study	• Background to the study. • Problem statement. • Objectives of the study. • Scope of the study. • Research methodology. • Limitations of the study.
Chapter two	Literature review	• Theoretical study. • Research questions.
Chapter three	Empirical study	• Questionnaire. • Discussion of statistical methodology. • Measures and data analysis.
Chapter four	Results	• Discussion of results. • Conclusion. • Recommendations. • Evaluation of success of the study. • Suggestions for further research.

CHAPTER 2

LITERATURE REVIEW

2.1. INTRODUCTION

All companies operate in a macro environment which is being shaped by influences originating from community values and lifestyles; population demographics; general economic conditions; legislation and regulations; technology and also the industry and the competitive environment wherein it operates (Thompson *et al*, 2010:56). This macro environment includes all the relevant factors and influences outside of the company's boundaries which influence their decisions regarding the direction they take, their objectives, strategy and business model. These influences can sometimes have a significant impact on a company's business situation regarding their direction and strategy. According to Thompson *et al*. (2010:57) the factors and forces having the biggest strategy-shaping impact on a company, are typically affected by their immediate industry and competitive environment. These include the actions of their rivals, buyer behaviour and supplier-related considerations etc. Supplier-related considerations are a strategy-shaping force which is directly controllable by the company and which can be addressed through supply chain management. In respect of the supply chain management process, Guneri *et al*. (2008:9223) state that the firm selecting the best supplier, gains a competitive advantage over their rivals.

2.1.1. Supply chain management

According to Guneri *et al*. (2008:9223), a manufacturer's purchases of goods and services make up 70% of that product's cost. In high-technological firms, as is being investigated within this study, the purchasing of materials and services represents up to 80% of the total cost of the end product. One of the most critical activities organisations therefore need to address to achieve the objectives of the whole supply chain is supplier selection (Amid *et al*. 2007:323). Not only is the choice of supplier important, but also the supply channel structure. According to Sucky (2008:311), a phenomenon that is known as the "bullwhip effect" implies that the

variability of orders increases as they move up the supply chain from retailers to wholesalers to manufacturers and to suppliers.

In the supply chain, the industry takes the leading role as the customer by making the first move regarding decisions on platform product composition and supplier selection. The industry and selected supplier then move together to make ordering and pricing decisions with a common objective, namely to maximise their joint payoffs (Zhang & Huang, 2009:121). Once this supplier base has been established, it is essential for the business to promote and build a long-term and intimate relationship between their buyers and suppliers as it is an essential objective in the success of supply chain management. According to Vachon and Klassen (2007:299), because of intense scrutiny from diverse stakeholder groups including end-users, industrial customers, suppliers and financial institutions, businesses are attempting to move toward environmental sustainability. A healthy relationship within the supply chain can assist in this regard as the focus should be on inter-organisational interactions between all the members, including aspects such as shared environmental planning, joint environmental goal-setting as well as working together to reduce pollution or other environmental impacts.

For an organisation to achieve the objective of a supply chain, it is imperative for decision-makers to select proper criteria for the supplier selection problem which include both tangible and intangible factors (Guneri *et al*. 2008:9223). Supplier selection is a multiple-criteria decision-making (MCDM) problem and is affected by several conflicting factors such as quality, price as well as delivery, and as a result, has a significant impact on the competitiveness of the company (Amid *et al*. 2007:323). MCDM techniques support decision-makers in assessing a set of alternatives. Through the supplier selection and development activities, intercompany communication can be enhanced, an environment of mutual trust can be created, partnership equity can be established, an understanding of both parties' expectations and a common strategic direction can be created. This will result in a company having a better understanding regarding its supplier's motivations and concerns about the development of a long-term relationship. On the other hand, suppliers also need to be knowledgeable about their customer's processes, controls and systems. In the long run, suppliers should be fully integrated into their customers' operations (Lo & Yeung, 2003:233).

According to Business for Social Responsibility (BSR), a new era is unfolding in supply chain management (BSR, 2007:3). In the past, supply chain management was treated mainly as a back office function managing the logistics of supply chains. Today, new entrants as well as the market-leaders are finding that environmental and social transparency across the supply chain delivers significant value to their firms. A sustainable supply chain provides companies with a competitive advantage to maintain, improve and expand the relationship between their suppliers and customers, as well as to ensure access to strategic markets.

The success of a business is no longer determined only by traditional notions of customer loyalty and shareholders' value. The next generation of supply chain management is shaped by external pressure from the investment community, business partners, civil society, governments, the media and consumers. These days companies are expected to make sure that products and services are more sustainable, as well as being produced, packaged and shipped by making use of manufacturing practices which are more socially and environmentally responsible. To respond to stakeholder's expectations and to meet the increasing regulatory requirements, companies are required to be transparent about their supply chain practices. By gaining visibility and control over their supply base, companies are in a position to align supplier performance and capabilities with their own corporate objectives (BSR, 2007:3).

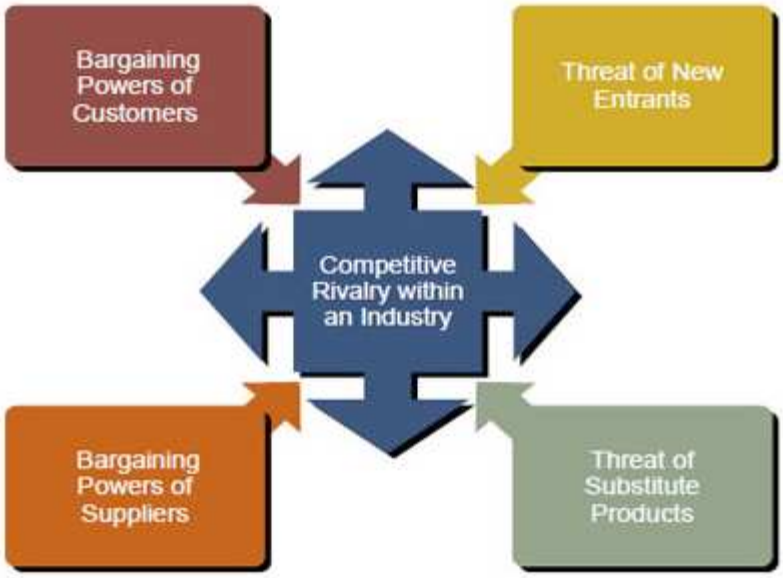
On the other side of the supply chain, the supplier also needs to position itself in a favourable position to become a preferred supplier, not only by complying with their intended customer specifications but also by being a dominant force when competing for a common market. According to the Small Business Encyclopaedia (2010?), an industry analysis will facilitate a company in understanding their position relative to competitors of similar products and/or services. Understanding the industry in which you compete and by anticipating its future trends, directly impacts on a company's ability to succeed. It gives the company the knowledge to react and control its portion of the industry. Because a supplier and its direct opposition are competing in the same industry, the key is to find the differing abilities between you and the competition in dealing with the industry forces impacting on the company. The collective strength of these industry forces determines the ultimate profit potential that needs to be analysed.

The goal of this competitive strategy is to find a position within the industry where a company can best defend itself against these competitive forces, or where one can influence it to one's favour. It is therefore, important when performing an industry analysis to first assess the impact of these forces (Small Business Encyclopaedia, 2010?).

2.1.2. Porter's Five Forces Model

Because competitive forces are never the same from one industry to the next, Porter's Five Forces Model of competition is probably the most widely used for systematically diagnosing the principal competitive pressures in a specific market as well as to assess the strength and the importance of each of the five forces as shown in figure 2.1 below (Thompson *et al*, 2010:60).

Figure 2.1: The Porter's Five Forces Model of competition



Source: Adopted from Chaffey and Wood. (2005:306)

Porter's model of competition shows that rivalry among firms within the same industry is dependent on five forces. These forces are: the potential for new competitors to enter the specific market and the threat they present; the bargaining power of suppliers; the bargaining power of the customer; the availability of

substitute products; and the competitors and nature of competition within the industry. These forces are summarised by the Small Business Encyclopaedia (2010?) below.

Threat of new entrants

This threat refers to the ease or difficulty of a new firm to start competing within a specific industry. This threat is important because it determines the likelihood of a company facing new competitors. If an industry is easy to enter, sources of competitive advantage tend to fade quickly. On the other hand, if an industry is difficult to enter, sources of competitive advantage tend to last longer. Companies also tend to benefit from having the same set of competitors.

The ease of entry into a new market is dependent upon two factors.

- The reaction of the existing market players towards these new entrants.
- The barriers to market entry that exist within the industry.

Existing players will most likely react very strongly against these new entrants, especially when existing competitors have invested substantial resources within the industry. Another reason would be if the specific industry is characterised by slow growth.

Some of the barriers to market entry include high capital requirements, switching costs for the customer, economies of scale, limited access to distribution channels, a high degree of product differentiation and restrictive government policies.

Bargaining power of suppliers

This is possible through a number of situations such as the following.

- When an industry relies on just a few suppliers.
- When there are no substitute products available.
- When switching costs are high.
- When each purchaser accounts for just a small portion of a suppliers' business.

- When suppliers have the resources to move forward in the distribution chain and by so doing, take over the role of their customers.

This force can affect the relationship between small businesses and their customers by influencing the price and quality of the final product. Companies can gain a competitive advantage with their customers through their supplier relationships.

Bargaining power of customers

Here the reverse situation occurs when the bargaining power moves over to the customer or buyer. Lower prices, higher quality or additional services can be demanded by powerful buyers by exerting pressure upon especially smaller companies. This can be accomplished by playing one competitor off against another. Their power tends to increase when:

- a single customers account for large volumes of a company's product;
- when substitute products are readily available;
- when switching costs are low; and
- when buyers possess over the resources to move backward in the distribution chain.

Threat of substitute products

The threat of substitute products occurs when customers come to believe that a similar product can perform the same function but at a lower price. Within a specific industry, all firms producing substitute products are in a broad sense competing for the same business. The problem for suppliers with substitute products is that it limits their potential return by placing a ceiling on the prices a company can charge.

This force can be subtle, for example in the insurance business where insurance agents have gradually moved into the investment field which was formerly controlled by financial planners. It can also be sudden. Vinyl record albums were suddenly replaced by the compact disc technology.

Product differentiation is the main defence against this threat. Some companies have success through the understanding of their customers and as a result, they are able to create a demand specifically for their product.

Competitive rivalry within an industry

Battles waged amongst competitors to gain market share, are arguably the strongest industry force with which companies have to contend. These competitive battles can come in the form of price wars, new product introductions, expanded service offerings or fierce advertising campaigns. These competitive actions can result in reduced profitability for the suppliers within the specific industry.

When an industry is characterized by a number of well-balanced competitors, a high fixed cost, a slow growth rate or a lack of high product differentiation, the intensity of competition tends to increase. Another factor which increases this intensity, is high exiting barriers. These include things like specialized assets, labour agreements, emotional ties, strategic inter-relationships with other business units and governmental or social restrictions.

2.1.3. Why standards matter in the supply chain

At first it is important to define standards: “A standard is a published document which lists specifications and procedures established to ensure that a material, product, method or service is fit for its purpose and performs in the manner it was intended for.” (SABS, 2010d.)

In the current day and age, especially within the industry, standards make an enormous positive contribution to most aspects of our lives (ISO, 2010i). Standards ensure desirable characteristics of products and services at an economical cost. These characteristics include things such as quality, safety, reliability, environmental friendliness, efficiency and interchange ability.

According to ISO (2010i), when a product or service meets with the consumer’s expectations, it is normally taken for granted and the consumer is totally unaware of the role standards play. On the other hand, when products do not meet with expectations like when it turns out to be of poor quality, when parts do not fit or

are incompatible with existing equipment, when it is unreliable or dangerous, it is soon noticed.

When products, devices, machinery and systems work well and safely, it is often because they meet with required standards.

The implementation of standards results in many benefits to consumers and the industry (SABS, 2010c). Some of these benefits include the following.

Consumers

- Consumers are protected from hazards to their health and safety.
- Standards improve quality and reliability.
- It ensures better operation and compatibility between products and services.
- It promotes and protects the economic interests of consumers.
- It ensures that consumers have easier access to a greater choice in goods and services.

Industry

- Standards lower installation and start-up costs.
- It ensures improved quality and reliability.
- It inspires added trust in a supplier.
- Could assist a business to meet mandatory regulations.
- It could create a competitive advantage.
- It could attract new customers.
- It could also open new markets by assuring prospective clients that you meet their quality requirements.

It is therefore, not surprising for manufacturing companies to also apply these practices to their industry.

2.2. SUPPLIER CRITERIA EXPECTED BY THE INDUSTRY

2.2.1. Overview on geographical recourses and industries

As was discussed in chapter one, this study is being conducted within the borders of the Vaal Triangle. Within this geographical area a large number of manufacturing industries exist as it is rich in natural resources. These resources include things like coal used in the generation of power and up to recently for the manufacturing of fuel and many other carbon by-products such as fertilizer, plastic, wax, etc. These days natural gas is being fed via a pipeline from Mozambique to the Sasol 1 plant in Sasolburg to serve as a replacement resource for coal Sasol (2009d). Water is another important resource with the Vaal River stemming from the Vaal dam and cutting right through the Vaal Triangle, as can be seen from Figure 1.1. Three Rand Water plants are established within this area supplying clean water as far north as Johannesburg (Rand Water, 2010b). Another dominant industry, is that of metals also with the necessary raw material like iron ore, coke and dolomite available within close proximity to the discussed area. The “metal giant” ArcelorMittal is situated in Vanderbijlpark, with two smaller plants in Vereeniging. They are a major supplier of metal coils used by many other smaller industries manufacturing items from small food cans used for packaging (Divfood, 2010) to big 200 litre steel drums (Greif, 2010) and even lipped channel and roof sheeting (Clotan Steel, 2010), all situated within the borders of the Vaal Triangle. They are also the supplier of flat metal for the automotive industry and manufacturers of household appliances like refrigerators and washing machines.

The Vaal Triangle basically house industries from most of the major industrial groups namely Metals; Oil and Gas; Water and Waste; Packaging; Food and Beverages; Mining; Paper as well as the Automotive industry.

For the purpose of this study, it was decided upon two of the most prominent companies within the Vaal Triangle to do an investigation on. This study would comprise of the criteria they use to qualify their suppliers. The two industries chosen are Sasol and Rand Water.

2.2.2. Background on Sasol

Because South Africa has no large oil reserves, Sasol was formed in 1950 with the purpose of manufacturing oil from coal (Sasol, 2009d). According to Sasol (2009a) they are an integrated energy and chemicals company who adds value to coal, oil and gas reserves using this feedstock to produce liquid fuels, fuel components as well as chemicals through unique proprietary techniques. In South Africa, Sasol refine imported crude oil and retail liquid fuels through a network of retail convenience centres. They also supply fuels to other distributors in the region as well as gas to industrial customers (Sasol, 2009b).

Sasol Limited is the holding company of the Sasol group and is located in Johannesburg (Sasol 2009c). Their operational footprint extends over 30 countries and they currently employ almost 34 000 people (Sasol 2009d).

According to Sasol (2009d), some of the highlights since their inception include the following.

- 1955, First automotive fuel.
- 1975, Development of new collieries at Secunda.
- 1979, Listing on the Johannesburg Stock Exchange (JSE).
- 1997, Sasol's Black Economic Empowerment (BEE) programme begins through the formulation of Exel Petroleum.
- 2003, Listing in the New York Stock Exchange in the United States of America (USA).
- 2004, Start of natural gas production in Mozambique's Temane field.
- 2006, Launching of major BEE deals for Sasol Mining and Sasol Oil.
- 2008, Concluding the landmark R24 billion Sasol Inzalo Broad Based Black Economic Empowerment (BBBEE) transaction.

Sasol (2009b) states, that they are committed to sustainable development and that they are a signatory of Responsible Care which is a worldwide initiative to improve performance in safety, health and the environment.

2.2.3. Background on Rand Water

According to Rand Water (2010b), back in 1886 when gold was discovered in the Witwatersrand, the scarcity of water was a problem. At first water was drawn from Fordburgspruit as well as from a few springs, but later as the demand increased, some smaller companies started operations in water supply. In 1887 the first major grant to a private company to supply water was to the Sivewright Concession. On 8 May 1903, the Rand Water Board was established by the British after the peace agreement between themselves and the Boer Republics.

Because of the scarcity of this natural recourse, as well as the need to supply a growing population, the Water Board had to impose water restrictions as well as look for other sources of water (Rand Water, 2010b). Following were some of the major development schemes upon which they embarked.

- 1914-1924, The Vaal River scheme which included the Barrage.
- 1924, The Vereeniging Pumping Station.
- 1938, Zwartkopjes Pumping Station Vaal Dam.
- 1949, Zuikerbosch Pumping Station situated in Vereeniging.
- 1998, Lesotho Highlands Project.

Today Rand Water is an organ of state reporting to the Department of Water and Environmental Affairs (Rand Water, 2010a). Throughout their history, they have remained financially self-sustained.

Rand Water states (Rand Water, 2010c) that they are the largest bulk water utility in Africa and one of the largest in the world. They provide bulk potable water (on average 3 653 million litres of water per day) to more than 11 million people within the Gauteng, parts of Mpumalanga, the Free State as well as the North-West. This area stretches over 18 000 km² and includes 58 strategically located service reservoirs which are fed through over 3 056 kilometres of large diameter pipeline (Rand Water, 2010a). Rand Water draws water from different catchments and then purifies it for human consumption. It is then sold to municipalities, industry and mines. Municipalities then sell the water to consumers or individual households (Rand Water, 2010c).

2.2.4. Importance of vendor selection in the supply chain

Vendor selection is a problem which has been formulated by Kumar *et al.* (2003:69) as "...a fuzzy mixed integer goal programming vendor selection problem that includes three primary goals: minimising the net cost, minimising the net rejections, and minimising the net late deliveries subject to realistic constraints regarding buyer's demand, vendors' capacity, vendors' quota flexibility, purchase value of items, budget allocation to individual vendors, etc." The main objective of managing a supply chain is to synchronise the customer's requirements with the flow of materials from the different suppliers in order to create a balance between high customer service, low inventory keeping, as well as low-unit cost. Vendors play an important role in achieving these supply management objectives. Therefore, when designing a supply chain, decisions regarding the selection of the right vendors and their quota allocation, must be considered as the choice of vendors is a crucial decision with wide-ranging implications on the supply chain. Vendors enhance customer satisfaction in the value chain and for this reason strategic partnerships with better performing suppliers should be integrated within the supply chain. This will result in the improvement in performance including the reduction in costs through the elimination of wastages, continuous improvement of quality to ultimately achieve zero defects, the reduction in lead times at different stages in the supply chain, the improvement in flexibility to meet the needs of the end-user, etc (Kumar *et al.* 2003:70).

2.2.5. Standardisation committees

For both of the companies being investigated, a committee was brought into life to manage their vendor selection which in this case, is their automation suppliers. For Sasol, the Electrical Supplier Management Group (ESMG), (Muller & Erasmus, 2009:4) and for Rand Water the Multi Functional Sourcing Team (MFST) were established (Rand Water, 2006b:2).

According to Muller and Erasmus (2009:4) the reason companies feel it necessary to establish such committees is because large companies comprising of different business units, each has its own forum, process or committee. They therefore individually manage their electrical product and service providers. This result in a

lack of consensus regarding the auditing criteria and the results obtained from the different audits on the same supplier regarding the supplier's performance. Communication to suppliers is also confusing as the different business units may communicate different recommendations or requirements to the same supplier. Other issues include current supplier lists not being consolidated and standardised between the different business units; the supplier list update process, (to add and remove suppliers) is not transparent to all business units; and the addition of new electrical suppliers is not effectively communicated.

Such committees, as was implemented by Sasol and Rand Water, should therefore consolidate the management of an electrical supplier list across the different business units of the company. Rand Water has developed a document especially for this purpose: "Methods and Procedures for the Procurement of Goods and Services". This document enables the various departments and divisions to streamline their processes to comply with one measurable standard (Rand Water, 2006a:4). The vision of the ESMG according to Muller and Erasmus (2009:4) is to "Develop, standardise and manage the database for Electrical Engineering equipment and service providers across the Sasol Group of companies."

The result of such an electrical supplier list will be, that only audited suppliers complying with a company's requirements, which include safety and quality aspects, are used to supply equipment and services. Electrical equipment may therefore, only be supplied to the Sasol group of companies if the supplier is on the ESMG supplier list and if they comply with the relevant International Electrotechnical Commission (IEC) or the South African National Standards (SANS) or Sasol's Specifications (Muller & Erasmus, 2009:7). According to communication by Mr A. Heineman (2010), because of the technicality of equipment being used within the industry which is mostly imported, Sasol accepts the internationally acclaimed standards from countries from which this equipment is imported. It is impractical to have all imported equipment retested by local testing facilities like the South African Bureau of Standards (SABS). Typical standards being accepted include the Conformité Européenne (CE) and Underwriters Laboratories (UL) mark of Europe and the USA respectively. According to Mrs K. van Niekerk (2010), a supplier needs to present a number of commercial documentation as requested in the Sasol Technology Vendor

Application Form (Sasol, 2010a:3, 5) and the Service Provider Pre-Qualification Information (Sasol, 2010b:3-5) forms. These include the following.

- Safety Health and Environmental (SHE) management system i.e. NOSA (National Occupational Safety Association).
- Environmental management system i.e. ISO 14000 (International Organization for Standardisation).
- Quality management system i.e. ISO 9001:2008.
- Company BBBEE accreditation in accordance with the codes of good practice as per the Department of Trade and Industry (DTI) requirements.

In the case of Rand Water, it is their policy to conduct business in such a manner as to encourage good supplier relationships in an environment that promotes competition within compliance of the law (Rand Water, 2008:10). They are an organ of state and as a result, will support the Government's policy to develop and sustain a viable and competitive local industry. They will co-operate with Government and its various departments to assist in the compliance with legislation to promote the local industry and BBBEE in particular (Rand Water, 2008:43). Rand Water therefore prefers to make use of BBBEE, SMME (Small, Medium and Micro Enterprises) and South African suppliers if possible, and will therefore, actively seek out suppliers complying with these criteria when reviewing competitive quotations (Rand Water, 2006a:8). For construction contracts, Rand Water is obliged when securing construction works to do so in terms of the Construction Industry Development Board (CIDB) requirements. The CIDB Act is applicable to all organs of state which prohibits the awarding of engineering and construction works contracts to any unregistered contractor within the private sector (Rand Water, 2008:21).

Initially with the supplier selection process, the appropriate MFST of Rand Water may develop and maintain a list of acceptable suppliers. For a supplier to qualify to be added to this list (Rand Water, 2006a:7), the following must be considered.

- Compliance to specifications and the adherence to Rand Water's criteria.
- The supplier's financial health and their ability to secure qualified labour, supervision and equipment to be able to provide the required goods and services.

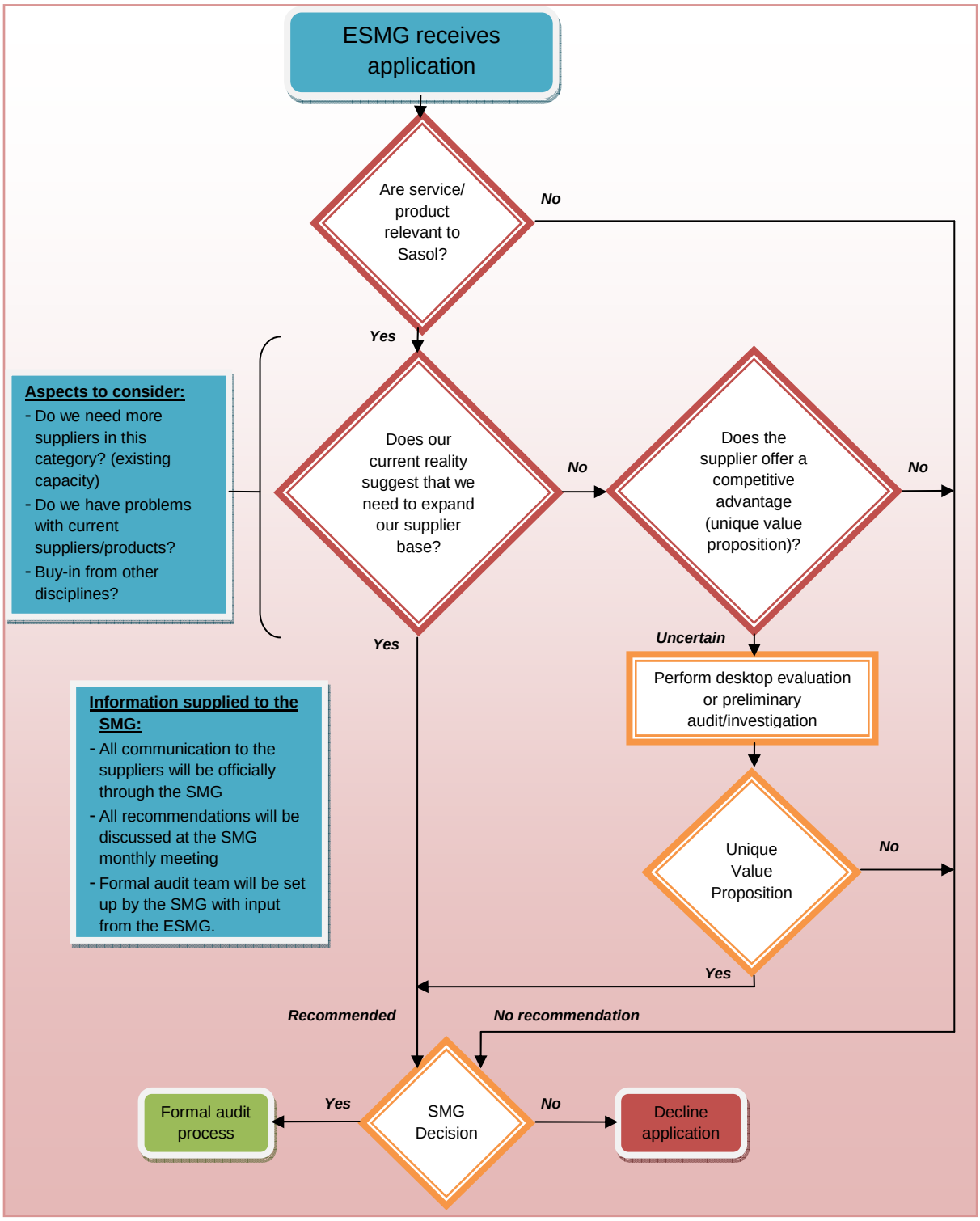
- The supplier's ability to be insured and their willingness to adhere to a non-discriminatory employment policy as well as an acceptable BBBEE policy.
- They should accept the required terms and conditions of Rand Water. This includes the employment of a comprehensive integrated system of quality assurance based on the SABS/ISO 9000 Standard of Quality Management System, or an equivalent standard approved by Rand Water (Rand Water, 2006c:11).
- All construction contracts must comply with the CIDB Act and the terms and conditions thereof (Rand Water, 2006a:17).

On the other hand, the MFST may also recommend for suppliers to be "de-certified" if they are deemed unacceptable.

- If the supplier consistently perform poorly regarding quality, deliveries etc.
- If they fail to adopt or maintain acceptable BBBEE policies.
- If not adhering to Rand Water's terms and conditions.
- If the supplier are deemed to be a financial risk or are declared insolvent.
- Unethical behaviour on the part of the supplier (Rand Water, 2006a:8).

Figure 2.2 below is a flow diagram of Sasol's supplier evaluation flow. It shows the process a potential supplier's application will follow when applying to supply a product and/or service to the ESMG. As seen from the flow diagram, the application will be evaluated by means of a number of questions emphasizing the relevance and need for that specific product or service, the end-result being that the application will be either rejected or that it will be further investigated through a formal auditing process.

Figure 2.2: Sasol's supplier evaluation flow



Source: Muller & Erasmus (2009:13)

The activities of the ESMG include the following.

- Ensure that the current suppliers list is consolidated for all business units.
- Provide guidance regarding the number of suppliers required for each product or service.
- Manage the approved suppliers list by adding, removing and updating the list.
- Continually evaluate the existing as well as new suppliers regarding their technical acceptability.
- Standardisation on the technical criteria to be used for assessing potential suppliers.
- Coordinate technical representations.
- Participate in supplier audits.
- Assist with supplier relationship management.
- Assist in developing performance criteria for suppliers (Muller & Erasmus, 2009:4-5).

The MFST's responsibilities include the following functions.

- The certification of suppliers.
- The development of critical criteria which will always include criteria for BBBEE, meeting technical specifications.
- Providing support to the end-user by monitoring supplier performance.
- Make recommendations and selections to the tender committee.
- Make stocking decisions where applicable (Rand Water, 2006b:2).

2.3. IDENTIFIED RESTRICTIONS

Through the study done on Sasol and Rand Water, a number of different obstacles suppliers encounter when attempting to conduct business with the local manufacturing industry were identified. These restrictions can be broken into a few categories.

Product Compliance restrictions

This includes product-related restrictions and covers the different standards to which products must comply i.e. SABS/SANS, IEC, CE and UL certification, etc.

Commercial restrictions

Commercial restrictions relate to the requirements the manufacturing industry calls for with regards to the supplier's business itself. These include things like the manufacturer or supplier's compliance to NOSA, ISO and their BBBEE status, as well as in cases where the industry is an organ of state, their CIDB rating.

Vendor quantity limitations

Added to the above restrictions, many companies also have a vendor restriction action plan where most try to limit their number of vendors per product or service to only a few. According to Rand Water's Methods and Procedures for the Procurement of Goods and Services (Rand Water, 2006a:6) their certified supplier lists will generally remain valid for a period of two to three years before the MFST will evaluate possible suppliers.

2.4. PRODUCT COMPLIANCE RESTRICTIONS

Product compliance standardisation is related to all those standards specific to the product being marketed in an attempt to sell it into the intended market. The manufacturer of the product decides to which standards their product needs to comply to be able to meet with the requirements of the majority of their intended market. Upon investigation, these products would be tested by the intended standardisation bodies and the corresponding mark would be placed on the product itself or in some cases, where there is not sufficient space on the product itself, on its packaging (Nordic, 2010?:3).

The distributor or reseller does not influence or impact this process of product standardisation. If they decide to sell a product in an international market, it would be marketed with its current product standardisation markings. If the consumer does not accept this marking, it would be in most cases impractical to have it retested with a

local standardisation institution. The major reason for this is that many of these market-leading products consist of hundreds of thousands of part numbers and it would therefore, be just too expensive to have it tested with every possible country's locally accepted testing body (Heineman, 2010). This restriction will therefore, only be discussed in general as local automation suppliers can rarely influence this restriction faced when attempting to supply their product into the manufacturing industry.

2.4.1. Background on SABS/SANS

SABS (2010b) states, that they are a constitutional body established in terms of the Standards Act (Act 24/1945). It continues to operate in terms of the latest edition of the Standards Act (Act 29/2008) as the national institution for the promotion and maintenance of standardisation and quality in connection with commodities as well as the rendering of services. They are in terms of the Standards Act (Act 8/2008) the recognised national institution for the promotion and maintenance of standards in South Africa.

SANS 1-1 is the norm developed by the SABS to detail the process for the development and amendment of South Africa's national standards. SABS serves as a facilitator in the development, as well as the maintenance of SANS. A SANS standard is therefore, a standard that is agreed upon by consensus of a committee, subject to public comment, approved as well as published by the SABS standards division. The technical content of a South African standard contextualises national requirements and needs are identified by the committee. South African standards therefore, are SANS and not SABS standards (SANS, 2009:8).

SABS have more than 50 years experience and are responsible for the development, issuing, promoting, maintaining, amending and withdrawing of standards. Their core function is to develop national standards, including the maximization of benefits of the internationalisation of standards (SABS, 2010a). Other activities include the following.

- Through a consensus process in technical committees, SABS publishes national standards from which they provide information on national standards of all countries as well as international standards.

- They test and certify products and services to specific standards.
- Based on national standards, they develop technical regulations (compulsory specifications), through which they monitor and enforce compliance with such technical regulations.
- They monitor and enforce legal metrology legislation.
- They promote design excellence.
- They provide training on aspects of standardisation.

Internationally, SABS represent South Africa in the development of international standards through their engagement with other international bodies such as ISO and the IEC. SABS is a member body of ISO and also actively participates in a number of its committees. They also provide the financial and administrative support for South Africa's membership of the IEC. Because of this liaison, they have access to sets of standards of standardisation bodies, including those of SANS, ISO and the IEC. South Africa, where possible, is obliged to base their national standards on international ones. They also have the right to adopt ISO, as well as IEC standards as their own (SANS, 2009:8).

2.4.2. Background on IEC

The IEC is a non-profit, non-governmental institutional standards organisation that prepares and publishes international standards in the field of electrical, electronic and related technologies, collectively known as electrotechnology (IEC, 2010a). They cover a vast range of technologies ranging from power generation, transmission and distribution, fibre optics, semiconductors, batteries, nanotechnology to home and office equipment. The IEC supports safety and performance, electrical energy efficiency, as well as renewable energies. They also manage conformity assessment systems which certify equipment, systems or components to conform to international standards.

Because international standards play a crucial role in the improvement of industrial efficiency as well as the development of international trade, the IEC works closely with other international standardisation partners like ISO (IEC, 2010b). The IEC is a

world leader in their field and members adopt their standards as national standards. Currently the IEC is represented within 130 countries of which 67 are members. The rest participate in the Affiliate Country Programme designed to help industrializing countries to get involved with the IEC. Members are called national committees, each representing its nation's electrotechnical interests within the IEC. These include manufacturers, distributors, consumers, professional societies, trade associates, as well as other standard developers from national standards bodies. SABS represents South Africa to form part of these member countries.

2.4.3. Background on the CE marking

Conformité Européenne (CE) is French for European Conformity and means "conformance to European Council (EC) Directives" (Nordic, 2010?:1). According to the Business Directory (Anon., 2010?), the definition for CE is a "...mandatory mark that indicates conformity with legal and technical directives of the European Union (EU). In effect, since 1993, it is not a mark of quality but serves as a 'passport' for EU-wide free-flow of a wide range of industrial products". Pre-standardisation, the greatest trade barriers within the European Economic Area (EEA), were linked to safety aspects, thus the basis for this European conformity (Nordic, 2010?:2).

To be able to market one's product within Europe, a manufacturer must meet with CE marking requirements where applicable. Once a manufacturer has gone through the conformity assessment process they may attach the CE marking on their product. As a result goods can be traded freely within the EEA. CE marking provides product access to 27 countries resulting in a population of approximately 500 million (CE, 2010).

When a CE mark is attached to a product, it certifies that the product meets with the health, safety and environmental requirements of the EU, ensuring the safety of the consumer (CE, 2010). CE marking usually involves amongst other obligations that a risk analysis for the product needs to be carried out. This includes determining the possible hazards that could be caused by the product, how great the risk is towards people, animals, goods, or to the environment, and what solutions should be applied to reduce risks in compliance with the appropriate EC directive (Nordic, 2010?:2).

2.4.4. Background on UL

Underwriters Laboratories (UL) is an independent internationally recognised product safety testing and certification organisation. UL is in the business of testing products and writing standards and test procedures for safety for more than a century (UL, 2009:1). According to UL's website, they evaluate more than 19 000 different types of products, materials, components and systems every year with 20 billion UL marks appearing on 66 000 manufacturers' products every year. Their global family of companies together with a network of service providers, includes 68 laboratory, testing and certification facilities which service customers in 102 countries (UL, 2010a).

UL has developed more than 1 000 standards for safety. These standards are essential for helping to ensure public safety and confidence, to reduce the cost, to improve quality and to market products and services (UL, 2010b).

2.4.5. Implications of product compliance standards on suppliers

The above-mentioned product/service compliance standards all have direct implications on suppliers hoping to do business with the manufacturing industry. Some of these implications, according to the SABS (2010c), are the following.

- Complying with standards, can open new markets by assuring prospective clients that you meet their quality requirements.
- It inspires added trust in a supplier.
- It could assist a business to meet mandatory regulations.
- It could create a competitive advantage by improving the quality of the product.
- It could attract new customers.
- Complying with the necessary standards, could lead to a reduction in damage claims and liability premiums.
- Another benefit may include, that a supplier's product is being made safer for end-users and consumers (ISO, 2010e).
- Regarding suppliers to the international market, like Other Equipment Manufacturers (OEM), the mayor benefit to acquiring the CE marking on your product, is that it will gain access into the EEA (Nordic, 2010?:1).

- When complying with an international standard like CE, as a supplier you will only have one set of laws and regulations to comply with in the design and manufacturing of your product for the entire EU marketplace.
- When a manufacturing industry requires certain standards, and a supplier's product/service does not comply, normally they will not be considered by that industry.
- Another drawback is that incurred costs will increase because of the extra expenses required in the testing of a product to obtain the required product certification.
- International standardisation can increase a supplier's opposition as international competitors may also enter the local market (ISO, 2010e).

2.5. COMMERCIAL RESTRICTIONS

Commercial restrictions, for the purpose of this study, will be defined as those restrictions directly related to an automation supplier's business when attempting to promote and sell their product/services into a local manufacturing industry. In other words, those things which they have control over and which are related to their business as an institution, for example a business' NOSA, ISO and CIDB ratings, as well as their BBBEE status. What all of them have in common, is that they all affect the supplier's business directly and it's in management's power to comply or not.

According to communication by Mr A. Heineman (2010), when a supplier attempts to do business with a manufacturing industry like Sasol, the industry normally has certain requirements they expect from their suppliers. These business-related standards are either enforced on the industry by government, i.e. BBBEE and CIDB, or are things they have to comply with as well, like SHE, quality and environmental standards. As discussed before, NOSA is a SHE management system and ISO is a quality an environmental management system. If contractors work on the industry's site and unsafe actions result in accidents, it will directly impact on their rating negatively. The industry therefore, requires the same or equivalent SHE, quality and environmental management systems of their suppliers. These requirements differ from one supplier to the next. If a supplier serves only as a middle-man, not adding value to the product like a reseller, they will normally only deliver the product to the

consumer's store. They would therefore, not come onto site and as a result not pose a risk to the consumer's safety, health and environment. It would therefore, not be required from them to comply with most of these requirements. On the other hand, when a supplier does system integration or construction work on the consumer's premises, they will pose a much greater risk to their safety, health and environmental issues. The consumer will therefore, require the supplier to conform to the necessary SHE, quality and environmental management systems.

2.5.1. Background on NOSA

According to the NOSA homepage (NOSA, 2010b), they are a leading global supplier of occupational risk management services, as well as products that enhance their clients' business performance.

Certification, consultation and training services are tailor-made according to their clients' needs, as well as their risk profiles and include areas such as occupational health, safety, hygiene, environment, quality, behaviour, HIV/Aids, social responsibility and sustainability (NOSA, 2010a:1).

NOSA assists their clients to achieve set goals through audits which are conducted by some of the most experienced auditors worldwide. They audit various risk management systems, and issue a NOSA grading certificate and a star-rating.

This NOSA Five Star System Standard specification specifies the crucial requirements which are the building blocks for an effective and efficient occupational health, safety and environmental management system. By implementing and maintaining such a system, the implementer will be enabled to manage risks as well as improve both business performance and sustainability within the field of occupational health, safety and environmental management. It is as integral to operations as production and quality standards.

NOSA builds their system on the following principals.

- Continual improvement.
- Commitment and policy.
- Planning.
- Implementation and operational control.

- Monitoring and system review.

The NOSA Five Star System is implemented by thousands of organisations across the world, thus providing them with a solid framework for managing their occupational health and safety. Many companies wish not to integrate environmental standards into their management system. For cases like these, the NOSA Five Star System (Health and Safety) audit is ideally suited. It recognises the need of especially the SMMEs who wish to manage their health and safety, but who does not possess the resources to implement a fully integrated health, safety and environmental risk management programme. A star grading audit is normally conducted annually but can be more frequent on the client's request.

NOSA has over 57 years experience in auditing companies. Their auditing service has been pivotal, locally and abroad, in improving the occupational risk management performance of companies.

Figure 2.3: Logo of NOSA

Source: NOSA (2010a:1)

A typical NOSA logo presented to a company complying with the NOSA requirements can be seen in figure 2.3 above. Depending on the level of conformity, a star-grading will be presented to the company and the matching star-rating will be indicated on their logo. This logo is normally displayed on a grading board strategically placed at the entrance of a company, as well as on official documentation.

Table 2.1. Criteria for NOSA star-rating

EFFORT %	DIFR (EXPERIENCE)	STAR-RATING
> 95	< 0.8	*NOSCAR Status*
> 91	< 1	5 Star: *Excellent*
> 75	< 2	4 Star: *Very good*
> 61	< 3	3 Star: *Good*
> 51	< 4	2 Star: *Average*
> 40	< 5	1 Star: *Fair*

Source: NOSA (2010a:5)

Table 2.1 above shows the criteria upon which NOSA bases its star-rating. The measuring of the successful implementation is determined by the grading audit. It focuses on the program status (percentage effort), as well as the disabling incident frequency rate (DIFR) of the company.

Disabling injuries are injuries resulting in restricted workdays as well as workdays lost. DIFRs are calculated as follows (NOSA, 2010a:5).

$$DIFR = \frac{\text{Number of disabling incidents} \times\ 200\ 000}{\text{Total man} - \text{hours worked}}$$

The above formula shows that the disabling incident frequency rate of a company can be calculated by multiplying the number of disabling incidents of that firm's workforce by 200 000 and by dividing it with the total number of workers minus their actual hours worked.

2.5.2. Implications of NOSA on suppliers

Because the world is more than ever before taking into consideration its impact on the environment, more and more consumers are choosing to buy environmentally friendly products. This results in manufacturers also following this trend where they prefer buying from suppliers who comply with certain requirements. These

requirements include things like the occupational health and safety of employees and how the environment is being affected by the production process.

Because of these requirements and certain legislation enforcements, suppliers are attempting to comply with these criteria. In many instances, especially with larger manufacturers likes Sasol, it is a prerequisite especially when working on-site, to have a certain NOSA or equivalent grading to be able to do business with them. It is therefore in a supplier's best interest to comply (Heineman, 2010).

Other benefits to suppliers include (NOSA, 2010c).

- Health, safety and environmental impacts and risks are more easily identified.
- Risks can be prioritised and addressed systematically.
- NOSA System Standards are compatible with existing organisational management systems and standards such as ISO 9001:2008, OHSAS 18000 (Occupational Health and Safety Assessment Series), ISO 14001 and legislative requirements.
- It reduces absenteeism by employees, claims as well as insurance assessments.
- It addresses moral, financial and legal issues which are related to occupational health, safety and environmental management.
- It improves the commitment of the employer as well as the employee towards health, safety and the environment.
- Recognition is received in the form of a grading certificate which can be displayed and presented in official documentation. This can present the company with a competitive advantage against opposition not complying.
- It can be integrated into sustainable reporting.

As can be seen from the above, complying with the NOSA System Standards is not only extra effort and expense to a supplier, but also presents certain worthwhile benefits.

2.5.3. Background on ISO

ISO is according to their web-site (ISO, 2010a), the world's largest developer and publisher of International Standards. They consist of a network of the national standards institutes of 161 countries of which each country only has one member. This system is coordinated by the Central Secretariat in Geneva, Switzerland.

ISO has in the excess of 18 000 international standards, together with other types of normative documentation in their portfolio. Their work programme ranges from standards for traditional activities such as construction and agriculture, through mechanical engineering, manufacturing and distribution, to transport, information and communication technologies, medical devices, to standards for good management practice and services (ISO, 2010d).

ISO is a non-governmental organisation that forms the link between the private and public sectors (ISO, 2010a). On the one side, there are the members who have their roots exclusively in the private sector, and on the other side, many of its member institutes form part of the governmental structure of their respective countries. ISO therefore, enables a consensus to be reached on solutions that meet both the requirements of business and the broader needs of society. For this reason it is fitting that their name is derived from the Greek word “isos” meaning "equal" (ISO, 2010b).

According to ISO (2010f) their standards affect the following.

- Make the development, manufacturing and supply of products and services safer, cleaner and more efficient.
- Facilitate trade between different countries and also make it fairer.
- Also provide governments with a technical base for health, safety and environmental legislation, and conformity assessment.
- Results in the sharing of technological advances and good management practices.
- Serve as a medium to disseminate innovation.
- Safeguard consumers in general, of products and services.
- Help making life simpler by providing solutions to common problems.

By far the most of ISO's standards are highly specific to a particular process, material or product. However, two very common standards namely ISO 9001 and ISO 14001 are nonspecific management system standards. This means that the same standard can be applied to any organisation, large or small, in any sector of activity whether it is a business enterprise, a government department or a public administration and even if they are suppliers of a service or a product (ISO, 2010g).

ISO 9001 management system standard

ISO 9001 contains a generic set of requirements for implementing a quality management system (QMS) (ISO, 2010f). Its objective is to provide a set of requirements that can establish consumer confidence regarding the supplier's ability to consistently provide goods and services that meet with the consumer's expectations, as well as with acceptable regulations. These requirements cover a wide range of topics including top management's commitment to quality, employee competence, customer focus, corrective/preventive actions, processes to resolve customer complaints, purchasing, review of incoming orders, adequacy of resources, process management (for production, service delivery and relevant administrative and support processes), product design, quality planning, monitoring and measurement of processes and products and a continual drive to improve QMS. (ISO, 2010c).

ISO 14001 management system standard

ISO 14001 contains a generic set of requirements for implementing an environment management system (EMS) (ISO, 2010f). According to Vachon and Klassen (2007:299), manufacturers face intense scrutiny from diverse stakeholder groups, including end-users, industrial customers, suppliers, and financial institutions. As a result, environmental management has become an important function and therefore, manufacturing managers have adopted various strategies in an attempt to limit the impact of their products and operations on the environment. Environmental management has in recent years evolved to include activities such as reverse logistics, green purchasing and product stewardship to expand its boundaries. These activities require varying degrees of interaction with other organisations in the supply

chain, whether downstream with the customers or upstream with the suppliers. Unfortunately in the supply chain, a limited understanding of environmental management has hampered the development of a widely accepted framework that would characterise and categorise environmental activities in the supply chain.

An EMS provides a framework for organisations wishing to effectively manage their environmental affairs. Implementing an EMS like ISO 14001 holds a number of benefits for the conforming company. These include the following.

- Increased profits by reducing the cost of goods sold through a reduction in quantities of material and energy used in the production phase.
- Cost reduction through a reduction in pollution as its components are purchased in raw materials.
- An improvement in the company's operations also leads to a reduction in costs. An EMS can identify redundancy in the company's day-to-day efforts for regulatory compliance and can be eliminated, resulting in a more efficient organisation.
- An improvement in communications can also lead to greater efficiency in decision-making. An efficient notification system can reduce the time to react to an environmental threat and as a result, limit the impact, risk and liability to the organisation.
- It can also assist in the marketing of the organisation to investors, clients, suppliers, creditors, employees and the public. A strong EMS can assist in attracting environmentally conscious customers and as a result, provide a competitive advantage over competitors (Prolor Techpros, 2010:1).

2.5.4. Implications of ISO on suppliers

When a large majority of products and services in a particular industry conform to international standards, it results in a state of industry-wide standardisation. Economic stakeholders concerned, will agree upon certain specifications and criteria which need to be applied consistently in the classification of materials, the manufacture and supply of products, testing and analysis, terminology and in the provision of services (ISO, 2010e). The result becomes a common technological

language between suppliers and their customers. It therefore, assists in the facilitation of trade and the transfer of technology.

According to ISO (2010h) standards provide technological, economical and societal benefits to all parties involved in business. A widespread adoption of international standards means that suppliers are in the position to develop and offer products and services that have wide international acceptance. This opens many more doors as they can compete in markets across the globe. On the other hand, this international standardisation has a negative impact on suppliers as well. Suppliers from abroad which traditionally were not able to supply their product or service into an overseas market now are able to do so because of international acceptance. They are therefore, becoming a threat to local suppliers as they start competing for the same business. Therefore, international standards create a level playing field for all competitors in specific markets.

Regarding ISO 9001, it provides some requirements for the purchasing process. These include requirements regarding purchasing information that should be provided by the buyer for the supplier to clearly understand their customers' needs, as well as ways in which the supplied products can be verified as meeting the customer's requirements (ISO, 2010c). ISO 9001 requires suppliers to monitor their customer's satisfaction levels and to feed this information back in order to improve the effectiveness of their QMS. If a customer should not be happy with specific goods or services they receive, it should be brought to their supplier's attention. According to ISO (2010c) the supplier is then obliged to investigate the complaint and appropriate actions should follow to avoid or reduce the chances of it happening again.

2.5.5. Background on BBBEE

Since 1994, historically disadvantaged citizens of South Africa have been encouraged to participate in the growing economy of South Africa. By using BBBEE, the legislature has been proactive in its efforts to encourage the participation of black people. The term "Black people" is defined in the BBBEE Act (53/2003) as Africans, Coloureds and Indians. The broad-based Codes and the Sector Charters not only encourage and formalise broad-based empowerment, but they also place more

emphasis on the inclusion and participation of women and new sector players (Fauconnier & Mathur-Helm, 2008:1).

In order to realize the joint participation of all South Africans, the Broad Based Black Economic Act of 2003 was promulgated in January 2004. According to Leappan (2006:2) the definition of the BBBEE Act is the “Economic empowerment of all Black people, including women, workers, youth, people with disabilities and people living in rural areas through diverse but integrated social economic strategies.”

The aim of the Act is to promote BBBEE through the issuing of codes of good practices, which will be legally binding on organs of state and public entities. The Act also establishes a BBBEE advisory council and encourages the development and implementation of transformation charters for the different sectors of the economy of South Africa (Pietersen, 2006:1).

BBBEE provides a policy framework for the strategic development of SMMEs in general, and black SMMEs in particular. In this way, the BBBEE policy framework presents a golden opportunity to bridge the divide between the “First and Second Economy”.

2.5.6. Implementation of BBBEE

The BBBEE policy uses a balanced scorecard to monitor the implementation of the objectives of BBBEE. Appendix A shows Code 801 which is the Small Enterprises Scorecard. The scorecard operates on the basis of a weighted average and the overall weighted average score that a business obtains, determines the BBBEE status of that business undertaking.

The seven elements of the codes of good practice which are measured by the balanced scorecard (Appendix A) are the following.

- Direct empowerment, (equity ownership and management control).
- Human resources development, (employment equity and skills development).
- Indirect empowerment, (preferential procurement, enterprise development and residual elements).

Table 2.2 below shows how this scorecard is then used to determine the company's BBBEE status and they are then recognised as a certain level BBBEE contributor.

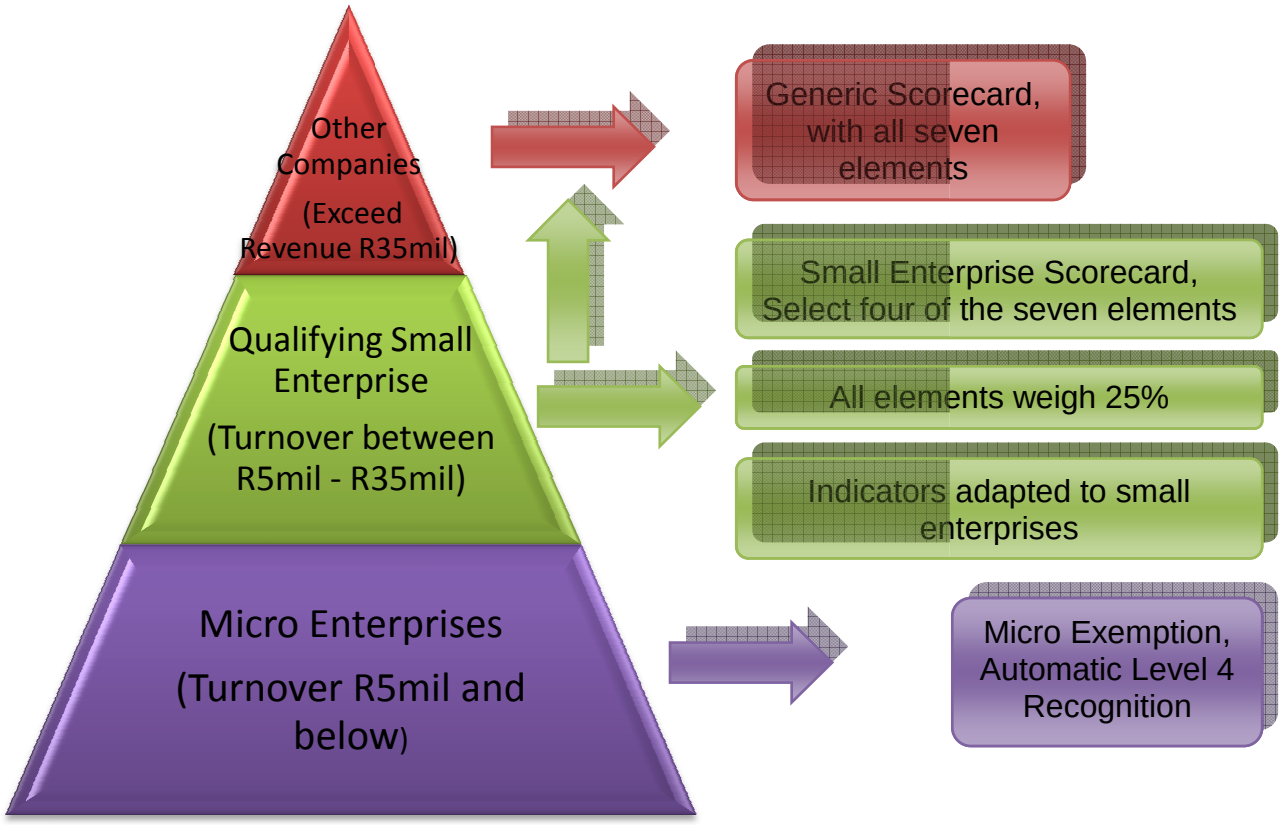
Table 2.2: Code 500: BBBEE procurement recognition level

BBBEE Status	Qualification	BBBEE Procurement Recognition Level
Level 1	≥ 100 points on the Generic Scorecard	135%
Level 2	85 - 99 points on the Generic Scorecard	125%
Level 3	75 - 84 points on the Generic Scorecard	110%
Level 4	65 - 74 points on the Generic Scorecard	100%
Level 5	55 - 64 points on the Generic Scorecard	80%
Level 6	45 - 54 points on the Generic Scorecard	60%
Level 7	40 - 44 points on the Generic Scorecard	50%
Level 8	30 - 39 points on the Generic Scorecard	10%
Not Compliant	< 30 points on the Generic Scorecard	0%

Source: DTI (2003:8-9)

Figure 2.4 below gives a summary of the measurement of BBBEE in small enterprises. Companies are divided into different categories through their annual turnover to give an indication of which scorecard should be used by that particular company.

Figure 2.4: Measurement of BBBEE in small enterprises



Source: DTI (2007?:31)

2.5.7. Implications of BBBEE on suppliers

According to the BBBEE Act (53/2003), the BBBEE initiatives lay forth a number of opportunities.

- It gives Black entrepreneurs access to real economic opportunities through the transfer of ownership.
- It encourages broad-based participation in managing, owning and controlling enterprises.
- BBBEE can be accelerated through the incorporation of skills development, employment equity and procurement plans as part of funding agreements.
- The business owners can make quality, sustainable enterprise development investments.

- In time to come, and if businesses are structured correctly, BBBEE will attract a monetary value, which in turn will add economic value to the business.
- When it comes to business efficiencies, the skills development and preferential procurement elements are isolated as being particularly relevant. The codes effectively require each company to conduct a complete audit of all their training and procurement in order to generate a score. In the case of skills development, a full audit of all training must be identified and quantified. The output will show who is being trained and on what. It should also assist in developing a comprehensive skills development strategy that is in the business's best interest. Similarly, a complete audit of all procurement has the potential to reveal buying patterns as well as cost of goods and services. The knowledge will provide the business with the ability to identify new suppliers, negotiate better rates with existing suppliers and ultimately streamline their expenditure.

On the other side, there are also a number of threats BBBEE Act (53/2003).

- BBBEE can be the cause of project delays which can possibly lead to cancellations.
- It can cause companies to change over to outsource services.
- A self-interest threat can arise from persons or enterprises acting in their own interest, for example financial self-interest.
- Self-review threats can occur when a person or an enterprise reviews the work they've done, themselves.
- BBBEE is still regarded as a threat and a further cost of compliance to yet another law.
- Some companies, especially the international industry, do not want to enter into BBBEE transactions.
- The perception/belief exists that "...BBBEE is important only to secure Government business".
- A negative perception exists amongst white-owned businesses regarding the impact of BBBEE on their businesses and the economy.

- For the smaller enterprises, size and funds available are significant constraints.
- Socio-economic development offers a common threat given that it is the “easiest pillar to implement”.
- Finding and retaining suitably qualified managers, is difficult.

2.5.8. Background on the CIDB

Because construction is a large-scale provider of employment in South Africa, it provides the physical infrastructure and backbone for local economic activity. As a result, construction plays an essential role in the economic and social development of this country. Unfortunately, the legacy of “Apartheid” has left the South African construction industry with a number of development and transformation challenges CIDB (2010a). Frustration exists in the emerging sector with regards to their inability to access opportunities, finance and credit, as well as training with regard to their profession and management.

In 1997, the South African Government published a Green Paper on “Creating an Enabling Environment for Reconstruction, Growth and Development in the Construction Industry". This paper paved the way for the establishment of the CIDB. In October 2000 the CIDB Act (Act 38/2000) was passed, establishing the CIDB mandate to lead stakeholders in construction development (CIDB, 2010a).

The purpose of the Act is “...to implement an integral strategy for the reconstruction, growth and development of the construction industry and to provide for matters connected therewith.” Legislation also prohibits any person from conducting business under a name containing the words “Construction Industry Development Board” (CIDB Act, 38/2000).

According to the CIDB (2010b) their focus is on the following.

- Sustainable growth, capacity development and empowerment.
- Improved industry performance and best practice.
- A transformed industry, underlined by consistent and ethical procurement practices.
- Aims to enhanced value to clients and society.

The Construction Industry Development Board Act (38/2000) states, that because of the specialised and risk-associated nature of the construction industry, a large responsibility is placed on the public sector client. It has to continuously improve its procurement management skills in such a matter which promotes efficiency, transformation, value for money and the sustainable development of this industry.

According to the Application for Contractor Registration form (CIDB, 2006:3), contractors are classified into different classes namely:

- Civil engineering.
- Electrical engineering.
- General building works.
- Mechanical engineering works.
- Specialist works.

The CIDB Act requires the CIDB to establish a register of contractors. This register should grade and categorise contractors according to their works as well as their financial capability. For a contractor to be get contracts with the public sector, they need to be registered with the CIDB (CIDB, 2005:2).

Table 2.3: CIDB grading

Grade	Maximum Contract Value
1	R 200 000
2	R 500 000
3	R 1 500 000
4	R 3 000 000
5	R 5 000 000
6	R 10 000 000
7	R 30 000 000
8	R 100 000 000
9	Unlimited

Source: CIDB (2005:2)

Table 2.3 above shows the nine different grading levels which a contractor can apply for, which indicates the size in rand value of contracts they are capable of doing. This grading is based on the financial as well as on the works criteria of the contractor. According to the CIDB (2005:2), the financial criteria comprises of the contractor's average annual turnover, their track record and their employable capital. The works capability assesses the contractor's track record and the number of personnel in certain specialist categories.

2.5.9. Implications of the CIDB on suppliers

The vision of the government regarding the CIDB is to promote stability, economic growth as well as international competitiveness, to create sustainable employment and to address the historic imbalance set by the "Apartheid" era.

The CIDB Act (38/2000) states, that the implementation of the CIDB should result in establishing a public sector of contractors that will:

- support risk management in the tendering process;
- the administrative burden associated with the awarding of contracts as well as the tendering costs to both contractors and clients should be reduced;
- enable the emerging sector to have effective access to work and development opportunities;
- assess the performance of contractors in the execution of contracts and will thus provide a performance record for contractors;
- minimum standards and best practice of contractors will be promoted;
- provide and store data regarding the size and distribution of contractors operating within the industry. This includes data pertaining to the volume, the nature, the performance and development of contractors and target groups;
- enable access by the private sector and therefore also help facilitating the private sector procurement.

The following are a number of benefits for those contractors who are registered with the CIDB.

- It qualifies the contractor to tender for public sector work.

- It promotes the development and sustainability of contractors.
- It builds a credible track record for the contractor.
- It provides clients the opportunity to identify potentially emerging contractors for targeted development support.

No construction work for public sector contracts awarded in terms of a competitive tender or quotation, or a portion thereof, may be undertaken, carried out or completed by a contractor, unless he or she is registered with the CIDB and holds a valid registration certificate.

Registration by the CIDB in terms of the CIDB Act (38/2000) is valid for a period of three years and the registered contractor must apply for renewal three months before the expiry date of the current registration.

2.6. SUMMARY

In this literature study, a general investigation into the supply chains of some of the most prominent manufacturing industries within the geographical demarcation of the study was analysed. In the process Porter's Five Forces Model was used to highlight the fact that through the conduction of an industry analysis, a company can determine a position within the industry where they can best defend themselves against these competitive forces discussed by Porter, or where they can influence it to their favour.

Two manufacturing industries were chosen, namely Sasol and Rand Water, and the different criteria upon which they qualify their suppliers, were identified. The main reasoning behind their required criteria, was investigated and was categorised as follows.

- Product Compliance restrictions which include standards to which the product itself must comply.
- Commercial restrictions which are the restrictions related to the business itself and include their NOSA, ISO and CIDB ratings as well as their BBBEE status.

Another restriction only touched on, was the limitations placed on suppliers by the consumers themselves which, in this case is the manufacturing industry. Here the suppliers are restricted to only a few per product or service.

From the study it was decided that only the commercial restrictions need to be addressed in detail as they impact the suppliers within the geographical area being studied more directly. The reasoning behind this was that these restrictions are directly related to the business which is in control of its management and as such can be controlled by them. On the other hand, it is not within management's control to change the product standardisation as it is impractical to have a whole product range retested and classified locally, which probably consists of hundreds of thousands of part numbers. The supplier also doesn't have it in their power to influence the restrictions placed on them by the consumers, namely that of the limitation of the number of suppliers per product or service.

The commercial restrictions were therefore, investigated in much more detail, which included the direct effects and implications of each restriction on the supplier. The following were some of the more noteworthy implications identified.

- Because of the implementation of SHE and quality management systems, legislative requirements like occupational health, safety and environmental impacts and risks, as well as moral, financial and legal issues which are related to SHE management, are more easily identified and addressed.
- Acceptance of international standardisation, like that of ISO, results in a common technological language. The outcome is that suppliers are in the position to develop and supply products and services that have international acceptance. Most ISO standards are highly specific to a particular process, material or product. ISO 9001 and ISO 14001 however, are non-specific management system standards pertaining to quality and environmental issues respectively. ISO 9001 can assist in complying suppliers to gain a competitive advantage over non-complying competitors, as it can establish consumer confidence regarding their ability to consistently provide goods and services that meet with the consumer's expectations as well as with acceptable regulations. ISO 14001, on the other hand, provides a framework for organisations wishing to effectively manage their environmental affairs. The

effective implementation of an EMS like ISO 14001 also has many costs saving implication on the complying supplier.

- Because of the enforcement of BBBEE by legislation, it unfortunately has a negative acceptance, especially under white-owned businesses. BBBEE does, however, lay forth opportunities like assisting in the development of a comprehensive skills development strategy that is in the business's best interest. Similarly, a procurement audit has the potential of revealing buying patterns, as well as cost of goods and services. This knowledge could provide the business with the ability to identify new suppliers, negotiate better rates with existing suppliers and ultimately streamline expenditure. Unfortunately, a number of threats also exist, namely: it can be the reason for project delays and even cancellations; it can result in outsourcing of services; it is regarded in many cases as a further cost of compliance to yet another law; and some international industries do not want to enter into BBBEE transactions.
- The CIDB Act (38/2000) dictates that no construction work for public sector contracts may be undertaken unless the contractor is registered with the CIDB. It is therefore, in the contractor's best interest to register to be able to tender for such contracts. Another benefit presented by the CIDB, is that they are required to establish a register which should grade and categorise contractors. Through this register, the CIDB provides and stores data regarding the size and distribution of contractors operating within the industry. This includes data pertaining to the volume, the nature, the performance and development of contractors and target groups. The performance of contractors in the execution of contracts is assessed and therefore, provides a performance record for contractors.

CHAPTER 3

RESULTS AND DISCUSSION OF THE EMPIRICAL RESEARCH

3.1. INTRODUCTION

In this chapter, the results of the empirical study measuring the common restrictions faced by automation suppliers when dealing with the manufacturing industry will be discussed. The empirical study comprised of the completion of a questionnaire which was distributed to the top management of suppliers in the automation field within the Vaal Triangle geographical area.

The questionnaire used in this study, was developed alongside the conduction of the literature study with the aim to be able to accomplish the primary and secondary objectives discussed in chapter one.

The completed questionnaires were analysed by the Statistical Consultation Services of the North-West University (Potchefstroom campus).

The reliability of the questionnaire was assessed by calculating the Cronbach Alpha coefficients. As a result of the fact that in this study, a convenient sample was used and no random sampling was done, interpretations were conducted on effect sizes (*d*-values) which gives an indication if there were any differences of practical value between any of the demographical variables regarding the constructs. For completeness' sake, *p*-values have been reported as if random sampling was done.

The means ($\bar{x}$) were used as a measure of central tendency and the standard deviation as an indication of the scatter of data around the mean.

Frequency distribution tables were included to indicate how the different demographical variables of the respondents were reported and how they were further grouped to compare these different demographical groups with the constructs.

3.2. GATHERING OF DATA

A newly developed questionnaire was used to assess the perception of the target population regarding their awareness as well as how they experience the commercial restrictions identified within this study.

3.2.1. Target population

In this study, the geographical demarcation was restricted to the borders of the Vaal Triangle, as was discussed in chapter one. The target population is made up of suppliers of automation equipment to the manufacturing industries. This target population included the channel partners of automation equipment manufacturers, their local Vaal Triangle branches, as well as resellers of similar products and services and consisted of a total of 70 companies.

A questionnaire was compiled, which was distributed to the Owner, the Managing Director, and the Member or to the Vaal Triangle Branch Manager of the supplier to be completed.

3.2.2. Data collection

The questionnaires were sent out to the target population via e-mail and they were urged to complete and return the questionnaires by a certain date. It was emphasised that the questionnaires should be filled out completely and as objectively and honestly as possible. A log was kept of all completed questionnaires and follow-up communication via a short message service (sms), e-mail and telephone calls were made to urge prospective participants to complete and return their questionnaires. Respondents who did not fill out their questionnaire completely were contacted to gather the required information.

The total number of questionnaires received back for analysis was 32, resulting in a response rate of 46%.

3.2.3. Questionnaire used in the study

The questionnaire used in this study consists of the following five sections.

- Section A: Demographic information.
- Section B: Awareness of NOSA, ISO, BBBEE and CIDB.
- Section C: Advantages to the company.
- Section D: Disadvantages to the company.
- Section E: General.

Refer to Appendix B for an example of the questionnaire used.

3.3. ASSESSMENT OF THE CONSTRUCTS MEASURED IN THE STUDY

Section B, C and D of the questionnaire assesses 12 constructs measuring the awareness, the advantages and the disadvantages of the commercial restrictions namely NOSA, ISO, BBBEE and CIDB on the participating companies respectively.

3.3.1. Arithmetic mean and standard deviation

Levine *et al.* (2008:97) state, that the arithmetic mean (also referred to as the mean) is the most common measure of central tendency, and also the only common measure in which all values play an equal role. Levine *et al.* (2008:108) also state that the standard deviation assists you in knowing how a set of data clusters around its mean. Normally the majority of observed values will lie within an interval of plus and minus one standard deviation above and below its mean.

The arithmetic mean and standard deviation values obtained by these 12 constructs are presented in Table 3.1 below.

The construct, ***awareness of BBBEE*** ($\bar{x}$ = 4.56) yielded the highest mean value with ***awareness of NOSA*** ($\bar{x}$ = 4.22) and ***awareness of ISO*** ($\bar{x}$ = 4.13) also yielding relative high means.

The construct ***awareness of CIDB*** ($\bar{x}$ = 2.44) yielded the lowest mean value, with three of the four disadvantage constructs namely ***disadvantages of CIDB*** ($\bar{x}$ =

2.44), ***disadvantages of BBBEE*** ($\bar{x}$ = 2.53) and ***disadvantages of NOSA*** ($\bar{x}$ = 2.54) also yielding low mean scores.

Table 3.1. The 12 constructs measured in the study

Constructs	*n*	Mean ($\bar{x}$)	Standard Deviation *(s)*
Awareness of NOSA	32	4.22	1.10
Awareness of ISO	32	4.13	1.29
Awareness of BBBEE	32	4.56	0.80
Awareness of CIDB	32	2.44	2.21
Advantages NOSA	32	2.59	0.51
Advantages ISO	31	2.64	0.65
Advantages BBBEE	32	2.79	0.58
Advantages CIDB	19	2.83	0.60
Disadvantages NOSA	32	2.54	0.53
Disadvantages ISO	31	2.59	0.567
Disadvantages BBBEE	32	2.53	0.53
Disadvantages CIDB	19	2.44	0.65

3.3.2. Reliability and validity

For the results of the questionnaire to be examined, it is imperative to ensure that the statements selected, do indeed test the constructs and variables, as well as that the statements relate to each other. In order to do this, the reliability and validity of the questionnaire needs to be tested.

According to Anastasi and Urbina (1997:84) the reliability of a test refers to the consistency of scores obtained on different occasions by the same person when he or she is re-examined with the same test, with different sets of equivalent items, or under other variable examining conditions.

Anastasi and Urbina (1997:113) also state, that the validity of a test relate to that what the test measures and how well it is able to do so. In other words, if valid it actually measures that what it is supposed to.

The following steps were carried out to ultimately determine the reliability and validity on the different constructs.

- Cronbach's Alpha coefficients to determine reliability.
- Confirmatory factor analyses were done by taking into account Kaiser's measure of sample adequacy (MSA), percentage variation explained and variation of communalities.

3.3.2.1. Cronbach's Alpha Coefficient

In order to assess the internal consistency between the items of the measuring instrument, it is necessary to calculate the Cronbach Alpha coefficient (Reynaldo & Santos, 1999). This coefficient is based on the average correlation of variables within the test (SAS Institute 2005:295).

According to Nunnally (1978:295), an overall score for each participant can be obtained by summing interrelated items. The reliability of this type of scale can be estimated through Cronbach's Alpha coefficient by determining the internal consistency of the test or through the average correlation of items within the test. In other words, how closely related a set of items are as a group.

The greater the Cronbach Alpha coefficient, the more reliable the scale. Field (2009:675) states that for cognitive tests such as intelligence tests, a Cronbach Alpha coefficient of 0.8 is generally appropriate. For ability tests, the cut-off point of 0.7 is more suitable. When dealing with psychological constructs, however, values of below 0.7 can realistically be expected. This is because of the diversity of the constructs being measured.

The Cronbach Alpha coefficients, as were determined through the statistical analysis for the constructs measuring the awareness, advantages and disadvantages of the commercial restrictions identified, are presented in Table 3.2 below.

Table 3.2. Cronbach's Alpha Coefficient

Constructs	Cronbach's Alpha Coefficient (α)
Awareness of NOSA	0.70
Awareness of ISO	0.71
Awareness of BBBEE	0.54
Awareness of CIDB	0.93
Advantages NOSA	0.75
Advantages ISO	0.85
Advantages BBBEE	0.77
Advantages CIDB	0.79
Disadvantages NOSA	0.76
Disadvantages ISO	0.70
Disadvantages BBBEE	0.60
Disadvantages CIDB	0.79

The following two constructs yielded Cronbach Alpha coefficients of lower than 0.70.

- ***Awareness of BBBEE*** *(α = 0.54).*
- ***Disadvantages BBBEE*** *(α = 0.60).*

According to Field (2005:668), it is however, not necessary to ignore constructs if the Cronbach Alpha coefficient is smaller than 0.7 if attitude rather than ability is measured. The questionnaire used in the study measured the attitude of managers and not ability. Both constructs namely ***awareness of BBBEE*** *(α = 0.54)* and ***disadvantages BBBEE*** *(α = 0.60)* yielded Cronbach Alpha coefficients above 0.5. Therefore, all twelve constructs can be regarded as reliable.

3.3.2.2. Kaiser's measure of sample adequacy

Kaiser's measure of sample adequacy (MSA), gives an indication of the inter-correlations among variables. It can be used to determine whether a factor analysis

is appropriate, (Tabachnick & Fidell, 2001:589). The MSA index ranges from 0 to 1 and reaches 1 when each variable is perfectly predicted by the other variables.

According to Field (2005:640), this measure can be interpreted making use of the following guidelines:

≥ 0.80: meritorious;
0.70: middling;
0.60: mediocre;
0.50: miserable; and
< 0.50: unacceptable.

Table 3.3. Kaiser's measure of sample adequacy

Constructs	Overall MSA
Awareness of NOSA	0.55
Awareness of ISO	0.58
Awareness of BBBEE	0.53
Awareness of CIDB	0.76
Advantages NOSA	0.60
Advantages ISO	0.77
Advantages BBBEE	0.73
Advantages CIDB	0.73
Disadvantages NOSA	0.68
Disadvantages ISO	0.41
Disadvantages BBBEE	0.63
Disadvantages CIDB	0.77

Table 3.3 above shows the overall MSA result obtained for each of the twelve constructs measured within the questionnaire. It indicates that overall a middling to meritorious result was obtained with 50% of the constructs obtaining these results. Only three mediocre, two miserable and one unacceptable result namely

disadvantages ISO *(0.41)* were obtained. Although the MSA for ***disadvantages ISO*** was unacceptable and therefore, construct validity for ***disadvantages ISO*** could not be validated, the decision was made to keep this construct as part of the analysis for completeness' sake and because of the fact that a high Cronbach Alpha coefficient value of 0.70 was obtained.

3.3.2.3. Factor variation

A factor analysis is conducted when it is believed that certain concealed variables (factors) exist that exert causal influence on the observed variables being studied. Exploratory factor analysis helps to identify the number and nature of these latent factors (Field, 2005:619).

The Eigenvalue-greater-than-one rule (MINEIGEN criterion) is one of the most popular heuristics to determine the number of factors needed to explain correlations among the variables.

Table 3.4. Factor variation

Constructs	Factors	% Variation Explained
Awareness of NOSA	1	51.95%
Awareness of ISO	2	70.07%
Awareness of BBBEE	1	50.78%
Awareness of CIDB	1	78.43%
Advantages NOSA	2	74.81%
Advantages ISO	1	63.55%
Advantages BBBEE	1	54.37%
Advantages CIDB	1	57.61%
Disadvantages NOSA	2	71.97%
Disadvantages ISO	2	71.71%
Disadvantages BBBEE	2	67.12%
Disadvantages CIDB	1	56.07%

Table 3.4 above indicates the factors that have been retained by the MINEIGEN criterion. Of all the constructs measured within the questionnaire, 58% showed one and the rest two factors. In cases where more than one factor was retained, it could be possible that the construct has more than one dimension. Because of the high Cronbach Alpha coefficient values, the decision was made to keep them as constructs.

As can be seen from Table 3.4, the percentage variation explained values of all the constructs being investigated, was at least 50%. This is an indication that for each construct more than 50% of the information was retained.

Five constructs obtained levels in the excess of 70% namely ***awareness of ISO*** (70.07%), ***disadvantages ISO*** (71.71%), ***disadvantages NOSA*** (71.97%), ***advantages NOSA*** (74.81%), and ***awareness of CIDB*** obtaining a percentage variation explained value of as high as 78.43%.

3.3.2.4. Variation of communalities

According to Field (2005:653) communality refers to the percentage of variance in an observed variable that is accounted for by the retained components (or factors). A certain variable will display a large communality if it weighs heavily on at least one of the study's retained components.

The communalities of the constructs studied within the study, varied between the lowest and highest values, as indicated in Table 3.5 below.

Within the questionnaire, the question with the lowest contribution to a construct was in the construct ***awareness of BBBEE*** (0.18) and the one with the highest contribution was in the construct ***awareness of ISO*** (0.89).

Table 3.5. Communality variation

Constructs	Lowest	Highest
Awareness of NOSA	0.31	0.81
Awareness of ISO	0.60	0.89
Awareness of BBBEE	0.18	0.83
Awareness of CIDB	0.69	0.87
Advantages NOSA	0.65	0.87
Advantages ISO	0.37	0.78
Advantages BBBEE	0.30	0.78
Advantages CIDB	0.41	0.84
Disadvantages NOSA	0.59	0.86
Disadvantages ISO	0.62	0.87
Disadvantages BBBEE	0.56	0.82
Disadvantages CIDB	0.41	0.77

3.4. DEMOGRAPHICAL INFORMATION OF RESPONDENTS

Section A of the attached questionnaire contains the demographical information of the respondents. The demographical information measured against the different constructs in the questionnaire, is discussed below and includes the following.

- Age of the respondent.
- Artisanship status of the respondent.
- Shares owned by the respondent.
- Managerial experience of the respondent.
- Size of the respondent company measured in permanent staff.
- Size of the respondent company measured in annual turnover.
- Legal status of the respondent company.

3.4.1. Age of participants

This question determines the age group classification of the respondents. The aim was to determine if the different age groups have different views on the topic at hand.

Table 3.6. Age of respondents

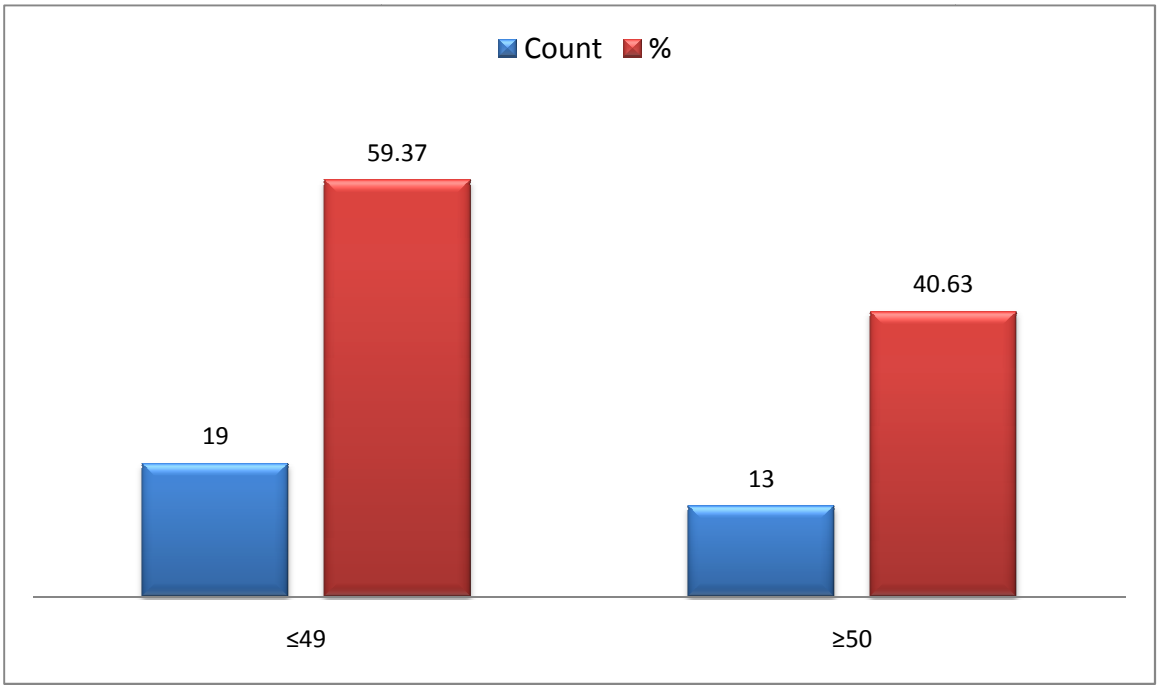
Age	Count	%
≤29	1	3.13
30-39	3	9.38
40-49	15	46.88
50-59	12	37.50
≥60	1	3.13
Total	**32**	**100**

Table 3.6 above shows the distribution of the age group classification of the respondents and clearly indicates that the majority of the participating respondents fell in two categories namely:

- between 40 and 49 years (46.88%); and
- between 50 and 59 years (37.5%) of age.

The remainder of the age groups accounted for only 15.63%, with only one person belonging to the age groups ≤29 and ≥60 years respectively. Because of the major imbalance in this category, the age groups were further grouped into two main age groups, as can be seen in Figure 3.1 below.

Figure 3.1. Two main age groups of respondents



As can be seen from the figure above, 19 respondents (59.37%) fell in the age group ≤49 years and 13 (40.63%) fell in the age group ≥50 years.

3.4.2. Artisanship status of the participant's manager

Because of the nature of the study, the respondents were also grouped according to their artisanship training. This study is being conducted in the field of electrical engineering, more specific heavy current and automation engineering. It is common for people in this field to start their careers as artisans.

Table 3.7. Artisanship status of respondents

Artisanship Status	Count	%
Artisan	23	71.88
Non-artisan	9	28.12
Total	**32**	**100**

Table 3.7 above confirms this as 23 respondents accounting for 71.88% who completed an artisanship within their careers. The aim of including this question was to determine if the completion of an artisanship would influence a manager's view regarding this topic.

3.4.3. Managerial ownership of participating companies

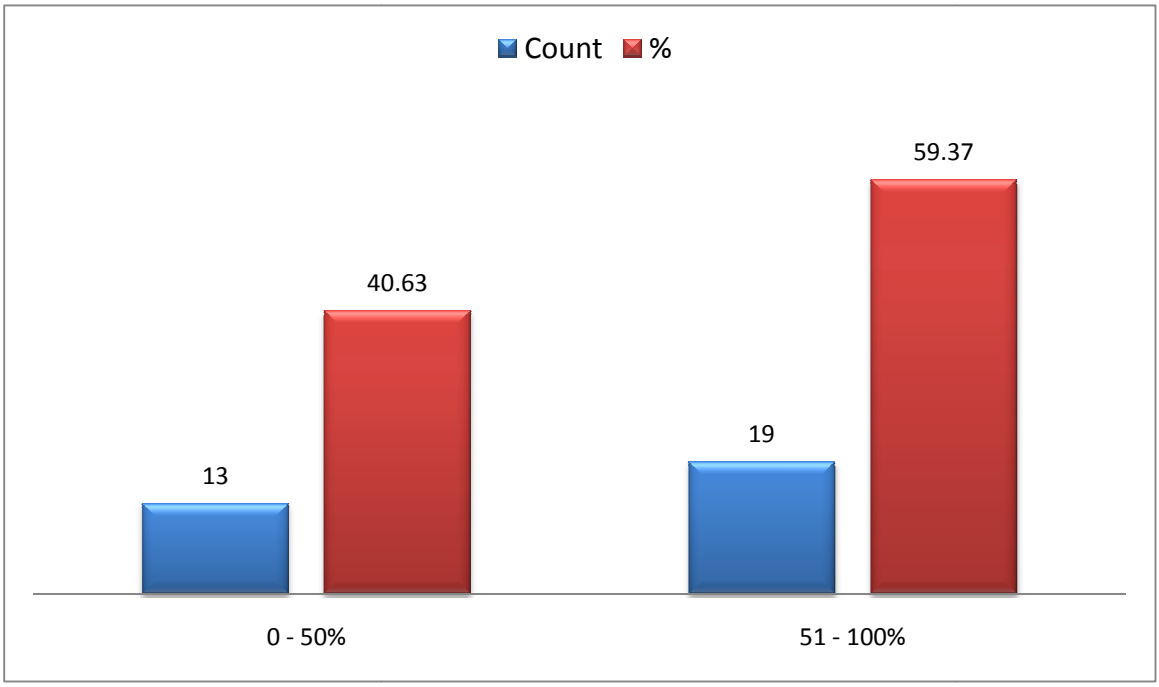
The respondents were requested to indicate the percentage of shares they own in the company they manage, if any. The results are summarised in Table 3.8 below.

Table 3.8. Shares owned by respondents

Percentage Shares Owned	Count	%
0	3	9.38
8	1	3.13
25	1	3.13
40	1	3.13
45	1	3.13
50	6	18.70
60	1	3.13
80	1	3.13
85	1	3.13
90	1	3.13
100	15	46.88
Total	**32**	**100**

Because of the major imbalance in this category, with almost half (46.88%) of the respondents being the sole share holder in their businesses, this demographical category was also further grouped into two main groups, as can be seen in Figure 3.2 below.

Figure 3.2. Two main groups of shares owned by respondents



As can be seen from the above figure, 13 respondents (40.63%) fell in the category where they own 50% or less, and 19 respondents (59.37%) where they own more that 50% shares in the business.

3.4.4. Experience of the manager of participating companies

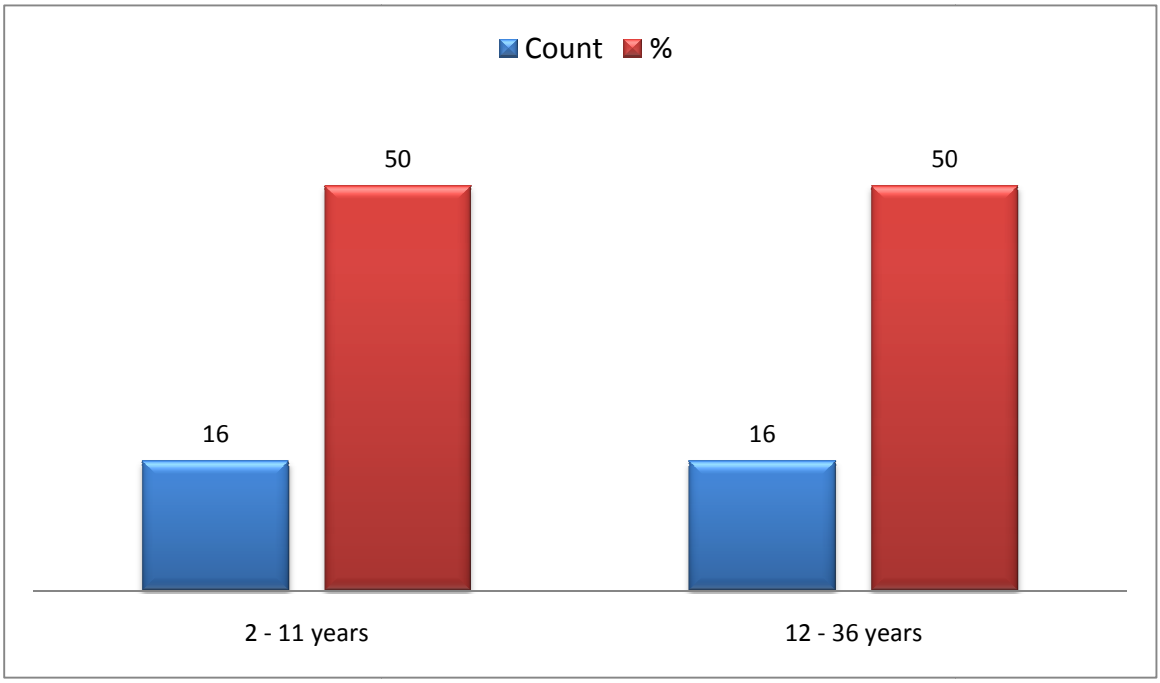
The number of years of managerial experience of the manager was included in this study to determine if a manager with more experience will view the commercial restrictions being investigated differently from those having less experience.

In this demographical category, as seen from Table 3.9 below, a wide range of years experience came forth and it was decided to distinguish between two main groups as seen in Figure 3.3 below. In this case exactly half of the respondents had 11 years or less experience and they are being compared to those having 12 to 36 years experience.

Table 3.9. Managerial experience of respondents

Managerial Experience	Count	%
2 years	2	6.24
3 years	4	12.50
4 years	3	9.38
6 years	1	3.13
7 years	1	3.13
9 years	1	3.13
10 years	2	6.24
11 years	2	6.24
12 years	4	12.50
15 years	3	9.38
16 years	4	12.50
18 years	1	3.13
22 years	2	6.24
26 years	1	3.13
36 years	1	3.13
Total	**32**	**100**

Figure 3.3. Two main groups of managerial experience of respondents



3.4.5. Size of participating companies

The size of the participating companies was also investigated as compliance with certain commercial restrictions i.e. CIDB and BBBEE is influenced by the business's size pertaining to their annual turnover. Tables 3.10 and 3.11 contain the results of the participating company's size measured in the number of permanent staff, as well as their annual turnover.

Table 3.10. Size of respondents measured in permanent staff

Number of Permanent Staff	Count	%
1 - 10	16	50
11 - 30	12	37.5
31 - 50	0	0
51 - 100	4	12.5
100+	0	0
Total	**32**	**100**

Table 3.10 above shows that 50% of the respondents have 10 permanent employees or less. Another interesting statistic shows that 87.5% of the respondents have 30 employees or less. In other words, the responding companies supplying to the local Vaal Triangle manufacturing industry, are made up of small numbers of permanent staff. None of the participating companies had between 31 and 50 permanent staff members employed. There were four companies having more than 50 permanent staff members making up 12.5% of the total number of respondents.

Table 3.11 below shows that no business had an annual turnover of less than R500 000. The majority of companies fell in the brackets of between R1 million to R5 million (34.38%), R5 million to R10 million (25%) and R10 million to R35 million (21.87%). Only two companies had annual turnovers of between R35 million to R50 million and over R50 million respectively.

Table 3.11. Size of respondents measured in annual turnover

Annual Turnover (R '000 000)	Count	%
<R0.5	0	0
>R0.5 - R1	2	6.25
>R1 - R5	11	34.38
>R5 - R10	8	25.00
>R10 - R35	7	21.87
>R35 - R50	2	6.25
>R50	2	6.25
Total	**32**	**100**

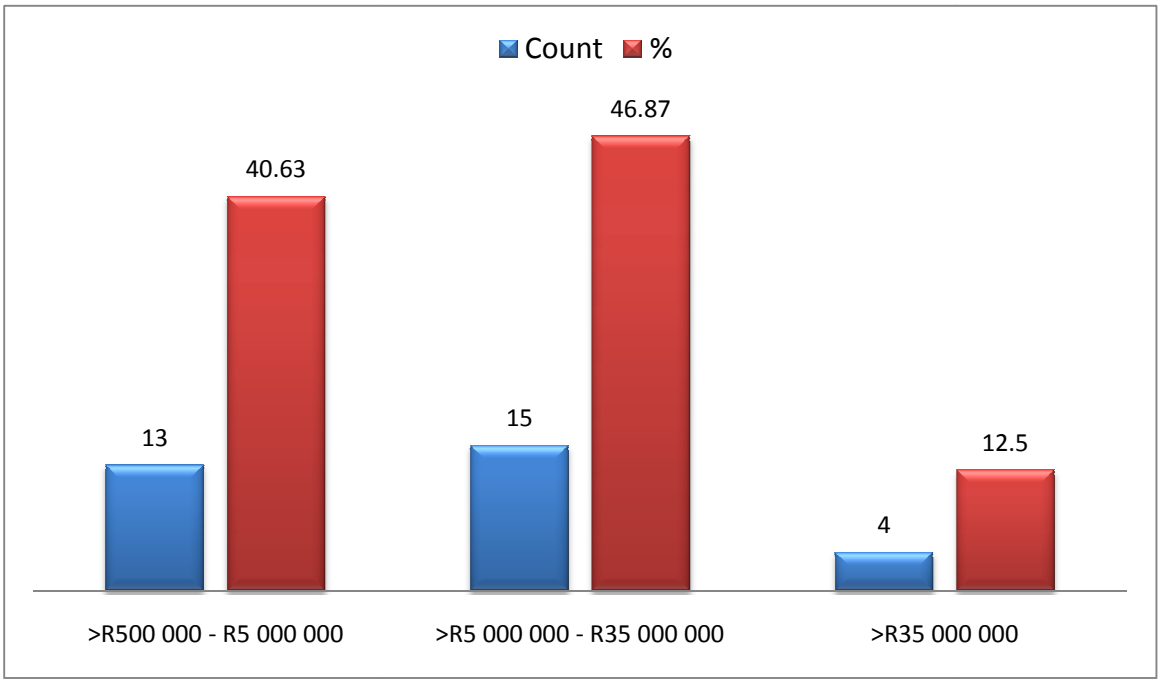
Compliance to the BBBEE commercial restriction, is directly linked to the annual turnover of a business in the sense that it dictates which scorecard should be used (DTI, 2007?:31). As was discussed in the literature study, three groups exist, namely:

- those with an annual turnover of less than R5 million;
- those with an annual turnover of between R5 million and R35 million; and
- those above R35 million.

For this reason the above demographical measurement was regrouped to fit the BBBEE categorisation.

As can be seen from Figure 3.4 below, 13 participating companies resulting in 40.63% have an annual turnover of less than R5 million. There were 15 (46.87%) whose annual turnover fell between R5 million and R35 million and only four (12.5%) who had an annual turnover in excess of R35 million.

Figure 3.4. Three main groups of size of respondents measured in the annual turnover



3.4.6. Legal status of participating companies

The respondents were also requested to indicate what the legal status of the business they manage, is. The results are summarised in Table 3.12 below.

Table 3.12. Legal status of respondent companies

Legal Status	Count	%
Private Company	16	50
Close Corporation	16	50
Total	**32**	**100**

The results presented in Table 3.12 above, shows that 50% of the participating companies were Private Companies and the other 50% are Closed Corporations.

3.5. THE RELATIONSHIP BETWEEN THE DEMOGRAPHIC VARIABLES AND THE CONSTRUCTS MEASURED IN THE QUESTIONNAIRE

By drawing a random sample, it enables one to study the properties of a population with the time and money available. In such cases the t-test, (to determine statistical significance) is used to illustrate that the result, for example the difference between two means, is significant. The *p*-value (indicating statistical significance) is a decisive factor of this, giving the probability that the acquired value could be obtained under the assumption that the null hypothesis (e.g. no difference between the population means) is true. A small *p*-value, which is a value smaller than 0.05, is considered to be sufficient evidence that the result obtained is statistically significant. This doesn't necessarily imply that the result obtained is important in practice as these tests have a tendency to yield small *p*-values as the data sets' sizes increase.

As mentioned before, in this study no random sampling was used but rather a convenient sample was done. For completeness sake, *p*-values are reported as if random sampling was done. According to Ellis and Steyn (2003:51) this is considered as standard practice where data obtained from convenience sampling are erroneously analysed as if it were obtained through random sampling. These data should therefore, be considered as small populations for which statistical inference and *p*-values are not relevant. By making use of the descriptive measures that have been calculated, statistical inference draws conclusions about the population from which the random sample was drawn. In such cases, instead of only reporting descriptive statistics, effect sizes can also be determined. Practical significance (*d*-values) can therefore, be understood as a large enough difference to have an effect in practice.

The normal way to comment on practical significance is to use the standardised difference between the means of two populations, i.e. the difference between the two means divided by the estimate for standard deviation. According to Steyn (2000:1-3) this measure is called the effect size, and not only makes the difference independent

of units and sample size, but also relates it to the data spread. Cohen (1998:25-26) gives the following guidelines for the interpretation of the effect size (*d*-value):

- $d = 0.2$ small effect;
- $d \geq 0.5$ medium effect (noticeable with the naked eye); and
- $d \geq 0.8$ large effect and also practical significant.

When $d \geq 0.8$, the effect size is considered as practically significant since it is the result of a difference having a large effect.

3.5.1. The relationship between the demographical variable age and the constructs measured in the questionnaire

The *p*-values and the *d*-values to test for statistical and practical significant differences respectively for the demographical variable age are summarised in Table 3.13 below.

When comparing the *p*-values, all the values smaller than 0.05 means that there are a statistical significance between the means ($\bar{x}$) of the two main age groups regarding that specific construct. Only one construct showed a statistical significance namely that of ***awareness of CIDB*** ($p = 0.04$).

When taking the *d*-values into account, the construct ***advantages CIDB*** ($d = 0.70$) obtained a medium effect size indicating a visible difference between the means. The constructs ***awareness of CIDB*** ($d = 0.80$) and ***disadvantages CIDB*** ($d = 0.86$) however, obtained a large effect indicating a practical significant difference ($d \geq 0.8$).

It can be noted from the above-mentioned results that the age of respondents only obtained statistically as well as practically significant results on the commercial restriction **CIDB**.

Table 3.13. Effect of age of respondents on the measured constructs

Constructs vs. Age of Participating Managers	≤49 years			≥50 years			Comparison	
	n	$\bar{x}$	*s*	*n*	$\bar{x}$	*s*	$p^{(a)}$ (in case of random sampling)	*d*
Awareness of NOSA	19	4.21	1.08	13	4.23	1.17	0.96	0.02
Awareness of ISO	19	4	1.20	13	4.31	1.44	0.53	0.21
Awareness of BBBEE	19	4.58	0.51	13	4.54	1.13	0.90	0.04
Awareness of CIDB	19	3.11	2.11	13	1.46	2.07	0.04*	0.80▲
Advantages NOSA	19	2.52	0.59	13	2.69	0.34	0.29	0.30
Advantages ISO	19	2.55	0.70	12	2.78	0.56	0.31	0.34
Advantages BBBEE	19	2.86	0.68	13	2.68	0.40	0.34	0.28
Advantages CIDB	14	2.94	0.62	5	2.52	0.41	0.12	0.70Δ
Disadvantages NOSA	19	2.55	0.53	13	2.54	0.54	0.96	0.02
Disadvantages ISO	19	2.56	0.64	12	2.6	0.42	0.96	0.02
Disadvantages BBBEE	19	2.46	0.57	13	2.63	0.48	0.38	0.30
Disadvantages CIDB	14	2.3	0.63	5	2.84	0.56	0.11	0.86▲

(a) *p*-value yielded by t-test for independent groups in case of random sampling.
* Statistically significant on a 0.05 level.
Δ Medium effect size.
▲ Practically significant.

3.5.2. The relationship between the demographical variable artisanship status and the constructs measured in the questionnaire

Table 3.14 below summarises the *p*-values and the *d*-values for the demographical variable artisanship status. It shows that again only one construct had a statistical significance, namely that of ***advantages ISO*** (*p* = 0.03).

The construct ***awareness of NOSA*** (*d* = 0.54) obtained a medium effect size, indicating a visible difference between the means. The construct ***advantages ISO*** (*d* = 0.80) however, obtained a large effect, indicating practically significant difference.

Table 3.14. Effect of artisanship status of respondents on the measured constructs

Constructs vs. Artisanship Status of Participating Managers	Artisan			Non-Artisan			Comparison	
	n	$\bar{x}$	*s*	*n*	$\bar{x}$	*s*	$p^{(a)}$ (in case of random sampling)	*d*
Awareness of NOSA	23	4.43	0.90	9	3.67	1.41	0.16	0.54$^{\Delta}$
Awareness of ISO	23	4.13	1.39	9	4.11	1.05	0.97	0.01
Awareness of BBBEE	23	4.61	0.89	9	4.44	0.53	0.53	0.18
Awareness of CIDB	23	2.35	2.29	9	2.67	2.12	0.71	0.14
Advantages NOSA	23	2.53	0.54	9	2.73	0.37	0.24	0.37
Advantages ISO	22	2.49	0.64	9	3.00	0.52	0.03*	0.80▲
Advantages BBBEE	23	2.75	0.64	9	2.89	0.43	0.48	0.22
Advantages CIDB	13	2.83	0.70	6	2.83	0.32	0.99	0.00
Disadvantages NOSA	23	2.62	0.49	9	2.36	0.61	0.27	0.43
Disadvantages ISO	22	2.65	0.57	9	2.44	0.54	0.34	0.37
Disadvantages BBBEE	23	2.49	0.41	9	2.64	0.78	0.58	0.20
Disadvantages CIDB	13	2.38	0.46	6	2.57	0.98	0.68	0.19

(a) *p*-value yielded by t-test for independent groups in case of random sampling.
* Statistically significant on a 0.05 level.
Δ Medium effect size.
▲ Practically significant.

3.5.3. The relationship between the demographical variable shares owned by managers and the constructs measured in the questionnaire

The demographical variable shares owned by the manager are summarised in Table 3.15 below and shows no construct indicating a statistical significance.

Table 3.15. Effect of shares owned by the respondents on the measured constructs

Constructs vs. Shares Owned by Participating Managers	0-50%			51-100%			Comparison	
	n	$\bar{x}$	*s*	*n*	$\bar{x}$	*s*	$p^{(a)}$ (in case of random sampling)	*d*
Awareness of NOSA	13	4.23	1.17	19	4.21	1.08	0.96	0.02
Awareness of ISO	13	4.46	0.78	19	3.89	1.52	0.18	0.37
Awareness of BBBEE	13	4.38	1.12	19	4.68	0.48	0.38	0.27
Awareness of CIDB	13	1.69	2.29	19	2.95	2.07	0.13	0.55^{Δ}
Advantages NOSA	13	2.58	0.47	19	2.59	0.54	0.98	0.01
Advantages ISO	13	2.71	0.63	18	2.59	6.67	0.62	0.18
Advantages BBBEE	13	2.75	0.33	19	2.81	0.71	0.76	0.08
Advantages CIDB	5	3.00	0.35	14	2.77	0.67	0.35	0.34
Disadvantages NOSA	13	2.60	0.45	19	2.51	0.58	0.61	0.16
Disadvantages ISO	13	2.52	0.37	18	2.64	0.67	0.52	0.18
Disadvantages BBBEE	13	2.58	0.47	19	2.49	0.58	0.63	0.16
Disadvantages CIDB	5	2.56	1.00	14	2.4	0.51	0.75	0.16

(a) *p*-value yielded by t-test for independent groups in case of random sampling.
* Statistically significant on a 0.05 level.
Δ Medium effect size.
▲ Practically significant.

Only the construct ***awareness of CIDB*** (*d* = 0.55) obtained a medium effect size indicating a visible difference between the means. There was however, no practical significant difference (d ≥ 0.8) in the mean values between the perceptions of those managers owning 50% or fewer shares compared to those owning 51% or more in the company they are managing with regard to the constructs measured in the study.

The commercial restriction CIDB pertains more to organs of state and is the most unknown amongst participating managers ($\bar{x}$ = 2.44) as was indicated in Table 3.1. It can therefore, be concluded that those managers with a higher percentage of

ownership in the business they manage, are more aware of commercial restrictions because of their personal interest in the business.

3.5.4. The relationship between the demographical variable manager's experience and the constructs measured in the questionnaire

The statistical analysis for the demographical variable manager's experience is summarised in Table 3.16. It shows no construct indicating a statistical significance.

Table 3.16. Effect of respondent's managerial experience on the measured constructs

Constructs vs. Managerial Experience of Participants	2-11 years			12-36 years			Comparison	
	n	$\bar{x}$	*s*	*n*	$\bar{x}$	*s*	$p^{(a)}$ (in case of random sampling)	*d*
Awareness of NOSA	16	4.13	1.26	16	4.31	0.95	0.64	0.15
Awareness of ISO	16	4.06	1.29	16	4.19	1.33	0.79	0.09
Awareness of BBBEE	16	4.31	1.01	16	4.81	0.40	0.08	0.50^{Δ}
Awareness of CIDB	16	2.19	2.14	16	2.69	2.33	0.53	0.21
Advantages NOSA	16	2.54	0.63	16	2.64	0.35	0.59	0.16
Advantages ISO	16	2.49	0.77	15	2.8	0.46	0.18	0.41
Advantages BBBEE	16	2.88	0.55	16	2.7	0.62	0.40	0.28
Advantages CIDB	9	2.87	0.72	10	2.8	0.50	0.82	0.09
Disadvantages NOSA	16	2.48	0.47	16	2.61	0.58	0.47	0.24
Disadvantages ISO	16	2.59	0.60	15	2.6	0.52	0.95	0.02
Disadvantages BBBEE	16	2.4	0.49	16	2.66	0.55	0.17	0.50^{Δ}
Disadvantages CIDB	9	2.36	0.68	10	2.52	0.64	0.59	0.24

(a) *p*-value yielded by t-test for independent groups in case of random sampling.
* Statistically significant on a 0.05 level.
Δ Medium effect size.
▲ Practically significant.

Two constructs, namely ***awareness of BBBEE*** (*d* = 0.50) and ***disadvantages BBBEE*** (*d* = 0.50) obtained a medium-effect size. There was however, no practical significant difference (d ≥ 0.8) in the mean values between the perceptions of those managers with 2-11 years experience compared to those with 12-36 years in managing the company with regard to the 12 constructs measured in the study.

It can however, be noted from the above-mentioned practically significant results that all of them pertain to the commercial restriction, namely BBBEE. Even though the older age group of managers are more aware of this commercial restriction as they have a larger mean value ($\bar{x}$ = 4.81) than the younger age group ($\bar{x}$ = 4.31); they perceive BBBEE to have less to offer their businesses than the younger group.

3.5.5. The relationship between the demographical variable number of permanent staff and the constructs measured in the questionnaire

To determine if there are any significant differences between the perceptions of managers of different sized companies measured in their permanent staff numbers with regard to the constructs measured in the study, *p*-values and *d*-values are summarised in Table 3.17 below.

Note that none of the participating companies had permanent staff members of between 31 and 50 employed. This resulted in Table 3.17 showing only the demographical groups 1 (1-10 employees), 2 (11-30 employees) and 4 (51-100 employees).

The following two constructs showed a statistical significance.

- ***Awareness of NOSA*** between 1-10 and 11-30 employees as well as 11-30 and 51-100 employees.
- ***Disadvantages ISO*** between 1-10 and 11-30 employees.

Table 3.17. Effect of number of permanent staff on the measured constructs

Constructs vs. Number of Permanent Staff of Participating Companies	1 – 10 (1)			11 – 30 (2)			51 – 100 (4)			Comparison	
	n	$\bar{x}$	*s*	*n*	$\bar{x}$	*s*	*n*	$\bar{x}$	*s*	*Significant at a **0.05** level* (in case of random sampling)	***d***
Awareness of NOSA	16	3.88	1.20	12	4.92	0.29	4	3.50	1.29	1 - 2	(1-2) 0.87▲
										2 - 4	(2-4) 1.10▲
Awareness of ISO	16	4.25	1.00	12	4.17	1.47	4	3.50	1.91	-	-
Awareness of BBBEE	16	4.31	1.01	12	4.75	0.45	4	5.00	0.00	-	-
Awareness of CIDB	16	1.94	2.35	12	3.08	2.07	4	2.50	2.08	-	(1-2) 0.50Δ
Advantages NOSA	16	2.40	0.52	12	2.78	0.44	4	2.75	0.44	-	(1-2) 0.74Δ
											(1-4) 0.67Δ
Advantages ISO	16	2.50	0.65	11	2.93	0.40	4	2.40	1.01	-	(1-2) 0.65Δ
											(2-4) 0.52Δ
Advantages BBBEE	16	2.68	0.64	12	2.85	0.41	4	3.05	0.82	-	-
Advantages CIDB	7	2.80	0.52	9	2.98	0.52	3	2.47	1.01	-	(2-4) 0.51Δ
Disadvantages NOSA	16	2.74	0.61	12	2.38	0.35	4	2.25	0.38	-	(1-2) 0.58Δ
											(1-4) 0.80▲
Disadvantages ISO	16	2.88	0.51	11	2.31	0.45	4	2.25	0.50	1 - 2	(1-2) 1.11▲
											(1-4) 1.22▲
Disadvantages BBBEE	16	2.58	0.62	12	2.53	0.34	4	2.35	0.72	-	-
Disadvantages CIDB	7	2.54	0.94	9	2.31	0.47	3	2.60	0.20	-	(2-4) 0.61Δ

Δ Medium effect size.
▲ Practically significant.

The following constructs obtained a medium effect size indicating a visible difference between the means.

- ***Awareness of CIDB*** between 1-10 and 11-30 employees (*d* = 0.50).

- ***Advantages NOSA*** between 1-10 and 11-30 employees (*d* = 0.74) as well as between 1-10 and 51-100 employees (*d* = 0.67).
- ***Advantages ISO*** between 1-10 and 11-30 employees (*d* = 0.65) as well as between 11-30 and 51-100 employees (*d* = 0.52).
- ***Advantages CIDB*** between 11-30 and 51-100 employees (*d* = 0.51).
- ***Disadvantages NOSA*** between 1-10 and 11-30 employees (*d* = 0.58).
- ***Disadvantages CIDB*** between 11-30 and 51-100 employees (*d* = 0.61).

The following constructs obtained a large effect indicating a practically significant difference (d ≥ 0.8):

- ***Awareness of NOSA*** between 1-10 and 11-30 employees (*d* = 0.87) as well as between 11-30 and 51-100 employees (*d* = 1.10).
- ***Disadvantages NOSA*** between 1-10 and 51-100 employees (*d* = 0.80).
- ***Disadvantages ISO*** between 1-10 and 11-30 employees (*d* = 1.11) as well as between 1-10 and 51-100 employees (*d* = 1.22).

3.5.6. The relationship between the demographical variable annual turnover and the constructs measured in the questionnaire

Table 3.18 below summarises the *p*-values and the *d*-values for the demographical variable of different sized companies with respect to their annual turnover. It shows no construct indicating a statistical significance.

The following constructs obtained a medium effect size, indicating a visible difference between the means: (x R1 000 000).

- ***Awareness of BBBEE*** >R0.5 - R5 and >R35 (*d* = 0.70) as well as >R5 - R35 and >R35 (*d* = 0.58).
- ***Advantages CIDB*** >R5 - R35 and >R35 (*d* = 0.50).
- ***Disadvantages NOSA*** >R0.5 - R5 and >R35 (*d* = 0.63).
- ***Disadvantages ISO*** >R5 - R35 and >R35 (*d* = 0.58).
- ***Disadvantages BBBEE*** >R5 - R35 and >R35 (*d* = 0.56).
- ***Disadvantages CIDB*** >R0.5 - R5 and >R5 – R35 (*d* = 0.68).

The following constructs obtained a large effect, indicating a practically significant difference (d ≥ 0.8): (R '000 000)

- ***Advantages CIDB*** >R0.5 - R5 and >R35 (*d* = 0.94).
- ***Disadvantages ISO*** >R0.5 - R5 and >R35 (*d* = 1.24).
- ***Disadvantages CIDB*** >R5 – R35 and >R35 (*d* = 0.83).

Table 3.18. Effect of annual turnover of respondents on the measured constructs

Constructs vs. Annual Turnover of Participating Companies (R '000 000)	>R0.5 - R5 (1)			>R5 - R35 (2)			>R35 (3)			Comparison	
	n	$\bar{x}$	*s*	*n*	$\bar{x}$	*s*	*n*	$\bar{x}$	*s*	*Significant at a **0.05** level* (in case of random sampling)	***d***
Awareness of NOSA	13	4.23	1.17	15	4.33	0.98	4	3.75	1.50	-	-
Awareness of ISO	13	4.15	1.46	15	4.07	1.28	4	4.25	0.96	-	-
Awareness of BBBEE	13	4.23	1.09	15	4.73	0.46	4	5.00	0.00	-	(1-3) 0.70$^{\Delta}$ (2-3) 0.58$^{\Delta}$
Awareness of CIDB	13	2.00	2.31	15	2.93	2.12	4	2.00	2.45	-	-
Advantages NOSA	13	2.60	0.45	15	2.56	0.57	4	2.65	0.57	-	-
Advantages ISO	12	2.78	0.57	15	2.49	0.70	4	2.75	0.68	-	-
Advantages BBBEE	13	2.66	0.68	15	2.92	0.55	4	2.70	0.26	-	-
Advantages CIDB	6	2.67	0.35	11	2.85	0.71	2	3.20	0.57	-	(1-3) 0.94$^{\blacktriangle}$ (2-3) 0.50$^{\Delta}$
Disadvantages NOSA	13	2.68	0.60	15	2.49	0.50	4	2.30	0.26	-	(1-3) 0.63$^{\Delta}$
Disadvantages ISO	12	2.77	0.46	15	2.56	0.62	4	2.20	0.43	-	(1-3) 1.24$^{\blacktriangle}$ (2-3) 0.58$^{\Delta}$
Disadvantages BBBEE	13	2.65	0.54	15	2.39	0.56	4	2.70	0.35	-	(2-3) 0.56$^{\Delta}$
Disadvantages CIDB	6	2.70	0.58	11	2.24	0.68	2	2.80	0.28	-	(1-2) 0.68$^{\Delta}$ (2-3) 0.83$^{\blacktriangle}$

$^{\Delta}$ Medium effect size.

$^{\blacktriangle}$ Practically significant.

3.5.7. The relationship between the demographical variable legal status and the constructs measured in the questionnaire

The relationship between the demographical variable legal status was compared with the 12 constructs. All of the participating companies were either private companies or close corporations. The statistical analysis is summarised in Table 3.19 below.

Table 3.19. Effect of legal status of respondents on the measured constructs

Constructs vs. Legal Status of Participating Companies	Private Company			Close Corporation			Comparison	
	n	$\bar{x}$	*s*	*n*	$\bar{x}$	*s*	$p^{(a)}$ (in case of random sampling)	*d*
Awareness of NOSA	16	4.25	1.00	16	4.19	1.22	0.88	0.05
Awareness of ISO	16	3.56	1.50	16	4.69	0.70	0.01*	0.75$^{\Delta}$
Awareness of BBBEE	16	4.69	0.48	16	4.44	1.03	0.39	0.24
Awareness of CIDB	16	2.69	2.09	16	2.19	2.37	0.53	0.21
Advantages NOSA	16	2.51	0.43	16	2.66	0.58	0.41	0.26
Advantages ISO	15	2.61	0.72	16	2.66	0.59	0.84	0.07
Advantages BBBEE	16	2.64	0.39	16	2.94	0.70	0.15	0.43
Advantages CIDB	11	2.51	0.49	8	3.28	0.43	0.00*	1.55▲
Disadvantages NOSA	16	2.46	0.50	16	2.63	0.56	0.39	0.29
Disadvantages ISO	15	2.53	0.50	16	2.65	0.62	0.57	0.19
Disadvantages BBBEE	16	2.69	0.54	16	2.38	0.49	0.10	0.58$^{\Delta}$
Disadvantages CIDB	11	2.56	0.77	8	2.28	0.41	0.31	0.38

(a) F-value yielded by t-test for independent groups in case of random sampling.
* Statistically significant on a 0.05 level.
$^{\Delta}$ Medium effect size.
▲ Practically significant.

Two constructs showed a statistical significance, namely that of ***awareness of ISO*** (p = 0.01) and ***advantages CIDB*** (p = 0.00).

The constructs ***awareness of ISO*** (*d* = 0.75) and ***disadvantages BBBEE*** (*d* = 0.58) obtained a medium effect size, indicating a visible difference between the means. The construct ***advantages CIDB*** (*d* = 1.55) obtained a large effect, indicating a practically significant difference (d ≥ 0.8).

3.6. THE RELATIONSHIP BETWEEN THE DEMOGRAPHIC VARIABLES AND THE QUESTIONNAIRE'S GENERAL SECTION CONSTRUCTS

When two variables are presented for example in a contingency table, it is important to know whether or not a relationship between the two variables is practically significant. In the case of random sampling, the statistical significance of such relationships is determined with the Chi-square tests. What needs to be determined is if a relationship is large enough to be of any importance. In the case of a contingency table as presented below, the effect size (ω) is given by the phi (ϕ) coefficient and is independent of the sample size (Ellis & Steyn, 2003:54).

Cohen (1998:224-225) gives the following guidelines for the interpretation of the effect size (ω):

- $\omega = 0.1$ small effect;
- $\omega \geq 0.3$ medium effect (noticeable with the naked eye); and
- $\omega \geq 0.5$ large effect and also practically significant.

According to Cohen (1998:80), a medium effect is already noticeable with the naked eye.

In this study the demographical variables were also compared with the general section's more specific constructs, as can be seen in the questionnaire. The following comparisons yielded effect sizes (ω) of a medium effect ($\omega \geq 0.3$).

- Age of respondent vs. Priority of compliance with commercial standards (ϕ = 0.36).
- Age of respondent vs. View that compliance with commercial standards are more important than product standards (ϕ = 0.34).
- Respondent's managerial experience vs. NOSA compliance (ϕ = 0.32).
- Legal status of responding company vs. NOSA compliance (ϕ = 0.32).

- Annual turnover of responding company vs. ISO 9001 compliance (ϕ = 0.31).
- Number of permanent staff vs. ISO 14001 compliance (ϕ = 0.31).
- Respondent's managerial experience vs. BBBEE contribution level (ϕ = 0.34).
- Number of permanent staff vs. BBBEE contribution level (ϕ = 0.38).
- Number of permanent staff vs. CIDB contractor grade (ϕ = 0.32).

Four comparisons yielded effect sizes (ω) of a large effect, ($\omega \geq 0.5$) indicating a practical significance.

- Number of permanent staff vs. NOSA compliance (ϕ = 0.58).
- Annual turnover of the respondent vs. BBBEE contribution level (ϕ = 0.58).
- Artisanship status of respondent vs. BBBEE contribution level (ϕ = 0.50).
- Shares owned by respondent vs. BBBEE contribution level (ϕ = 0.53).

3.6.1. The relationship between the demographical variable number of permanent staff and NOSA compliance

The statistical analysis for the construct where the size of the company is determined by the number of its permanent staff compared to its NOSA compliance, yielded a phi (ϕ) coefficient of 0.58, which is an indication of practical significance.

Table 3.20. Effect of number of permanent staff on the NOSA compliance measured in the questionnaire

Constructs vs. Number of Permanent Staff of Participating Companies	1 – 10		11 – 30		51 – 100	
	n	*%*	*n*	*%*	*n*	*%*
Compliance to the NOSA star-grading	2	6.25%	8	25.00%	3	9.38%
Non-compliance to the NOSA star-grading	***14***	***43.75%***	4	12.5%	1	3.13%
Totals	**16**	**50.00%**	**12**	**37.50%**	**4**	**12.50%**

Table 3.20 above shows with the naked eye that companies with a smaller number of permanent staff members (between 1 and 10), making up 43.75% of the respondents, tend not to comply with the NOSA star-grading system. This is in comparison to those companies with a higher number of permanent staff.

3.6.2. The relationship between the demographical variable annual turnover and the BBBEE contribution level

The statistical analysis for the construct where the size of the company is determined by its annual turnover compared to its BBBEE contribution level, yielded a practical significant phi (ϕ) coefficient of 0.58.

Table 3.21. Effect of annual turnover of the respondents on the BBBEE contribution level measured in the questionnaire

Constructs vs. Annual Turnover of Participating Companies (R '000 000)	>R0.5 - R5		>R5 - R35		>R35	
	n	*%*	*n*	*%*	*n*	*%*
BBBEE status: Levels 1, 2 & 3	3	9.38%	2	6.25%	0	0.00%
BBBEE status: Levels 4 & 5	***6***	***18.75%***	***9***	***28.13%***	1	3.13%
BBBEE status: Levels 6, 7 & 8	2	6.25%	1	3.13%	3	9.38%
BBBEE status: Not compliant	2	6.25%	3	9.38%	0	0.00%
Totals	**13**	**40.63%**	**15**	**46.88%**	**4**	**12.50%**

Companies with the following annual turnovers, tends to have with a high effect in practice BBBEE contribution levels of four and five as tabulated in Table 3.21 above.

- Between >R0.5 million and R5 million (18.57%).
- Between >R5 million and R35 million (28.13%).

3.6.3. The relationship between the demographical variable artisanship status and the BBBEE contribution level

The construct where the artisanship status of the responding manager was compared to the company he manages' BBBEE contribution level, yielded a phi (ϕ) coefficient of 0.50.

With the naked eye it can be seen from Table 3.22 below, that with a high effect in practice the company that is being managed by a manager who completed an artisanship within his or her career, tends to have BBBEE contribution levels of four and five (40.63%).

Table 3.22. Effect of artisanship status of respondents on the BBBEE contribution level measured in the questionnaire

Constructs vs. Artisanship Status of Participating Managers	Artisan		Non-Artisan	
	n	*%*	*n*	*%*
BBBEE status: Levels 1, 2 & 3	1	3.13%	4	12.50%
BBBEE status: Levels 4 & 5	***13***	***40.63%***	3	9.38%
BBBEE status: Levels 6, 7 & 8	5	15.63%	1	3.13%
BBBEE status: Not compliant	4	12.50%	1	3.13%
Totals	**23**	**71.88%**	**9**	**28.13%**

3.6.4. The relationship between the demographical variable shares owned by managers and the BBBEE contribution level

A practical significant phi (ϕ) coefficient of 0.53 resulted from the statistical analysis for the construct regarding the percentage of shares owned by the responding manager of the company being analysed, compared to the company's BBBEE contribution level.

Table 3.23. Effect of shares owned by the respondents on the BBBEE contribution level as measured in the questionnaire

Constructs vs. Shares Owned by Participating Managers	0-50%		51-100%	
	n	*%*	*n*	*%*
BBBEE status: Levels 1, 2 & 3	4	12.50%	1	3.13%
BBBEE status: Levels 4 & 5	5	15.63%	***11***	***34.38%***
BBBEE status: Levels 6, 7 & 8	4	12.50%	2	6.25%
BBBEE status: Not compliant	0	0.00%	5	15.63%
Totals	**13**	**40.63%**	**19**	**59.38%**

Table 3.23 above shows, that with a high effect in practice the company where the manager owns the higher percentage of shares in the company, namely 51 - 100%

tends to have BBBEE contribution levels of four and five. These managers make up 34.38% of the total number of managers of the responding companies.

3.7. SUMMARY

To be able to accomplish the primary and secondary objectives discussed in chapter one, a questionnaire was developed alongside the conduction of the literature study.

Firstly the assessment of the constructs measured in the study was done by analysing the arithmetic mean and standard deviation values obtained. The reliability and validity of the constructs measured within this study were examined firstly by calculating the Cronbach Alpha coefficients for reliability. Confirmatory factor analyses were done by taking into account Kaiser's measure of sample adequacy (MSA), percentage variation explained and variation of communalities. Only two of the construct's Alpha coefficients were less than 0.7, namely *awareness of BBBEE (α = 0.54)* and *disadvantages BBBEE (α = 0.60)* respectively. Because attitude rather than ability was measured, these Alpha values were acceptable. It is therefore, an indication of a relatively high reliability of the research instrument. The overall MSA result indicates that a middling to meritorious result was obtained, with only one unacceptable result obtained, namely *ISO disadvantages (0.41)*. The MSA results therefore, determined that a factor analysis was appropriate. The factor analysis indicated that 58% of the constructs had one factor and the remainder, two factors. In case of the latter, it could be possible that those constructs have more than one dimension. Although one MSA result was unacceptable with 42% of the constructs having two factors, the decision was made to keep those constructs as part of the analysis for completeness' sake and because of the fact that high Cronbach Alpha coefficient values were obtained.

Secondly, an analysis regarding the demographic information of the respondents was conducted. The following demographic information was analysed.

- Age of the respondents (49 years and younger and 50 years and older).
- Artisanship status of the respondents (artisan and non-artisan).
- Shares owned by the respondents (0% – 50% and 51% – 100%).
- Managerial experience of the respondent (2 – 11 years and 12 – 36 years).

- Size of the respondent company measured in permanent staff (1 – 10, 11 – 30 and 51 – 100).
- Size of the respondent company measured in annual turnover (>R0.5 – R5 million, >R5 – R35 million and >R35 million).
- Legal status of the respondent company (private company and close corporation).

The next section compared the demographic variables with the constructs tested in the questionnaire. Table 3.24 summarises the relationships yielding practical significance.

Table 3.24. Summary of the effect of the demographic variables on the constructs measured in the questionnaire

Relationship between Demographical Variables and Constructs tested	Effect sizes (d ≥ 0.8) indicating practical significance
Age of participant vs. awareness of CIDB	*d* = 0.80
Age of participant vs. disadvantages CIDB	*d* = 0.86
Artisanship status vs. advantages ISO	*d* = 0.80
Number of permanent staff (between 1-10 & 11-30) vs. awareness of NOSA	*d* = 0.87
Number of permanent staff (between 11-30 & 51-100) vs. awareness of NOSA	*d* = 1.10
Number of permanent staff (between 1-10 & 51-100) vs. disadvantages NOSA	*d* = 0.80
Number of permanent staff (between 1-10 & 11-30) vs. disadvantages ISO	*d* = 1.11
Number of permanent staff (between 1-10 & 51-100) vs. disadvantages ISO	*d* = 1.22
Annual turnover (between >R0.5 - R5 & >R35) vs. advantages CIDB (R '000 000)	*d* = 0.94
Annual turnover (between >R0.5 - R5 & >R35) vs. disadvantages ISO (R '000 000)	*d* = 1.24
Annual turnover (between >R5 - R35 & >R35) vs. disadvantages CIDB (R '000 000)	*d* = 0.83
Legal status of company vs. advantages CIDB	*d* = 1.55

Lastly a comparison was done between the demographic variables and the questionnaire's general section constructs. Table 3.25 summarises the relationships yielding practical significance.

Table 3.25. Summary of the effect of the demographic variables on the constructs in the general section of the questionnaire

Comparison between Demographical Variables and Constructs in the General section	Effect sizes ($\omega \geq 0.5$) indicating practical significance
Number of permanent staff vs. NOSA compliance	$\phi = 0.58$
Annual turnover of the respondent vs. BBBEE contribution level	$\phi = 0.58$
Artisanship status of respondent vs. BBBEE contribution level	$\phi = 0.50$
Shares owned by respondent vs. BBBEE contribution level	$\phi = 0.53$

In the following chapter, conclusions will be drawn from the results obtained in this chapter. Recommendations will be made regarding compliance to the commercial restriction studied in this mini dissertation.

CHAPTER 4

CONCLUSIONS AND RECOMMENDATIONS

4.1. INTRODUCTION

In this chapter, the results of the empirical study measuring the common restrictions faced by automation suppliers when dealing with the manufacturing industry within the Vaal Triangle demographical area will be discussed.

The chapter begins with conclusions drawn from the results obtained from the questionnaire completed by the top management of these automation suppliers. Firstly the demographical information will be discussed, where after conclusions regarding the 12 constructs and finally the relationship between some of the demographic variables and the constructs tested, will be addressed.

After conclusions are drawn, recommendations will be made regarding compliance to the commercial restriction studied in this mini dissertation. The success of this study will be evaluated in terms of the primary and secondary objectives put forward in chapter 1. The chapter concludes with suggestions for further research in this field of study.

4.2. CONCLUSIONS

Conclusions will follow the basic structure of chapter 3 and will firstly address the demographical information of the respondents. Thereafter conclusions regarding the constructs testing the awareness and perceived influences of the commercial restrictions on the suppliers will be made. Finally, the relationship between some of the demographic variables and the constructs will be addressed.

4.2.1. Demographical information of respondents

Demographical information of the respondents regarding their age, gender, artisanship status, race ownership of business, the percentage shares in the business owned by the responding manager, the respondent's years managerial experience, the size of the company measured in its number of permanent staff, the

size of the company measured in its annual turnover and the responding company's legal status, were obtained.

Because of a very high imbalance of respondents pertaining to some of the demographical groups, these groups were excluded from this study. They include gender and race ownership of the business, with only two female managers and three non-white owned companies respectively.

The following general conclusions can be drawn regarding the demographical information of the respondents.

- The distribution of participating managers with respect to their age mainly fell in two groups namely 40 to 49 years and 50 to 59 years, accounting for 84.35% of the total number of respondents. This is an indication that managers in the field of suppliers of automation equipment to the Vaal Triangle manufacturing industry are middle-aged and are well-balanced below and above 50 years of age. The field of study is highly specialised and it is therefore, not surprising that managers within this field are highly experienced.
- It is common for people in this technical field to start their careers as artisans. It is for this reason that respondents were grouped according to their artisanship training. The result shows, that 71.88% of respondents completed an artisanship within their careers. This is an indication that the majority of responding managers have good practical hands-on training and as a result this adds another dimension to their experience and leadership skills.
- A very high percentage (46.88%) of respondents is the sole owner of the business they manage, indicating that this type of business is normally of a smaller type. This is confirmed by the demographical variable where the size of the business is measured by the number of permanent staff and will be discussed later on.
- The number of years of managerial experience of the respondents was very evenly spread ranging from 2 to 36 years. There were three groups with four respondents each (12.50%) namely 3, 12 and 16 years experience. It could be concluded that new management continuously enter this segment of the market and that they then tend to serve in this capacity for duration of time.

- The size of the business measured in the number of permanent staff of the company, showed that 50% of the participating companies have 1 to 10 permanent employees. Because of the even spread of the number of years managerial experience ranging from 2 to 36 years, and the high percentage of sole ownership, it is assumed that most of this managerial experience occurred within the present company. Therefore, a high percentage of the responding companies are well-established businesses. The conclusion therefore, is that the small number of permanent employees are not due to the company being new and upcoming, but rather that few employees are needed to supply this type of highly technical product and service.
- The size of the company measured in the annual turnover, shows that the majority of companies fell in the bracket of between R1 million to R5 million (34.38%). Two other groups also had mentionable annual turnovers, namely R5 to R10 million (25%) and R10 to R35 million (21.87%). As was discussed earlier, this type of business is normally of a smaller type when considering the number of permanent staff. The annual turnover per employee however, contradicts this as it is relatively high. This can be explained by the high technicality of the field of study resulting in the product and service being very expensive.
- There was an equal distribution between the numbers of respondents regarding the company's legal status. There were 50% who were private companies and 50% who were close corporations.

Detailed conclusions on the relationship between the demographic variables and the constructs tested within the study will be presented in section 4.2.3.

4.2.2. Assessment of the constructs tested

The following general conclusions can be drawn regarding the 12 constructs measuring the awareness and perceived influences of the commercial restrictions on suppliers of automation equipment and services.

- The commercial restriction awareness of CIDB had the lowest awareness amongst the responding companies with 40.63% of the managers being

totally unaware of its existence. This is evident from the results obtained in the empirical study as it yielded the lowest mean value ($\bar{x}$ = 2.44) of all four of the awareness constructs.

- Only one manager was unaware of the commercial restriction awareness of ISO yielding a mean value of $\bar{x}$ = 4.13.
- The constructs, awareness of BBBEE ($\bar{x}$ = 4.56) and awareness of NOSA ($\bar{x}$ = 4.22), yielded the highest mean values confirming the results obtained in the empirical study that all respondents were in some manner aware of their existence. It is not surprising that respondents were the most aware of BBBEE as this commercial restriction has been on the forefront of business since the first narrow-based BEE approach came into existence in 1994 after the first election of a democratic government (Fauconnier & Mathur-Helm, 2008:2).
- As can be seen from Table 3.1, the mean values of all the constructs pertaining to the advantages they offer to suppliers are very similar. It is evident though that the commercial restriction CIDB this time had the highest mean result, namely $\bar{x}$ = 2.83. This is an indication that responding managers who are aware of the CIDB commercial restriction, felt that it is the most beneficial to their businesses. The commercial restriction advantages NOSA had the lowest mean ($\bar{x}$ = 2.59) indicating that it is the least beneficial to their businesses.
- The mean values of the disadvantages that commercial restrictions have on the suppliers of automation equipment and services are again very closely spread. As seen from Table 3.1 they vary between $\bar{x}$ = 2.44 and $\bar{x}$ = 2.59 for the constructs disadvantages CIDB and disadvantages ISO respectively. This is an indication that the managers of these companies feel that the commercial restrictions overall have a slightly negative effect on their businesses.
- Comparing the constructs measuring the advantages to the disadvantages on businesses, it can be observed with the naked eye that the average mean value of the advantage constructs is higher than the disadvantage ones. It therefore, indicates that the constructs tested in this mini dissertation are

more advantageous to the businesses supplying automation equipment and services.

4.2.3. Relationship between demographical variables and the constructs tested in the questionnaire

The following section will discuss conclusions made regarding the relationship between the demographical variables and the constructs tested in the study which had a large effect size ($d \geq 0.8$) being considered as practical significant.

Conclusions will also be discussed where the relationship between the demographical variables and the questionnaire's general section constructs were presented in contingency tables. In this case a large effect size which is being considered as practical significant, is represented when $\omega \geq 0.5$.

As was discussed earlier, the mean is the most common measure of central tendency, and also the only common measure in which all values play an equal role (Levine *et al,* 2008:97). The variables will therefore, be compared making use of their mean values in an attempt to make certain conclusions.

4.2.3.1. Number of permanent staff vs. awareness of NOSA

Two practical significant results were obtained where the demographical variable measuring the company's size by means of the number of permanent staff with regard to their awareness of NOSA.

- Between 1 to 10 and 11 to 30 employees yielded a practical significance of $d = 0.87$.
- Between 11 to 30 and 51 to 100 employees yielded a practical significance of $d = 1.10$.

This result indicates that firms with permanent staff numbers ranging from 11 to 30 were much more familiar with the commercial restriction NOSA when compared to firms with staff numbers of between 1 to 10 and 51 to 100 employees respectively.

The difference between the means of the discussed variables also indicated a statistical significance of *p*-values less than 0.05.

4.2.3.2. Number of permanent staff vs. disadvantages NOSA

Overall, the study indicates that there is a considerable difference between the mean values of two of the different size companies measured in their staff numbers concerning their perception of the negative implications NOSA holds for their firms. The smaller firms with permanent staff members ranging from 1 to 10 felt that NOSA have less to offer them than those with staff members ranging from 51 to 100.

The difference between these mean values showed a practical significance of d = 0.80, indicating a large enough difference to have an effect in practice.

4.2.3.3. Number of permanent staff vs. NOSA compliance

Where the size of the company being determined by the number of its permanent staff is compared to its NOSA compliance, a phi (ϕ) coefficient of 0.58 was yielded, which is a clear indication of practical significance. Table 3.20 indicates that companies with permanent staff members of between 1 and 10, making up 43.75% of the total number of respondents, tends not to comply with the NOSA star-grading system. This can be explained, as section 4.2.3.1 indicated that these “smaller” companies are not that familiar with this commercial restriction. Section 4.2.3.2 indicated that these “smaller” companies also felt that NOSA has less to offer their firms compared to how the bigger firms feel.

4.2.3.4. Artisanship status vs. advantages ISO

Although both managerial groups, namely those who have completed an artisanship and those who have not, were more or less equally aware of ISO, a practical significant result of d = 0.80 was obtained regarding this demographical variable and the construct advantages ISO. Participants who did not complete an artisanship during their careers, feel that the commercial restriction compliance to ISO holds more advantages to their firms than what the managers feel who have completed an artisanship.

The difference between the two means of the discussed variable, also indicated a statistical significance (p = 0.03).

4.2.3.5. Number of permanent staff vs. disadvantages ISO

Again two practical significant results were obtained where the demographical variable measuring the company's size by means of the number of permanent staff, but this time with regard to the perceived disadvantages ISO holds.

- Between 1 to 10 and 11 to 30 employees yielded a practical significance of *d* = 1.11.
- Between 1 to 10 and 51 to 100 employees yielded a practical significance of d = 1.22.

This result indicates that firms with permanent staff numbers ranging from 1 to 10 feel that ISO have less to offer them than those with staff members ranging from 11 to 30 and 51 to 100 employees respectively.

The difference between the means of the discussed variables also indicated a statistical significance of *p*-values less than 0.05.

4.2.3.6. Annual turnover vs. disadvantages ISO

The mean values of both groups within the variable where the size of the company is determined using the measure of their annual turnover (between >R0.5 to R5 and >R35) were very similar but still yielded a practical significant result of *d* = 1.24. Those companies who have the smaller turnover of the two groups, yielded the bigger mean value ($\bar{x}$ = 2.77) compared to the bigger group's mean value of $\bar{x}$ = 2.20. This is an indication that smaller companies are more sceptical when it comes to what ISO can offer them pertaining to quality (ISO 9001) and environmental (ISO 14001) aspects.

4.2.3.7. Annual turnover vs. BBBEE contribution level

A clear indication of practical significance was obtained (ω = 0.58) in the case where the size of the company is determined by its annual turnover compared to its BBBEE contribution level. The study indicates, that companies with annual turnovers from >R0.5 million to R5 million and from >R5 million to R35 million tend to have BBBEE contribution levels of four and five. This is especially the case with the bigger of the

two groups contributing 28.13% of the total number of respondents, as can be seen from Table 3.21.

4.2.3.8. Artisanship status vs. BBBEE contribution level

Table 3.22 indicates that a company that is being managed by a manager, who completed an artisanship within his or her career (contributing to 40.63% of the total number of respondents), tends to have BBBEE contribution levels of four and five. A clear indication of practical significance was obtained (ω = 0.50) in the case where this demographic variable was compared to the company's BBBEE contribution level.

4.2.3.9. Shares owned by respondent vs. BBBEE contribution level

A clear indication of practical significance was obtained (ω = 0.53) in the case where the demographic variable, namely the percentage of shares owned by the participating manager in the company was compared to the company's BBBEE contribution level. 34.38% of the total number of respondents owning 51 to 100% shares in the business has BBBEE contribution levels of four and five.

It can be noted from the last three sections where the demographic variables were tested against the questionnaire's general section constructs, that all have the company's BBBEE contribution levels in common. As a matter of fact, all three demographical groups, namely annual turnover, artisanship status of the participating manager and the percentage of shares owned by the participating manager, have BBBEE contribution levels of four and five.

Appendix A shows the generic scorecard for qualifying small enterprises. A level 4 status on the generic scorecard is the result of obtaining 65 to 74 points resulting in a BBBEE procurement recognition level of 100%. A level 5 status is the result of obtaining 55 to 64 points, resulting in a BBBEE procurement recognition level of 80%.

4.2.3.10. Age of participant vs. awareness of CIDB

The study indicated that there is a considerable difference between the mean values of the two different age groups (≤49 and ≥50 years) concerning their awareness of the commercial construct CIDB. The participating managers who were 49 years and younger, yielded a mean value of $\bar{x}$ = 3.11, compared to the mean value of those managers of 50 years of age and over ($\bar{x}$ = 1.46). This is an indication that the younger managers are considerably more aware of CIDB than the older managers. In fact, the difference between these mean values showed statistical (*p* = 0.04) as well as practical significance *(d* = 0.80), indicating a large enough difference to have an effect in practice.

This commercial construct mainly concerns organs of state and as a result it can be concluded, that the younger managerial group are more interested in doing business with organs of state.

4.2.3.11. Age of participant vs. disadvantages CIDB

The study also indicated a practical significance *of d* = 0.86 regarding the age of participating managers when tested against the construct disadvantages CIDB. The results obtained in the study show that the older managers (≥50 years) feel that CIDB holds more disadvantages to their companies than do the younger group. It can be concluded, that this result was obtained because the older group are uninformed as the study indicated they are considerably less aware of CIDB's existence.

4.2.3.12. Annual turnover vs. advantages CIDB

On average, the variable where the size of the company is determined using the measure of their annual turnover (between >R0.5 to R5 and >R35), yielded practical significance of *d* = 0.94, when measured against the construct advantages CIDB.

The larger companies having annual turnovers greater than R35 million, indicated that they feel that the commercial restriction pertaining to CIDB compliance is more advantageous ($\bar{x}$ = 3.20) to their firms than do those with smaller turnovers ($\bar{x}$ = 2.67).

4.2.3.13. Annual turnover vs. disadvantages CIDB

Again the variable annual turnover (between >R5 to R35 and >R35) showed practical significance (*d* = 0.83) but this time, when tested against the construct disadvantages CIDB. The bigger companies felt that the construct CIDB this time has less to offer their firms but when compared to those companies having annual turnovers of between >R5 to R35.

The construct CIDB compliance is more relevant to organs of state. It could be that bigger firms are not that prone to do business with these industries as the perception exists that some organs of state are poor payers. These suppliers are also well-established with the other non-governmental industries within the Vaal Triangle and for this reason, not that desperate for the organ of state's business.

4.2.3.14. Legal status vs. advantages CIDB

Overall, the study indicates that there is a considerable difference between the mean values of the variable legal status of the company and the construct advantages CIDB. Close corporations, with a mean value of $\bar{x}$ = 3.28, indicated that they find it more favourable to comply with this construct than the private companies ($\bar{x}$ = 2.51). A practical significance of *d* = 1.55 was obtained, indicating a large enough difference to have an effect in practice.

4.3. RECOMMENDATIONS

Based on the conclusions drawn, the following recommendations regarding compliance to the different commercial restrictions studied can be made.

- The first recommendation to be made, is regarding the commercial restriction NOSA. If it can be assumed that a company is more successful because of their bigger size measured in its permanent staff numbers, then it is recommended that the smaller companies also comply with NOSA. The reasoning behind this is that section 4.2.3.1 concluded that the bigger firms are more aware and according to Table 3.20, they are also keener to comply with this restriction.

- Most of the more prominent industries require their suppliers to comply with some sort of a quality system like ISO 9001. To support the recommendation that all suppliers should comply with this commercial restriction, conclusions made in section 4.2.3.5 indicated, that smaller companies feel that ISO have less to offer them than do the bigger companies. If again the assumption is made that bigger-sized companies are more successful than are the smaller ones, it is an indication that compliance to ISO can be a worthwhile requirement to accept.
- Because this field of study is a predominantly male- and white-owned industrial segment, BBBEE is perceived to be a serious threat. It is therefore, not surprising that the results obtained from the respondents indicated that this demographical group is the most aware of this construct. South Africa requires an economy that can meet the needs of all citizens and their enterprises in a sustainable manner. This can be accomplished only if our economy builds on the full potential of the whole population and communities across the entire country. A few recommendations can be suggested to promote compliance to this restriction, especially amongst the respondents of this study, as the purpose of BBBEE is to stimulate economical growth. Because of a general lack of understanding and knowledge of the BBBEE principles as a result of the complexity of the codes, these recommendations include the implementation of a communication programme to address the perceptions and perceived constraints of BBBEE. Support mechanisms need to be developed for smaller companies. There has to be an improvement in the attractiveness of investment returns. A suitable BBBEE partner, a fair entry value as well as the desire for both parties to work together, should be promoted. More resources should be made available for managerial development in order to effect true empowerment, and all involved parties should work towards a culture of transformation.
- The last recommendation to be made pertains to the commercial restriction CIDB. As section 4.2.3.12 concluded that larger firms are more willing to comply with this restriction, it is recommended that the older group of managers, who are as stipulated in section 4.2.3.10 less aware of this

restriction, investigate it and consider complying. Compliance could open up new opportunities to expand their businesses, especially with organs of state.

4.4. ACHIEVEMENT OF OBJECTIVES

The success of this study is based on the evaluation of the achievement of the primary and secondary objectives as indicated in section 1.4.

4.4.1. Primary objectives

The primary objective of this study was to identify and investigate the main restrictions automation suppliers encounter when attempting to promote and sell their products into their local manufacturing industry.

The achievement of the primary objectives was dependent on the realising of the secondary objectives.

4.4.2. Secondary objectives

The secondary objectives were determined in section 1.4.2 of this study. These objectives were set out to help with the achievement of the primary objective. The secondary objectives were the following.

- The different criteria, upon which the local manufacturing industry qualifies their suppliers, need to be identified.
- The main reasoning behind the required criteria needs to be investigated.
- The identified standardisation restrictions must be compared, amongst each other, in terms of supplier awareness.
- The identified standardisation restrictions must be compared in terms of effects/implications on the supplier.

The first two secondary objectives were achieved in chapter two of this study by means of a comprehensive literature study.

The third and forth secondary objectives were achieved by means of the empirical study with the findings being discussed in detail in chapter three.

Through the literature study the main restrictions automation suppliers encounter when attempting to promote and sell their products into their local manufacturing industry have been narrowed down to a commercial nature. As all of the secondary objectives have been achieved, the primary objective has also been met as these restrictions have been identified as well as investigated successfully.

4.5. SUGESTIONS FOR FURTHER RESEARCH

The following suggestions can be made for further research regarding this topic:

- From the empirical research it is clear that different responses with regards to the constructs tested within this study were received from different demographical groups. Further research can be conducted in an attempt to investigate if the attitudes of these respondents regarding certain constructs have any effect on the success of their businesses.
- Even though the Vaal Triangle is a rich industrial area, and houses numerous suppliers of automation equipment and services to the local industry, the respondents of the questionnaire used in the empirical study weren't enough to fully cover all the demographical variables. Because this field of study is a predominantly male- and white-owned industrial segment, the demographical variables gender and racial ownership had to be excluded from this study as to few female and non-white respondents, with only two and three respectively participated in this study. Further research can attempt to increase the number of participating companies by expanding the geographical demarcation of the study. This may result in the excluded demographical groups to be well-represented and as a result, can be tested against the constructs in this study.
- The study indicated that the commercial construct awareness of CIDB had 40.63% of the total number of respondents indicating that they were totally unaware of its existence. Further research can be conducted in an attempt to establish if it is a case of it being a relatively new commercial requirement, or if it is because of the fact that it mainly pertains to organs of state and that suppliers are not very eager to conduct business with them.

- Not all the results obtained in the empirical study could be explained. Further, more specific research can be conducted in an attempt to determine why the different demographical groups felt certain ways regarding the specific constructs where practically significant results were obtained.
- The study was limited to national restrictions only where problems like international trade restrictions, government subsidies and import and export taxes were, omitted. Further research could include this.

4.6. SUMMARY

The aim of this chapter was to conclude on the results obtained from the study and to give practical recommendations regarding compliance to the commercial restriction studied in this mini dissertation.

The chapter started off by concluding on the demographic information of the respondents. Further conclusions were drawn regarding the 12 main constructs, as well as the constructs tested in the general section of the questionnaire. Finally the relationship between some of the demographic variables and the constructs tested, were addressed.

After conclusions were drawn, recommendations were made regarding compliance to the commercial restriction studied.

The chapter concluded by evaluating the success of the study based on achievement of the primary and secondary objectives. It was found to be successful after it was established that all the objectives were reached. Suggestions for further research in this field of study were made.

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Appendix A

Code 801: Qualifying Small Enterprises Scorecard. (DTI, 2007:1.)

Element	Criteria	Weighting points	Compliance Target
Ownership		**25 points**	**25% + 1**
Voting rights:	Exercisable Voting Rights in the enterprise in the hands of Black people	6	
Economic Interest:	Economic Interest of Black people in the enterprise	9	
Realisation points:	Ownership fulfilment	1	
	Net Value	9	
Bonus Points:	Involvement in the ownership of the enterprise by Black women	2	
	Involvement in the ownership of the enterprise by Black Participants in Employee Ownership Schemes, Cooperatives or Broad-Based Ownership Schemes	1	
Management		**25 points**	**50.10%**
-	Black Representation at Top Manager level	25	
-	Bonus Points: Black Women representation as Top-Managers	2	
Employment Equity		**25 points**	**(40% to 70%)**
-	Black employees of the Measured Entity who are Management as a percentage of all Management adjusted using the Adjusted Recognition of Gender	15	
-	Black employees of the Measured as a percentage of all employees adjusted using the Adjusted Recognition for Gender	10	
Skills Development		**25 points**	**2% of payroll**
-	Adjusted Skills Development Spend on Learning Programmes for black employees as a percentage of Liveable Amount	25	
Preferential Procurement		**25 points**	**50%**
-	BEE Procurement Spend from all Suppliers based on the BEE Procurement Recognition Levels as a percentage of Total Measured Procurement Spend.	25	
Enterprise Development		**25 points**	**2% (NPAT)**
-	Average annual value of all Qualifying Contributions made by the Measured Entity measured from the commencement of this statement or the Inception date to the date of measurement as a percentage of the target	25	
Socio-Economic Development		**25 points**	**1% (NPAT)**
	Average annual value of all Qualifying Contributions made by the Measured Entity measured from the commencement of this statement or the Inception date to the date of measurement as a percentage of the target	25	

Appendix B

Questionnaire

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Potchefstroom Campus
North-West University
Potchefstroom
2520

Questionnaire:

"A Study on company related requirements the Manufacturing Industry within the Vaal Triangle calls for when Automation Suppliers attempt to supply them with products and/or services"

Contact details:
David Huxham
Cell: 082 466 5719
E-mail: david@staro.co.za

Background:

Through a literature study conducted on some of the leading manufacturing industries within the Vaal Triangle, different obstacles were identified regarding suppliers attempting to conduct business with the local manufacturing industry. This included product-related standardisation like SABS/SANS, IEC, CE and UL. Another was restrictions placed on suppliers by the industry relating to limitations on the number of suppliers allowed to supply a certain product type or service. The last obstacle, and the one being investigated, concerns the requirements the manufacturing industry calls for relating to the supplier's business itself. These include supplier's compliance to NOSA, ISO, BBBEE and CIDB. What all of them have in common, is that they all affect the supplier's business directly and it's in management's power to comply or not.

This questionnaire needs to supply information pertaining to the last obstacle. Please, if applicable, it should be answered for your local Vaal Triangle branch.

All information will be treated as **STRICTLY CONFIDENTIAL** and will be used for academic purposes only.

THIS QUESTIONNAIRE MUST PROVIDE THE RESEARCHER WITH SUFFICIENT INFORMATION TO ANALYSE AND INTERPRET THE DATA RETRIEVED ACCURATELY. KINDLY FOLLOW THE INSTRUCTIONS BELOW.

GENERAL INSTRUCTIONS

- This questionnaire must be completed by the **OWNER / MANAGING DIRECTOR / MEMBER / VAAL TRIANGLE BRANCH MANAGER** of the business.
- Please answer **all** the questions.
- Please answer the questions **objectively** and **honestly**.
- Please mark as indicted and mail back a.s.a.p.

SECTION A: DEMOGRAPHIC INFORMATION

The following information is required to help the researcher with the statistical analysis of the data for comparisons among different businesses.
Please mark the relevant block where applicable.

A1	In which age group do you fall?	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
		≤ 29	**30 – 39**	**40 – 49**	**50 – 59**	**60+**
A2	What gender are you?		**Male**		**Female**	
A3	Are you a qualified artisan?		**Yes**		**No**	
	If **Yes**, what trade?					
A4	Is the business white-owned?		**Yes**		**No**	
A5	What percentage of shares in the business do you own?				**%**	
A6	How many years have you been running this business/branch?				**years**	
A7	How many permanent employees do the company / branch employ in the Vaal Triangle?	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
		1-10	**11-30**	**31-50**	**51-100**	**100+**

A8	What is the company's annual turnover? (x R1 000 000)						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
	<R0.5	**>R0.5-R1**	**>R1-R5**	**>R5-R10**	**>R10-R35**	**>R35-R50**	**>R50**

A9	What is the legal status of the business?			
	(1)	**(2)**	**(3)**	**(4)**
	Proprietorship	**Partnership**	**Company (private)**	**Company (public)**
	(5)	**(6)**	**(7)**	**(8)**
	Close Corporation	**Co-operative**	**Business Trust**	**Franchise**
	(9) Other combination (specify):			

<u>SECTION B:</u> AWARENESS OF NOSA, ISO, BBBEE & CIDB RATINGS

Indicate if you agree, are unsure or disagree with the following statements. Mark the applicable block with an "X".

B1	I am familiar with the National Occupational Safety Association (NOSA).	**Yes**	**Unsure**	**No**
B2	I know that certification; consultation and training services are tailor-made according to NOSA's client needs.	**Yes**	**Unsure**	**No**
B3	I know that NOSA needs to conduct a star-grading audit at least once annually.	**Yes**	**Unsure**	**No**
B4	I am familiar with the criteria upon which NOSA bases their star-rating.	**Yes**	**Unsure**	**No**
B5	I am aware of how NOSA's Disabling Incident Frequency Rate (DIFR) is calculated.	**Yes**	**Unsure**	**No**
B6	I am familiar with the International Organization for Standardisation (ISO).	**Yes**	**Unsure**	**No**
B7	I am aware that South Africa is represented at ISO through SABS being a member body.	**Yes**	**Unsure**	**No**
B8	I am aware that ISO's work program includes products as well as services.	**Yes**	**Unsure**	**No**
B9	I am aware of the requirements of the ISO 9001 Quality Management System.	**Yes**	**Unsure**	**No**
B10	I am aware of the requirements of the ISO 14001 Environment Management System.	**Yes**	**Unsure**	**No**
B11	I am familiar with the legislation pertaining to Broad Based Black Economic Empowerment (BBBEE).	**Yes**	**Unsure**	**No**
B12	I am aware of the contribution levels of BBBEE.	**Yes**	**Unsure**	**No**
B13	I am aware that businesses with less than R5 million turnover are exempted from complying with the codes.	**Yes**	**Unsure**	**No**

B14	I am aware of the fact that qualifying small enterprises consist of businesses with an annual turnover of R5 million - R35 million.	**Yes**	**Unsure**	**No**
B15	The fact that qualifying small enterprises only have to adhere to four of the seven elements of codes of good practice, is known to me.	**Yes**	**Unsure**	**No**
B16	I am familiar with the function of the Construction Industry Development Board (CIBD).	**Yes**	**Unsure**	**No**
B17	I am aware that the CIBD was established by Act of Parliament to promote a regulatory and development framework.	**Yes**	**Unsure**	**No**
B18	I am aware that no construction work for public sector contracts awarded in terms of a competitive tender may be undertaken by a contractor unless they are registered with the CIDB and holds a valid registration certificate.	**Yes**	**Unsure**	**No**
B19	I am aware the registration with CIDB is valid for a period of three years.	**Yes**	**Unsure**	**No**
B20	I am aware that the contractor must apply for renewal three months before the expiry date of the current registration.	**Yes**	**Unsure**	**No**

<u>SECTION C:</u> ADVANTAGES TO YOUR COMPANY

The questions of sections C and D should be answered by making a cross **"X"** in the relevant block. Use the following keys: **1** (Strongly Disagree); **2** (Disagree); **3** (Agree); **4** (Strongly Agree). You should select the number which best describes how you feel about the specific statement. For example, when presented with the following statement;

"I think it would be beneficial to be able to present this grading logo on my premises and official documentation."

and you feel that you agree for **NOSA**, you should mark the number **3** (Agree);

and you feel that you strongly disagree for **ISO**, you should mark the number **1** (Strongly Disagree) and so on as per the example below:

	Advantages to my Company	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**
I think it would be beneficial to be able to present this grading logo on my premises and official documentation.					
C13	NOSA	**1**	**2**	**X3**	**4**
C14	ISO	**X1**	**2**	**3**	**4**

Indicate to what extent you agree or disagree with the following statements. Mark the applicable block with an "X".

	Advantages to my Company	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**
Compliance with these "standards" has resulted in a broadening of our client base.					
C1	NOSA	**1**	**2**	**3**	**4**
C2	ISO	**1**	**2**	**3**	**4**
C3	BBBEE	**1**	**2**	**3**	**4**
C4	CIDB	**1**	**2**	**3**	**4**

Advantages to my Company (Continued)		Strongly Disagree	Disagree	Agree	Strongly Agree
Complying with this “standard” is beneficial when applying for credit at financial institutions.					
C5	NOSA	**1**	**2**	**3**	**4**
C6	ISO	**1**	**2**	**3**	**4**
C7	BBBEE	**1**	**2**	**3**	**4**
C8	CIDB	**1**	**2**	**3**	**4**
Complying with this “standard” makes it possible for the business to expand its operations within the Vaal Triangle.					
C9	NOSA	**1**	**2**	**3**	**4**
C10	ISO	**1**	**2**	**3**	**4**
C11	BBBEE	**1**	**2**	**3**	**4**
C12	CIDB	**1**	**2**	**3**	**4**
I think it would be beneficial to be able to present this grading logo on my premises and official documentation.					
C13	NOSA	**1**	**2**	**3**	**4**
C14	ISO	**1**	**2**	**3**	**4**
C15	BBBEE	**1**	**2**	**3**	**4**
C16	CIDB	**1**	**2**	**3**	**4**
Complying with this “standard” makes it possible for the business to get access to contracts with organs of state.					
C17	NOSA	**1**	**2**	**3**	**4**
C18	ISO	**1**	**2**	**3**	**4**
C19	BBBEE	**1**	**2**	**3**	**4**
C20	CIDB	**1**	**2**	**3**	**4**

SECTION D: DISADVANTAGES TO YOUR COMPANY

Indicate to what extent you agree or disagree with the following statements. Mark the applicable block with an "X".

	Disadvantages to my Company	Strongly Disagree	Disagree	Agree	Strongly Agree
Implementing this "standard" could result in the loss of focus on business matters and therefore, could have a hampering effect on our business.					
D1	NOSA	**1**	**2**	**3**	**4**
D2	ISO	**1**	**2**	**3**	**4**
D3	BBBEE	**1**	**2**	**3**	**4**
D4	CIDB	**1**	**2**	**3**	**4**
Implementation of this "standard" is time-consuming.					
D5	NOSA	**1**	**2**	**3**	**4**
D6	ISO	**1**	**2**	**3**	**4**
D7	BBBEE	**1**	**2**	**3**	**4**
D8	CIDB	**1**	**2**	**3**	**4**
Non-compliance with this "standard" has caused us to lose business.					
D9	NOSA	**1**	**2**	**3**	**4**
D10	ISO	**1**	**2**	**3**	**4**
D11	BBBEE	**1**	**2**	**3**	**4**
D12	CIDB	**1**	**2**	**3**	**4**

Disadvantages to my Company (Continued)		Strongly Disagree	Disagree	Agree	Strongly Agree
Complying with this “standard” puts a burden on this business.					
D13	NOSA	**1**	**2**	**3**	**4**
D14	ISO	**1**	**2**	**3**	**4**
D15	BBBEE	**1**	**2**	**3**	**4**
D16	CIDB	**1**	**2**	**3**	**4**
Complying with this “standard” is not a priority to this business.					
D17	NOSA	**1**	**2**	**3**	**4**
D18	ISO	**1**	**2**	**3**	**4**
D19	BBBEE	**1**	**2**	**3**	**4**
D20	CIDB	**1**	**2**	**3**	**4**

SECTION E: GENERAL

E1	Complying with Business-related Standards is a priority to this business.	**Yes**	**No**
E2	I feel that Business-related Standards are more important than Product Standards like SABS/SANS, IEC, CE, UL etc.	**Yes**	**No**
E3	There are benefits for this company through compliance with Business-related Standards.	**Yes**	**No**

E4	The majority of this company's business is conducted within the following industry/institution:						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
	Metals	**Oil & Gas**	**Water & Waste**	**Packaging**	**Food & Beverage**	**Mining**	**Organs of State**
	(8) Other (Specify):						

E5	My company's NOSA Star-grading is:						
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
	1 Star	**2 Star**	**3 Star**	**4 Star**	**5 Star**	**NOSCAR**	**Not Applicable**
	(8) Other Equivalent SHE System (Specify):						

E6	My company uses the following ISO Management System/s:		
	(1)	**(2)**	**(3)**
	ISO 9001 (Quality)	**ISO 14001 (Environmental)**	**None**

E7	My company's BBBEE contribution level is:								
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
	Level 1	**Level 2**	**Level 3**	**Level 4**	**Level 5**	**Level 6**	**Level 7**	**Level 8**	**Not Compliant**

E8	My company's CIDB contractor grade is:									
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Not Applicable**

YOUR TIME AND EFFORT ARE HIGHLY APPRECIATED