

Title

***The Impact of ISO 9001 on the Asset Returns of 9
Manufacturing Companies***

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ABSTRACT

The aim of this study was to analyse the impact that ISO 9001 certification has on the financial performance of manufacturing companies in South Africa. Garvin (1984) developed a theoretical model that established the link between quality management and increased profitability. Previous studies have shown mixed results but most indicated that the ISO 9001 quality management standard can improve sales as well as profitability. This study analysed financial data from nine ISO 9001 certified companies and used the difference-in-differences method to detect abnormal increases in profitability. The study found no significant increase in profitability. The erratic nature of the profitability of the companies analysed indicates that poor implementation might be preventing certified companies from realising the potential benefits of ISO 9001 certification.

DECLARATION

I, Elvin Sean Nel, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Elvin Seal Nel

Signed at

On the day of 20.....

DEDICATION

I would like to dedicate this report to my family and all my friends at Systems Automation and Management.

ACKNOWLEDGEMENTS

I would like to acknowledge my supervisor Chris Muller and my finance lecturer Justin Spencer-Young for their assistance.

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CHAPTER 1. INTRODUCTION

1.1 Purpose of the study

The purpose of this research is to analyse the financial impact of ISO 9001 certification on manufacturing companies in South Africa. The study will look at manufacturing companies listed on the Johannesburg Stock Exchange (JSE) and analyse their financial records for evidence of a change in performance since becoming ISO 9001 certified.

1.2 Context of the study

The International Standards Organisation (ISO) has developed the ISO 9001 Quality Management System to allow companies to maintain or improve the quality of their products and services (ISO, 2008).

ISO 9001 certification is costly to companies in terms of the initial disruption in operations caused by companies having to change the way they operate as well as the increase in additional overhead costs (Simmons & White, 1999).

There have been several studies conducted in various countries to determine whether ISO 9001 certification improves performance but there have been mixed results (Sousa & Voss, 2002).

The aim of this study is to determine whether the benefits which are advertised by certification bodies actually result in financial improvement.

The assumption made is that any benefit accrued to companies as a result of becoming ISO 9001 certified will reflect in the financial results of these companies.

The study will examine improvements in financial performance by analysing the Return on Assets (ROA) ratio of each company in the sample. From DuPont analysis it can be seen that the ROA ratio will be affected by any change in sales or profitability. Thus, ROA proves to be an appropriate measure of

performance since it is assumed that improvements in sales and/or profitability are the desired outcomes for any company contemplating ISO 9001 certification as well those companies that have already been certified. Kawthar and Vinesh (2011) found that “The association between ISO 9000 certification and financial performance is mainly concerned with impact on sales and profitability” (p 7).

1.3 Problem statement

The main problem that this study will try to address is to analyse the financial impact of ISO 9001 certification on companies in the manufacturing sector of the South African economy.

1.4 Significance of the study

The study fills a gap in that it will provide empirical evidence to either support or dispute claims of improved performance that ISO 9001 certification brings. From a financial perspective, there is a need to quantify the benefits of ISO 9001 certification in order to determine its feasibility.

The study will provide guidance to managers who are considering ISO 9001 certification for their companies. It will quantify the benefits, if any, that can be expected. This will help managers make more informed decisions regarding ISO 9001 certification.

1.5 Delimitations of the study

- This study will only focus on publicly listed companies on the JSE which are in the Industrial sector of the economy.
- This study will only focus on the tangible financial benefits of ISO 9001 certification that are experienced by companies that have already been certified.

1.6 Definition of terms

- Acceptable Quality Limit (AQL) – defines the level of quality that is worst tolerable (ISO 2859 standard, as cited in Anjoran, 2011).

1.7 Assumptions

The following assumptions have been made regarding the study:

- Any measurable benefits conferred by ISO 9001 certification would be permanent.
- All companies in the sample that are ISO 9001 certified have implemented the practices required by the standard to the same degree.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

This chapter contains a review of the literature pertaining to quality management systems. The discussion will start by defining quality and quality management systems. Next, the ISO 9000 family of standards will be discussed. The discussion will then move to examining whether quality management systems lead to actual financial benefits by examining previous studies.

2.2 Definition of topic or background discussion.

2.2.1 *Defining quality*

Research in Quality Management has been unable to provide a single definition of product quality (Sousa & Voss, 2002). This may be due to the fact that quality may actually be multidimensional as proposed by Garvin (1984). The dimensions for product quality put forward by Garvin (1984) are performance, features, reliability, conformance, durability, serviceability, aesthetics and perceived quality. Garvin then goes on to propose five approaches to defining quality, namely, the transcendental approach, the product-based approach, the user-based approach, the manufacturing based approach and the value-based approach.

The transcendental approach to defining quality takes the view that quality is an innate property that is difficult to define precisely, such as beauty (Garvin, 1984). Instead, we can only learn to recognise it through experience (Garvin, 1984).

The product-based approach views quality as precisely measurable and views differences in the quality of products as differences in the quantity of some attribute (Garvin, 1984). According to this view quality, it follows that higher quality should result in increased cost (Garvin, 1984).

The user-based approach to quality states that a product has higher quality if it is able to better satisfy the customer's needs compared to other products on the market (Garvin, 1984). The problem with this approach is that an objective meaningful definition of quality is difficult to obtain because individual consumers have different preferences (Garvin, 1984).

The manufacturing-based approach is more concerned with the process of making the product. From this perspective, quality is defined as conformance to customer specifications (Garvin, 1984). According to this view, improvements in quality lead to fewer deviations from the expected standard and therefore result in less waste and in turn lower costs (Garvin, 1984).

The value-based approach is similar to the manufacturing approach but is viewed from the customer's perspective. According to this view, quality is assessed as performance versus price (Garvin, 1984). This means that customers would regard a product as having higher quality if it meets performance expectations at a lower price.

So, from the approaches to defining quality, it can be concluded that companies should adopt a definition of quality that allows quality to be measurable and controllable if they intend to manage it.

2.2.2 *Quality Management*

Quality management has been defined as an approach to management that consists of mutually reinforcing principles each of which is supported by specific practices and techniques (Dean and Bowen, 1994 as cited in Sousa and Voss, 2001). Quality management consists of two distinct yet complementary elements. The first element is Quality Assurance (QA) which seeks to identify all of the processes that have a direct impact on quality and then standardise these processes (Van Ewyk, 1994) . Talha (2004) defines quality assurance as “a system of activities designed to ensure production that meets pre-established requirements” (p. 17).The

second element is Total Quality Management (TQM) which involves continually improving the processes that affect quality and thereby improving quality (Van Ewyk, 1994). Benson, Saraph, & Schroeder (1991) noted that Quality Management has its origins in prescriptions from practitioners who are experienced in the field of quality; however, none of their prescriptions were derived from organisational theory.

Thus, in sum, quality management is concerned with both the standardisation of processes that affect quality as well as the improvement of these processes to improve quality if necessary.

2.2.3 *The ISO 9000 family of standards*

The ISO 9000 series of standards has been defined as standards that provide a generic quality management system that can be used across a broad range of industries (Simmons and White, 1999). The ISO 9000 international standards provide a set of guidelines that make-up a generic quality management system that can be applied to any organisation – ISO (1998) as cited in Kawthar and Vinesh (2011). The ISO 9000 set of standards only prescribes the elements of a quality management system but does not provide guidance as to how to implement them (Simmons & White, 1999). The ISO 9001 standard is by far the most comprehensive of the ISO 9000 family of standards and it addresses the control of product design as well as management responsibilities (Simmons & White, 1999). ISO 9000 consists of eight principles namely, Customer Focus, Leadership, Involvement of People, Process Approach, System Approach to Management, Continuous Improvement, Factual Approach to Decision Making and Mutually Beneficial Supplier Relations (Pryor, Toombs, Anderson, & White, 2010)

The ISO 9000 family of standards include:

- ISO 9000:2005 – deals with basic concepts and terms (ISO, 2013).

- ISO 9001:2008 – sets out the requirements of a quality management system (ISO, 2013).
- ISO 9004:2009 – prescribes methods for making a quality management system more effective (ISO, 2013).
- ISO 19011: 2011 – provides guidance on audits of the quality management system (ISO, 2013).

Together the ISO 9000 family of standards form the core of a generic quality management system that is intended to be used by most companies in any industry (Simmons & White, 1999).

2.2.4 ISO 9000 and business performance

One of the first authors to establish a connection between product quality and business performance was Garvin (Barclay, 1993). Garvin (1987) found that product quality was linked to the survival of businesses that were facing strong international competition.

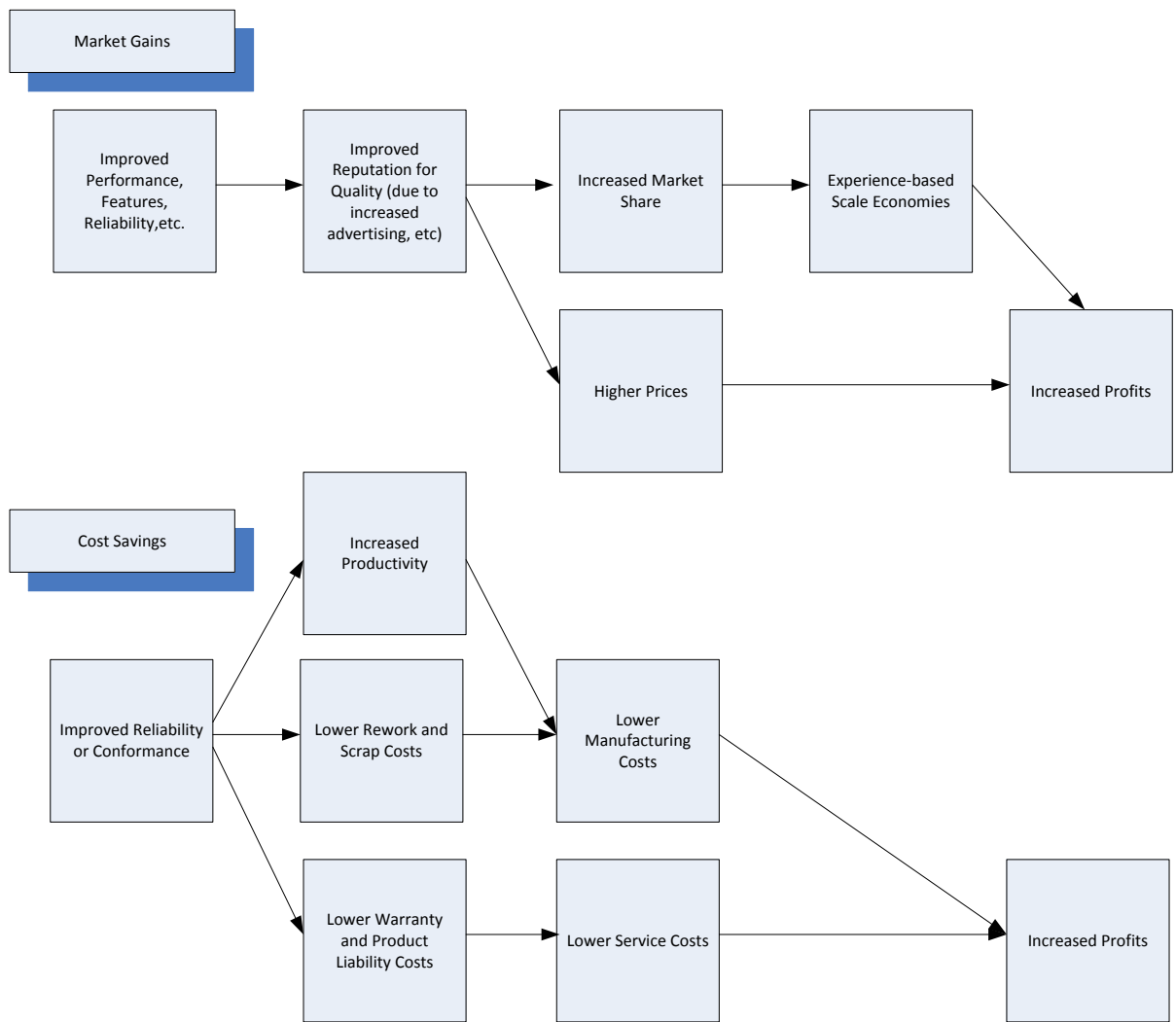


Figure 1: The quality performance model (Garvin, 1984)

Figure 1 depicts Garvin's (1984) illustration for how financial benefits are obtained from quality management practice. As indicated in figure 1, there are essentially two ways that quality management can increase profits, namely, through market gains and costs savings. Market gains refer to external benefits such as an improved reputation for quality. This would allow a company to charge higher prices and thus increase profits. This is indicative of a differentiation strategy. The second way in which quality management can increase profits is through cost savings. As indicated in figure 1, the practice of quality management can lead to increased profits due to increased productivity, lower rework and scrap cost, and lower warranty and product liability costs.

Barkley (1993) asserts that a competitive advantage could be gained through a quality based strategy that focuses on continuous improvement, a philosophy known as kaizen. Goedhuys and Sleuwaegen (2011) state that there are two important benefits of quality certification, namely improvements in efficiency and reinforcing of the firm's position in the market. Improvements in product quality have been shown to give businesses the flexibility to pursue either a low-cost strategy or a differentiation strategy (Porter 1980, 1986, as cited in Barkley, 1993). Gavin (1984, as cited in Sousa and Voss, 2001) argues that internal process quality and product quality leads to internal benefits such as improved operational performance as well as market benefits such as increased sales and increased market share.

A more recent study by Kim, Kumar, & Kumar (2012) found a relationship between quality management practices and innovation. Drucker, Ohmae, Porter and Peters (1990) showed that innovation was crucial to establishing a sustainable competitive advantage. Figure 2 depicts the level of sophistication of a firm's competitive advantage as described in Drucker et al. (1990). The main argument put forward by Drucker et al. (1990) is that advantages have levels of sophistication and that firms have to continually move to higher levels of sophistication in order to maintain their competitive advantage. Once the highest levels are reached, a competitive advantage is only maintained through innovation. It is interesting to note that the higher levels of sophistication, unique and proprietary product features, and proprietary process technology are the domain of a quality management system.

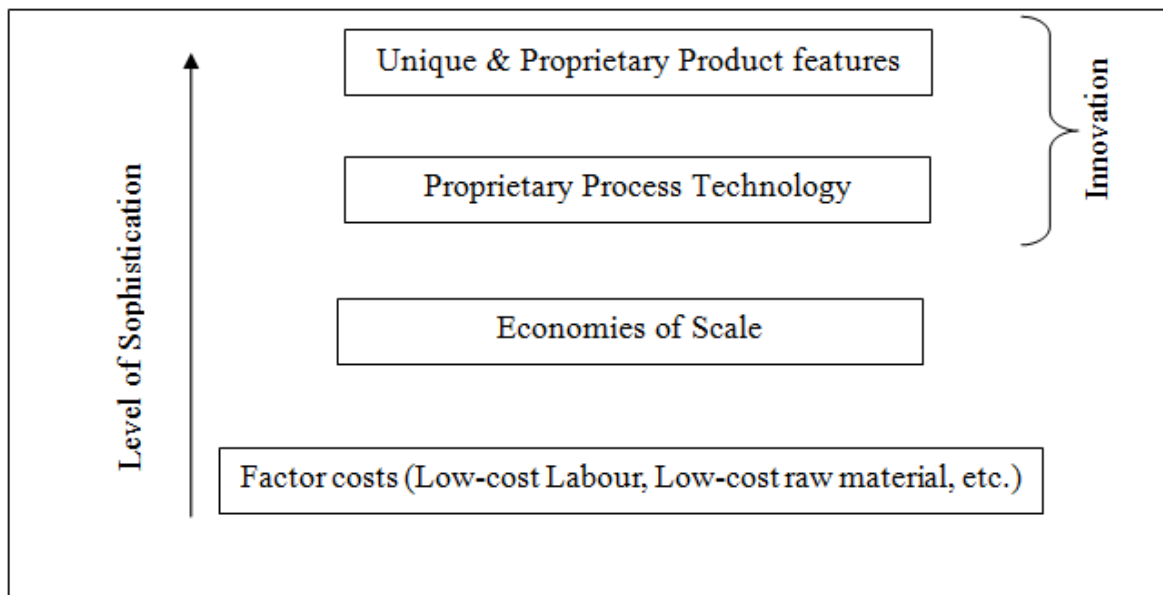


Figure 2: Gaining a sustainable competitive advantage through innovation (Drucker et al., 1990).

ISO 9001 certification is increasingly becoming used a selection criterion by suppliers (Douglas et al. 1999, Jaideep et al. 1996, Mispelblom 1995, as cited in Boiral, 2003). Companies are also pressured into getting certified because they believe it has market value (Berny and Peyrat 1995, Mispelblom 1995, Hayes 1994, as cited in Boiral, 2003). The 2002 Engineering Quality Forum (EQF) report found its respondents to support this view and states that small to medium enterprises (SME's) were concerned that the benefits of ISO certification rarely outweighed the investment in resources required and that certification is being pursued for marketing reasons and not for improvements in quality (Rowland-Jones, Thomas, & Page-Thomas, 2008). The EQF study also reported that customers are expecting increasingly higher levels of quality (Rowland-Jones et al., 2008) . However, according to Ken Stephens (as cited in Evens, 2013), ISO 9001 registrations are declining and may be approaching saturation. He attributes the possible cause of this to the fact ISO 9001 does not deal effectively with the quality of actual products. Other possible reasons for the decline in ISO 9001 registrations were given by Goedhuys and Sleuwaegen (2013) who argue that while ISO certification may be on the decrease in Western European countries, it is on the increase in Africa and Latin American countries. They attribute this phenomenon to firms in institutionally weak

countries pursuing ISO certification because such global standards are seen as transaction supporting institutions.

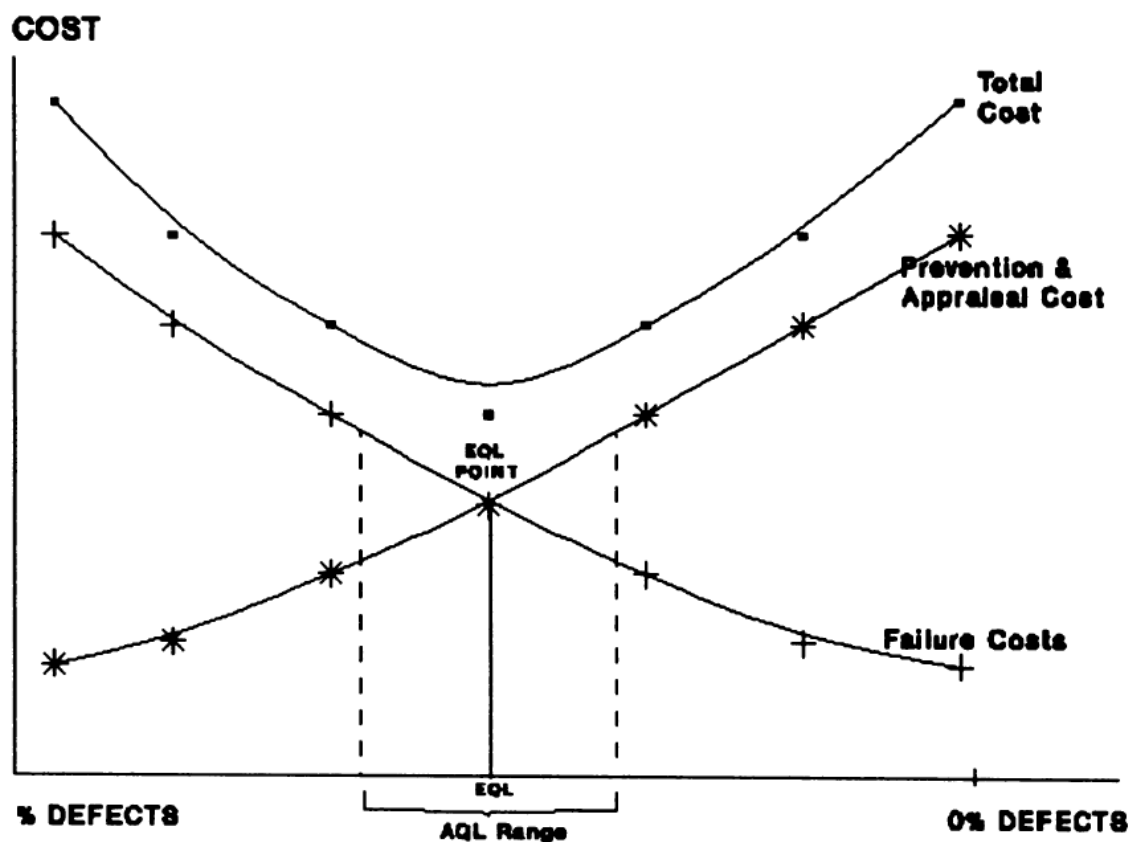


Figure 3: EQL-AQL Model (Barclay, 1993)

Figure 3 depicts the Expected Quality Level (EQL) versus Acceptable Quality Level (AQL) model. In this model Barclay (1993) illustrates that there is a relationship between achieving increased levels of quality and cost. He suggests that there is an optimum level of quality, above which, the cost of prevention starts to outweigh the cost of failure.

It can thus be concluded that there are numerous possible benefits of ISO 9001 certification such as maintaining or improving a company's market position, helping a company withstand strong international competition, giving a company the flexibility to pursue a low-cost or differentiation strategy, improved operational performance, improved sales and an increased ability to innovate. However, there are concerns around the costs and motivation for getting certified. There are concerns that the costs might out-weigh the benefits and that ISO certification does not deal effectively with product quality. Despite

these concerns, it appears that companies are being pressured into getting ISO certification by both customers and competitors.

2.2.1 Possible impediments to the realisation of the benefits of ISO certification

Studies have shown that many companies fail to achieve the desired improvements in quality and efficiency (Victor, Boynton, & Stephens-Jahng, 2000). Heineke (as cited in Evens, 2013), also concludes that the problems that arise in Quality Management are related to implementation.

Victor et al. (2000) argue that the reason the implementation of total quality management systems fails, the philosophy of which is incorporated in ISO 9001, is because of the dual role of employees. Employees are expected to execute their tasks while simultaneously come up with ideas for any improvements that can be made (Victor et al., 2000). Katz and Kahn (1978, as cited in Victor et al. 2000) noted that generating and presenting good ideas is not the job of most workers. Danny Samson (as cited in Evens, 2013) has noted that the implementation of Quality Management Systems fail in many organisations because the practices do not become embedded deep enough in the organisations. He suggests that knowledge of change management might be lacking in implementation efforts.

The culture of the organisation as well as motivation could also play a role in the effectiveness of the implementation of a quality management system. Terziovski et al. (2003) found a positive relationship between the culture of an organisation and the benefits derived from ISO certification. The study also found that the motivation for obtaining certification was a good predictor for the benefits that could be expected. A study done by Martinez-Costa and Martinez-Lorente (2008) found that companies that were more internally motivated to obtain ISO certification showed improved performance when compared to companies that were more externally motivated. Boiral and Amara (2009) also found that the success of ISO 9000 implementation was dependent on whether the organisation was internally or externally motivated.

The study by Boiral and Amara (2009) also identified the size and sector of the company as possible determinants of successful implementation of the ISO standard. The study by Fatima (2014) also provides evidence that size could be moderating factor that influences the financial performance gains conferred by certification in favour of larger organisations. This however contradicts the findings of Levine and Toffel (2010) who found that the effects of certification were more pronounced in smaller companies. An argument in favour of large organisations provided by Boiral and Amara (2009) is that large organisations tend to be more organised compared smaller organisations and are thus better suited to the standard. Boiral and Amara (2009) also noted that, while ISO 9000 certification can lead to an improved image externally, it could also lead to excessive bureaucracy within the organisation. An increase in bureaucracy would be more detrimental to smaller organisations since these companies might not have the resources to absorb this cost.

There could also be certain levels of implementation that exist and this could have an impact on the effectiveness of ISO certification. In order to gauge the level of implementation in certified companies, Conca et al. (2004) have developed an instrument that tries to measure the level of the eight factors (Leadership, Quality Planning, Employee management, Supplier management, Customer focus, Process management, Continuous improvement and Learning) that are deemed critical for the successful functioning of a quality management system. It is hoped that by gauging the levels of the eight factors that appropriate interventions could be made to ensure that quality management implementations were more successful and lasting and thereby allowing companies to realise the desired gains in quality improvement.

From the above it can then be concluded that organisational culture, motivation, employee roles, size of the company as well as the level of implementation could all be considered as possible moderating factors that affect the performance of ISO certified companies.

2.2.2 Previous Studies

In a research paper by Santos-Vijande and Alvarez-Gonzalez (2007), it is noted that previous studies that attempted to assess the impact quality management systems on business performance in general and financial performance in particular have had mixed results. They attribute this in part to different indicators being used in different studies.

Sousa and Voss (2002) summarised the results of previous studies on the link between quality performance and business performance at that stage (see Table 1).

Summary of the empirical evidence on the relationship between quality performance and operational and business performance

Study	Methodology	Sample	Findings related to the impact of quality performance on	
			Operational performance	Business performance
Capon et al. (1990)	Meta-analysis	20 published studies relating quality to business performance	Not addressed	In the sample of studies there were 104 positive, versus 8 negative, relationships between quality and business performance
Maani et al. (1994), Sluti et al. (1995)	Survey study, structural equation modeling	184 manufacturing firms	Conformance quality had a significant and strong effect	Conformance quality had a significant but weak effect
Madu et al. (1995)	Survey study, path analysis	146 manufacturing firms	Not addressed	Significant effect of quality performance (customer satisfaction, employee satisfaction and employee service quality)
White (1996)	Meta-analysis	Previous studies providing empirical evidence of relationships between conformance quality and business performance	Strong support for the beneficial effect of conformance quality	Less strong, but still positive support for the beneficial effect of conformance quality

Table 1: Summary of empirical studies done on the link between quality performance and operational and business performance (Sousa & Voss, 2002)

It can be concluded from Table 1 that improvements in quality have a strong impact on operating performance but a weaker impact on business performance. Sousa and Voss (2002) attributed this to the possibility that business performance may be dependent on a number of factors of which quality performance is just one.

Simmons and White (1999) conducted a study of US based ISO 9000 certified firms to establish if ISO certification yields any financial benefits. The study

compared ISO 9000 certified firms with similar firms that were not certified. The study found no difference between the two groups as far as operational performance and increases in foreign sales was concerned. The study did however find that the group of ISO certified companies studied were more profitable than the group containing non-ISO certified companies.

Heras, Casadesus and Ochoa (2001) conducted a study of Spanish companies that are ISO certified to establish whether these companies would be more profitable than non-ISO certified companies. The study found a statistically significant difference in the profitability of the two groups of companies. The results showed that, not only were the ISO 9000 certified companies more profitable, but that their profitability was improving over the five year period which the study examined.

Corbett et al. (2005) conducted an Empirical study on the financial impact of ISO 9000 certification in the US. They employed the event study method to determine whether ISO 9000 certification leads to improvements in productivity, increased market benefits as well as improved financial performance. The study found that after three years of ISO certification, companies did display above normal improvements in financial performance.

Terlaak and King (2006) had similar results and found no significant change in the operational performance of ISO 9000 certified companies. In this study, operational performance was analysed by tracking the amount of waste that was generated by an ISO certified facility.

However, a study by Martinez-Costa and Martinez-Lorente (2007) found that ISO 9001 had the effect of decreasing profitability, as measured by ROA, due to an increase in operational costs.

A subsequent study by Martinez-Costa et al. (2009) however, found that there was no noticeable difference in performance between ISO certified companies and non-certified companies.

In 2010 Levine and Toffel conducted a study to determine the effect of ISO 9001 on both employees and employers. The study found that ISO certified companies have lower organisational death rates, have a higher sales growth rate and they also found that employees' earnings grew more rapidly after certification (Levine & Toffel, 2010). The study also found that some of the benefits of ISO 9001 certification were more pronounced in smaller companies than in larger companies.

Kawthar and Vinesh (2011) assessed the impact of ISO 9000 certification on companies in Mauritius. Their study compared the sales of 39 ISO certified companies against 39 non-certified companies and found certified companies were associated with higher sales on average.

More recently, Fatima (2014) conducted a study to assess the impact of ISO 9000 on business performance in the context of a developing country, namely, Pakistan. The results of this study provide evidence that ISO 9000 certification improved the financial performance of medium and large companies but had no effect on small companies.

From the previous studies, discussed above, the following can be concluded. There were two aspects of performance that were of interest, namely, operational performance and financial performance. Financial performance was analysed in terms of improvements to sales and profitability. The focus of this study is improvements to profitability, so in this regard; the previous studies provide strong evidence to support the claim that ISO 9000 certification does improve financial performance. Although there were studies that found no effect or even a negative effect of ISO 9000 certification on performance, the weight of the evidence is in favour of ISO certification having a positive effect on financial performance.

2.1 Conclusion of Literature Review

From the discussion of the literature above, it can be seen that, while there is a fair amount of theory to support claims of improved financial performance of

companies that are ISO certified, previous empirical tests have had mixed results but mostly support these claims.

Figure 1 shows that there is a link between quality management and business performance via operational performance. Improvement in operational performance is the primary target of ISO 9000 since the focus of ISO 9000 is on the internal processes that affect quality. The literature suggests that internally motivated companies, that is, companies that seek certification to improve their internal processes, are more likely to realise the benefits of ISO certification compared to externally motivated companies. However, many companies experience external pressure to be certified. Therefore these companies become certified to gain from the marketing or branding value that certification might offer and have no intention of using the standard to improve their internal processes. The literature indicates that such companies are less likely to benefit from certification.

The literature has also indicated that culture and employee roles could influence the ability of ISO certification to provide benefits. These are factors that cannot be ignored in the South African context. The South African environment could be characterised as having ridged labour laws and it is not known what impact this could have on the success of a quality management system such as ISO 9001 which might have been successful in other parts of the world that perhaps have a different business environment. The South African economic environment could also be said to be more turbulent than that of the other countries where previous studies have been conducted (i.e The Unites States, Spain and Mauritius, etc). This could impact on the analysis and appropriate adaptations to the design of the study would have to be done in order to adapt it to the South African economic environment.

The literature also suggests that the size of a company might play a role in whether the financial benefits of ISO certification can be realised. However, previous studies have had conflicting results in this regard. Some studies suggesting that SME's are more likely to benefit from ISO certification, while others find just the opposite.

Based on this, this study will focus on the financial impact of ISO 9001 certification as measured by improvements in the Return-on-Assets (ROA). The first test will be to test if ISO 9001 certification leads to improvements in the ROA of the sample. The second test would be to assess whether size has any correlation with the performance of companies in the sample.

2.1.1 Hypothesis 1

H0: ISO 9001 certification does not lead to an increase in Return-on-Assets

H1: ISO 9001 certification does lead to an increase in Return-on-Assets

2.1.2 Hypothesis 2

H0: Abnormal performance of ISO 9001 certified companies does not depend on the size of the company

H1: Abnormal performance of ISO 9001 certified companies does depend on the size of the company

CHAPTER 3. RESEARCH METHODOLOGY

This section addresses the research paradigm as well as the design of the research in order to test the hypothesis stated in the previous chapter. The approach taken in addressing the research problem is to move from the generic to the specific. That is, to first identify the class of problem that matches the research problem as close as possible. Then using the techniques developed for handling the class of problem on this specific research problem. Thus, the terms used in explaining the research design might come from outside the financial and economic domain, but the techniques are no less applicable.

3.1 Research methodology /paradigm

Since the aim of this study is to assess the financial impact of ISO 9001 certification on companies, a quantitative research approach will be used.

A quantitative paradigm seems to be the best approach when analysing financial information and is well suited for this study.

3.2 Research Design

Since the aim of this study is to draw a causal inference from data that has already been collected (secondary data), the study will be structured as an observational study. In observational studies, the researcher does not have control over the assignment of the *treatment* between the treated group and the control group (untreated group) as is the case in an experiment. The *treatment*, in this case, refers to companies receiving ISO 9001 certification. As an observational study, the following elements are of importance:

- Constructing a control group to use as a reference
- Estimating the Average Treatment Effect
- Testing for a significant difference between the treated and untreated groups

Depending on the nature of the treatment, consideration also needs to be given to the time the treatment effects take to manifest after the treatment has been applied. This will be called the *window period*.

3.2.1 Defining a Measure of Company Performance

The measure that will be used to examine company performance will be Return-on-Assets (ROA) as prescribed by Barber and Lyon (1996). ROA will be calculated by dividing operating income by average total assets for each period. Operating income was defined by Barber and Lyon (1996) as COMPUSTAT item number 13, which is income before deducting depreciation. The method used in this study to compute operating income was to add depreciation back to Earnings before Interest and Tax (EBIT).

3.2.2 Defining the Window Period

The window period used in this study will be 4 years. This period comes from the study done by Levine and Toffel (2010) who found that ISO 9001 certified companies start to experience significant improvements in sales 4 to 6 years after certification. The assumption is that improvements in sales would lead to improved operating income as well as ROA during the same period.

3.2.3 Constructing the Control Groups

In order to generate an appropriate benchmark against which to check for abnormal performance, model number 5 (Table 2 below) from the study by Barber and Lyon (1996) will be used. Model number 5 uses the firms lagged performance as well as the change in the industry performance to generate a model of expected performance. The *industry* in this model is defined as all companies that have the same two-digit Standard Industry Classification (SIC) code as the company being assessed except, of course, the company that is being assessed. In adapting this study to the South African context, Industry Classification Benchmark (ICB) codes will be used instead of SIC codes. ICB codes are used to classify companies listed on the Johannesburg Stock

Exchange (JSE) into various industries. The two-digit SIC code, prescribed by Barber and Lyon (1996), was translated into the two-digit ICB code. The two-digit ICB code defines a super-sector to which related companies belong. The super-sectors used in this study are 2300 and 2700 which are described as *Construction and Materials*, and *Industrial Goods and Services* respectively. According to Barber and Lyon (1996), the median of the ROA of the companies in the super-sector should be used as the industry average.

Model Number	Expected Performance Model	Description	Industry Comparison Group
1	PI_{it}^1	Level of industry performance	Two-digit SIC matched
2	PI_{it}^2	Level of industry performance	Four-digit SIC matched
3	PI_{it}^3	Level of industry performance	Two-digit SIC and size-matched
4	PI_{it}^4	Level of industry performance	Two-digit SIC and performance-matched
5	$P_{i,t-1} + \Delta PI_{it}^1$	Lagged firm performance and change in industry performance	Two-digit SIC matched
6	$P_{i,t-1} + \Delta PI_{it}^2$	Lagged firm performance and change in industry performance	Four-digit SIC matched

7	$P_{i,t-1} + \Delta PI_{it}^3$	Lagged firm performance and change in industry performance	Two-digit SIC and size-matched
8	$P_{i,t-1} + \Delta PI_{it}^4$	Lagged firm performance and change in industry performance	Two-digit SIC and performance-matched
9	$P_{i,t-1}$	Lagged firm performance	-

Table 2: Models of expected performance (Barber & Lyon, 1996)

3.2.4 Estimating the Average Treatment Effect – Abnormal Performance

In order to calculate the level of abnormal performance, model number 5 can be re-written as a difference-in-differences model. That is, abnormal performance is equal to the difference between the company's current performance and the current performance of the benchmark subtracted from the difference between the company's lagged performance and the lagged performance of the benchmark. The benchmark in this instance is the industry average. Equation 1 below depicts the difference-in-differences model used in this study.

$$\text{Equation 1: } AP = (P_t - PI_t) - (P_{t-k} - PI_{t-k})$$

Where

$$AP = \text{Abnormal performance}$$

$$P_t = \text{Current firm performance}$$

$PI_t = \text{Current industry performance}$

$P_{t-k} = \text{Lagged firm performance}$

$PI_{t-k} = \text{Lagged industry performance}$

$k = \text{The number of years lagged}$

3.2.5 Testing for a Significant Effect

In order to determine whether the abnormal performance of the sample is statistically significant, the Wilcoxon signed-rank test will be used. Barber and Lyon (1996) tested both the student's t-test as well as the Wilcoxon signed-rank test and found that the Wilcoxon signed-rank test was more powerful at detecting abnormal performance compared to the t-test and therefore advocated its use.

3.3 Population and sample

3.3.1 Population

The aim of this study is to assess the impact of ISO 9001 certification on manufacturing companies in South Africa. However, manufacturing is not classified as a sector in South Africa according to the ICB classification system used by the JSE. For this study, ISO 9001 certified companies in the *Industrials* (ICB code 2000) industry will be used as the population due to the high concentration of manufacturing companies within this sector. Although 75 companies were identified as belonging to this sector, only 12 companies were found to be completely ISO 9001 certified as an organisation and thus defines the population for the purpose of this study.

3.3.2 Sample and sampling method

The sample used in this study will include ISO 9001 certified companies from the 2300 and 2700 super-sectors. These super-sectors were chosen as they have the most number of companies that are completely ISO 9001 certified within the Industrials industry. Companies that were excluded from the sample were those companies that were not certified for at least 4 years as well as companies that only have certain sites or business units certified. The entire company needed to be certified to be included in this sample. The resulting sample consists of the 9 companies listed in Table 2 below.

Name of Company	JSE code	Sector code	Date of certification
PRETORIA PORT CEMENT	PPC	2353	2003
MASONITE (AFRICA) LIMITED	MAS	2353	2005
BASIL READ HOLDINGS LIMITED	BSR	2357	1998
WILSON BAYLY HOLMES- OVCON LIMITED	WBO	2357	2004
CAFCA LTD	CAC	2733	1999
SOUTH OCEAN HOLDINGS LTD	SOH	2733	2008
DIGICORE HOLDINGS LIMITED	DGC	2737	2002

BELL EQUIPMENT LIMITED	BEL	2757	2002
CARGO CARRIERS LIMITED	CRG	2779	2004

Table 3: Sample of ISO 9001 certified companies

3.4 Procedure for data collection

The primary source of the financial information required for this study will be obtained from the McFAS database. The McFAS database is a database that contains, inter alia, income statements and balance sheets of companies listed on the JSE. In the event that the necessary financial information cannot be found in this database, the McGregorBFA website will be used. McGregorBFA is a website that contains financial records of all companies listed on the JSE.

To ascertain whether a company is ISO 9001 certified as well as the date of certification, the company's website as well as the Integrated Annual Reports will be examined.

3.5 Data analysis and interpretation

The data analysis and interpretation of this study will be done using the framework of an observational study as is often used in clinical trials. The *treatment* being tested in this case is ISO 9001 certification. The effect of ISO 9001 certification on the financial performance of the companies in the sample, the *treated group*, will then be gauged against a suitable benchmark. The difference-in-differences model will be used to calculate any abnormal performance exhibited by the companies in the sample. The abnormal performance of the sample will be tested for significance by using the Wilcoxon-signed ranked test.

3.6 Limitations of the study

3.6.1 *Small population size*

A small number of companies were found to meet the criteria for inclusion in the study. A total of 12 companies were identified as being completely ISO 9001 certified manufacturers and of the 12 companies, a sample of 9 companies will be used in the study. This small number of companies that will be examined in the study could have an impact on the reliability of the results of the study.

3.6.2 *Turbulent economic environment*

Much of the analysis will include periods of turbulent economic conditions for South Africa and the world. Companies in the construction industry were in a position to benefit from strong demand due the construction of the stadiums used in the 2010 world cup. However, there were also recessionary pressures on companies after 2008. These conditions could have an impact on the results of the study.

3.7 Validity and reliability

3.7.1 *External validity*

The results of this study should be applicable to companies outside of the group studied. ISO 9001 is intended to be applicable to all companies in different industries. The study will use financial measures that can be used by any company to gauge the impact of ISO 9001 certification.

3.7.2 *Internal validity*

This study will ensure that the data is valid by collecting the data from a single source. The financial information is published annually and there is little chance of these figures being incorrect

3.7.3 Reliability

Reliability will be ensured by using a widely accepted technique for conducting observational studies. The difference-in-differences model is one of the most widely used tools for applied research in economics (Abadie, 2005). It is therefore a reliable method for the type of study that this research aims to conduct.

CHAPTER 4. PRESENTATION OF RESULTS

4.1 Introduction

The results will be presented using tables and graphs followed by a description of the results. The abnormal performance of each company will be presented and described. Thereafter, the Wilcoxon signed-rank test results will be presented and described.

4.2 Results pertaining to Hypothesis 1

4.2.1 PPC Limited Results

PPC Limited was completely ISO 9001certified in 2003, so its pre-certification ROA was taken in 2002 and was calculated to be 0.2939 while the industry average at the time was 0.1413 (see Table 4). Four years after certification, the ROA was again calculated for both PPC Limited as well as the industry average. PPC's ROA greatly improved to 0.5174 while the industry average improved moderately over the same period to 0.1855 (see Table 5). The result of the difference-in-differences calculation shows that PPC had an abnormal increase in ROA of 0.1793 (see Table 6). This is quite a substantial increase and represents a 74.04% increase in ROA compared to the increase of 31.28% of the industry average. Figure 4 shows that PPC outperformed the industry average even before certification however, after certification the PPC's ROA increased at a higher rate than that of the industry average.

Difference before certification - 2002	
P(t-5)	0.2939
PI(t-5)	0.1413
P(t-5) - PI(t-5)	0.1526

Table 4: PPC's pre-certification performance

Difference after window period - 2007	
P(t)	0.5174
PI(t)	0.1855
P(t) - PI(t)	0.3319

Table 5: PPC's post-certification performance

Abnormal Performance - 2007	
$[P(t) - PI(t)] - [P(t-5) - PI(t-5)]$	0.1793

Table 6: PPC's abnormal performance

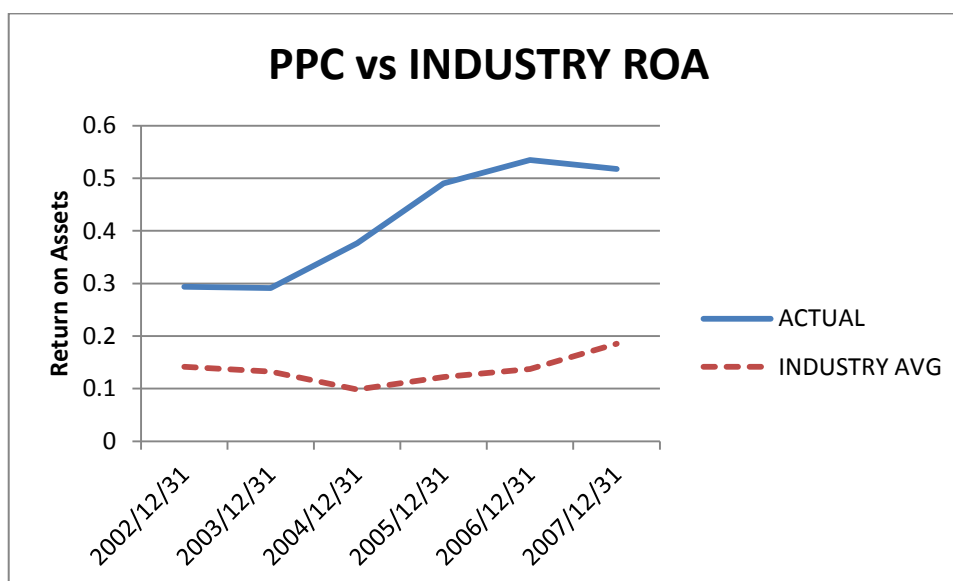


Figure 4: PPC versus Industry Average ROA

4.2.2 *Masonite (Africa) Limited Results*

Masonite Limited was completely ISO 9001certified as of 2005, so its pre-certification ROA was taken in 2004 and was calculated to be 0.0743 while the industry average at the time was 0.1009 (see Table 7). Four years after certification, the ROA was again calculated for both Masonite Limited as well as the industry average. Masonite's ROA improved to 0.1319 while the industry average improved to 0.1435 over the same period (see Table 8). The result of the difference-in-differences calculation shows that Masonite had an abnormal increase in ROA of 0.0149 (see Table 9). Masonite's ROA increased by 77.45% based on its pre-certification ROA, while the industry average increased by 42.30% by comparison. Figure 5 shows that Masonite's ROA has been consistent with the industry average over the period under discussion.

Difference before certification - 2004	
P(t-5)	0.0743
PI(t-5)	0.1009
P(t-5) - PI(t-5)	-0.0265

Table 7: Masonite's pre-certification performance

Difference after window period - 2009	
P(t)	0.1319
PI(t)	0.1435
P(t) - PI(t)	-0.0116

Table 8: Masonite's post-certification performance

Abnormal Performance - 2009	
$[P(t) - PI(t)] - [P(t-5) - PI(t-5)]$	0.0149

Table 9: Masonite's abnormal performance

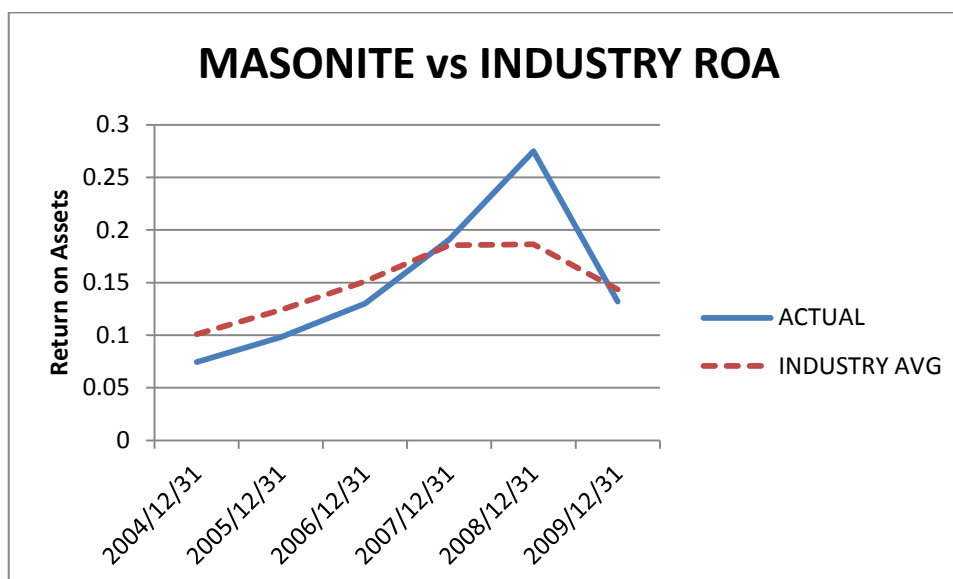


Figure 5: Masonite versus Industry Average ROA

4.2.3 Basil Read Holdings Limited Results

Basil Read Holdings Limited was completely ISO 9001certified in 1998, so its pre-certification ROA was taken in 1997 and was calculated to be 0.2247 while the industry average at the time was 0.1356 (see Table 10). Four years after certification, the ROA was again calculated for both Basil Read as well as the industry average. Basil Read's ROA decreased to 0.1574 while the industry average also decreased over the same period to 0.1153 (see Table 11). The result of the difference-in-differences calculation shows that Basil Read had an abnormal decrease in ROA of -0.0469 (see Table 12). Basil Read's post-certification ROA decreased by -29.95% compared to the decrease in the industry average of -15.03%. Figure 6 shows that Basil Read's performance has been very erratic when compared to the industry average over the same period.

Difference before certification - 1997	
P(t-5)	0.2247
PI(t-5)	0.1356
P(t-5) - PI(t-5)	0.0890

Table 10: Basil Read's pre-certification performance

Difference after window period - 2002	
P(t)	0.1574
PI(t)	0.1153
P(t) - PI(t)	0.0421

Table 11: Basil Read's post-certification performance

Abnormal Performance - 2002	
$[P(t) - PI(t)] - [P(t-5) - PI(t-5)]$	-0.0469

Table 12: Basil Read's abnormal performance

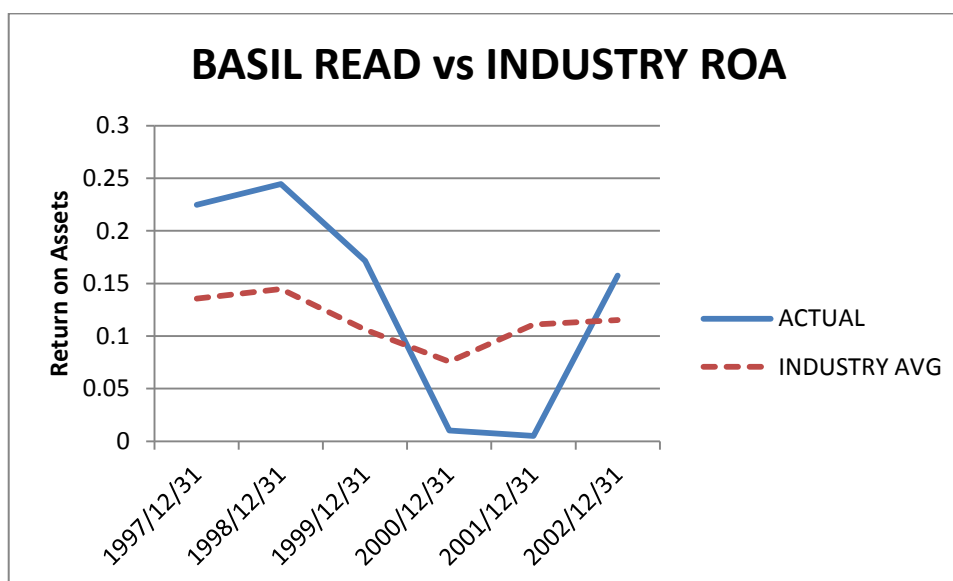


Figure 6: Basil Read versus Industry Average ROA

4.2.4 Wilson Bayly Holmes-Ovcon Limited Results

Wilson Bayly Holmes-Ovcon (WBHO) Limited was completely ISO 9001certified in 2004, so its pre-certification ROA was taken in 2003 and was calculated to be 0.0911 while the industry average at the time was 0.1613 (see Table 13). Four years after certification, the ROA was again calculated for both WBHO Limited as well as the industry average. WBHO's ROA greatly improved to 0.1873 while the industry average improved moderately over the same period to 0.1864 (see Table 14). The result of the difference-in-differences calculation shows that WBHO had an abnormal increase in ROA of 0.0711 (see Table 15). WBHO' ROA improved by 105.56% over the four year period after certification. The industry average ROA increase by 15.56% over the same period. Figure 7 shows, while starting from a lower base, WBHO's performance as improved to be consistent with that of the industry.

Difference before certification - 2003	
P(t-5)	0.0911
PI(t-5)	0.1613
P(t-5) - PI(t-5)	-0.0702

Table 13: WBHO's pre-certification performance

Difference after window period - 2008	
P(t)	0.1873
PI(t)	0.1864
P(t) - PI(t)	0.0008

Table 14: WBHO's post-certification performance

Abnormal Performance - 2008	
$[P(t) - PI(t)] - [P(t-5) - PI(t-5)]$	0.0711

Table 15: WBHO's abnormal performance

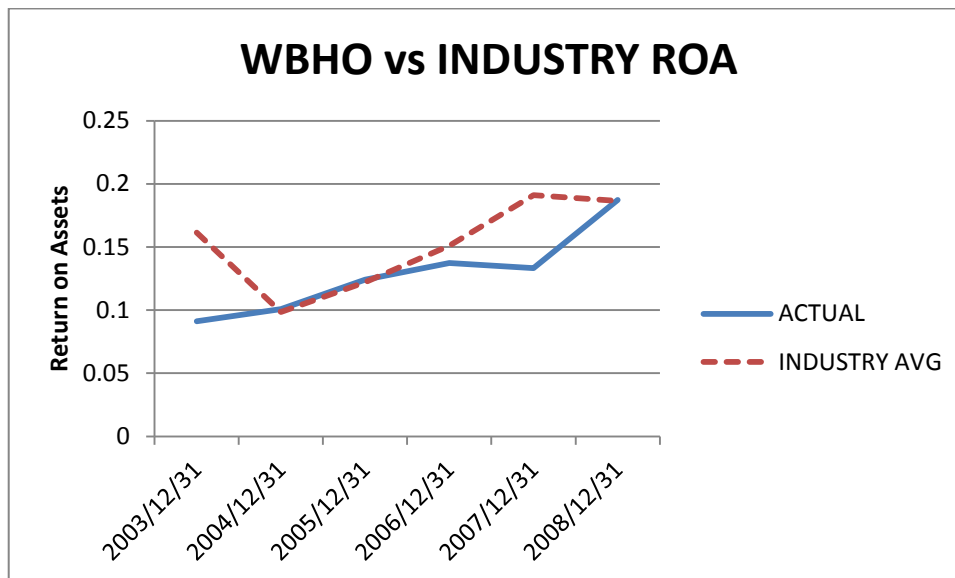


Figure 7: Wilson Bayly Holmes-Ovcon versus Industry Average ROA

4.2.5 CAFCA Limited Results

CAFCA Limited was completely ISO 9001certified in 1999, so its pre-certification ROA was taken in 1998 and was calculated to be 0.2440 while the industry average at the time was 0.1743 (see Table 16). Four years after certification, the ROA was again calculated for both CAFCA Limited as well as the industry average. CAFCA's ROA greatly improved to 0.9871 while the industry average improved moderately over the same period to 0.1944 (see Table 17). The result of the difference-in-differences calculation shows that CAFCA had an abnormal increase in ROA of 0.7231(see Table 17). This is quite a substantial increase. CAFCA's ROA rose by 304.62% compared to the industry average increase of 11.54% over the period. Figure 8 shows that CAFCA's dramatic increase in ROA after certification.

Difference before certification - 1998	
$P(t-5)$	0.2440
$PI(t-5)$	0.1743
$P(t-5) - PI(t-5)$	0.0697

Table 16: CAFCA's pre-certification performance

Difference after window period - 2003	
$P(t)$	0.9871
$PI(t)$	0.1944
$P(t) - PI(t)$	0.7927

Table 17: CAFCA's post-certification performance

Abnormal Performance - 2003	
$[P(t) - PI(t)] - [P(t-5) - PI(t-5)]$	0.7231

Table 18: CAFCA's abnormal performance

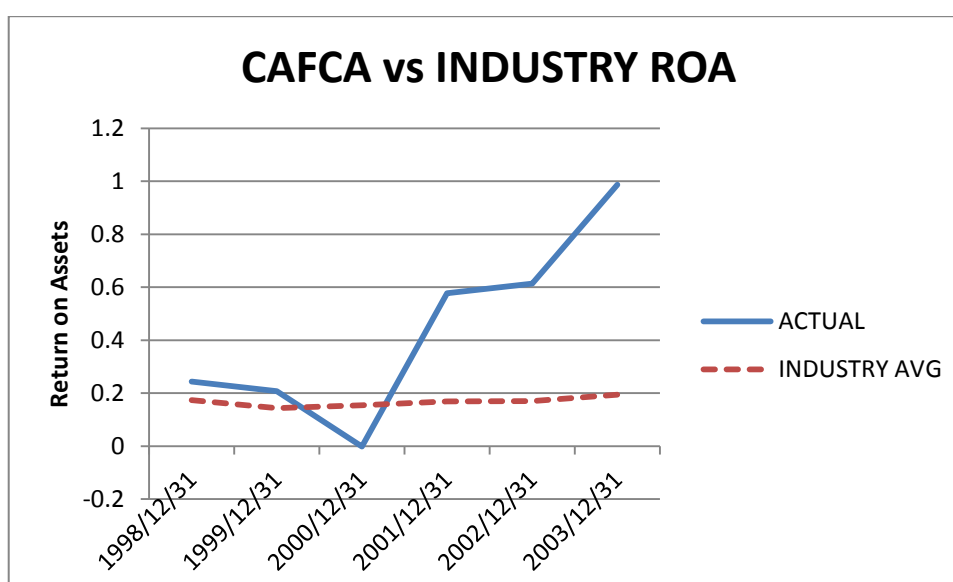


Figure 8: CAFCA versus Industry Average ROA

4.2.6 South Ocean Holdings Limited Results

South Ocean Holdings (SOH) Limited was completely ISO 9001certified in 2008, so its pre-certification ROA was taken in 2007 and was calculated to be 0.3616 while the industry average at the time was 0.1991 (see Table 19). Four years after certification, the ROA was again calculated for both SOH Limited as well as the industry average. SOH's ROA decreased to 0.1229 while the industry average decreased to 0.1525 over the same period (see Table 20). The result of the difference-in-differences calculation shows that SOH had an abnormal decrease in ROA of -0.1921 (see Table 21). This is quite a substantial and represents a -66.02% decrease in ROA compared to the decrease of -23.40% of the industry average. Figure 9 shows that SOH outperformed the industry initially, then experienced a sharp decrease in ROA to be more in-line with the industry average.

Difference before certification - 2007	
P(t-5)	0.3616
PI(t-5)	0.1991
P(t-5) - PI(t-5)	0.1625

Table 19: South Ocean Holdings' pre-certification performance

Difference after window period - 2012	
P(t)	0.1229
PI(t)	0.1525
P(t) - PI(t)	-0.0297

Table 20: South Ocean Holdings' post-certification performance

Abnormal Performance - 2012	
$[P(t) - PI(t)] - [P(t-5) - PI(t-5)]$	-0.1921

Table 21: South Ocean Holdings' abnormal performance

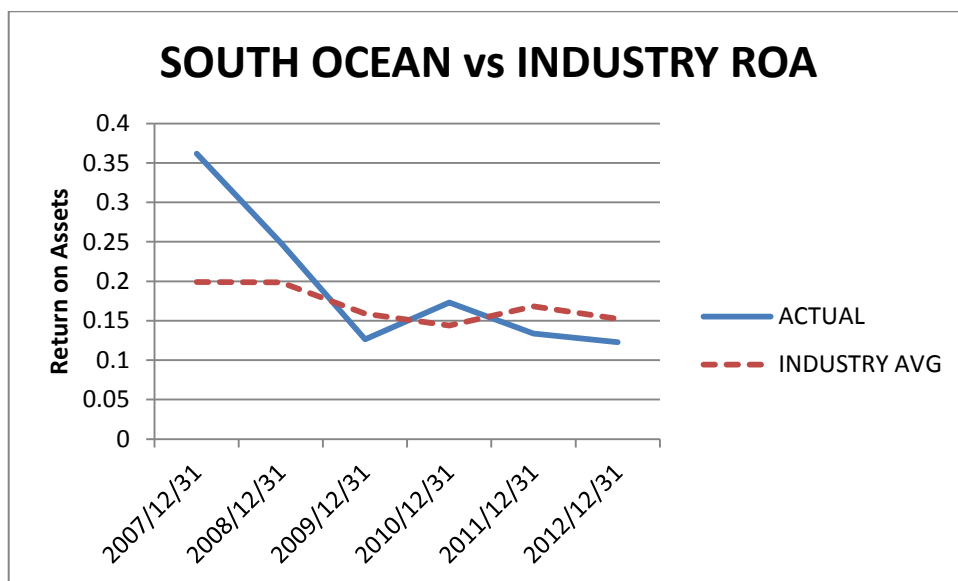


Figure 9: South Ocean Holdings versus Industry Average ROA

4.2.7 Digicore Holdings Limited Results

Digicore Holdings Limited was completely ISO 9001certified in 2002, so its pre-certification ROA was taken in 2001 and was calculated to be 0.4218 while the industry average at the time was 0.1695 (see Table 22). Four years after certification, the ROA was again calculated for both Digicore Limited as well as the industry average. Digicore's ROA improved moderately to 0.4805 while the industry average improved slightly over the same period to 0.2206 (see Table 23). The result of the difference-in-differences calculation shows that Digicore had an abnormal increase in ROA of 0.0077 (see Table 24). This is quite a

small increase. Digicore's performance improved by 13.93% over the period of analysis compared to the industry average improvement of 30.14%. Figure 10 shows that Digicore's performance dropped during the year of certification to that of the industry average, but has since improved to outperform the industry.

Difference before certification - 2001	
$P(t-5)$	0.4218
$PI(t-5)$	0.1695
$P(t-5) - PI(t-5)$	0.2523

Table 22: Digicore's pre-certification performance

Difference after window period - 2006	
$P(t)$	0.4805
$PI(t)$	0.2206
$P(t) - PI(t)$	0.2599

Table 23: Digicore's post-certification performance

Abnormal Performance - 2006	
$[P(t) - PI(t)] - [P(t-5) - PI(t-5)]$	0.0077

Table 24: Digicore's abnormal performance

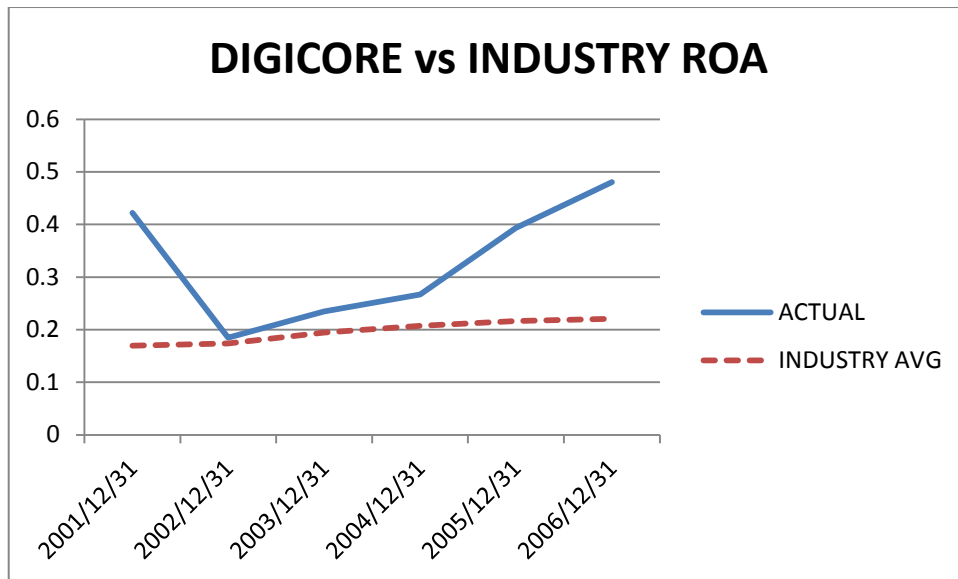


Figure 10: Digicore Holdings versus Industry Average ROA

4.2.8 Bell Equipment Limited Results

Bell Equipment Limited was completely ISO 9001certified in 2002, so its pre-certification ROA was taken in 2001 and was calculated to be 0.1561 while the industry average at the time was 0.1731 (see Table 25). Four years after certification, the ROA was again calculated for both Bell Equipment Limited as well as the industry average. Bell Equipment's ROA improved to 0.2256 while the industry average improved moderately over the same period to 0.2088 (see Table 26). The result of the difference-in-differences calculation shows that Bell Equipment had an abnormal increase in ROA of 0.0338 (see Table 27). Bell Equipment's performance improved by 44.49% after four years of certification, while the average industry performance increased by 20.58%. Figure 11 shows that Bell Equipment' performance has been volatile in the period after certification but it is beginning to outperform the industry.

Difference before certification - 2001	
P(t-5)	0.1561
PI(t-5)	0.1731
P(t-5) - PI(t-5)	-0.0170

Table 25: Bell Equipment's pre-certification performance

Difference after window period - 2006	
P(t)	0.2256
PI(t)	0.2088
P(t) - PI(t)	0.0169

Table 26: Bell Equipment's post-certification performance

Abnormal Performance - 2006	
$[P(t) - PI(t)] - [P(t-5) - PI(t-5)]$	0.0338

Table 27: Bell Equipment's abnormal performance

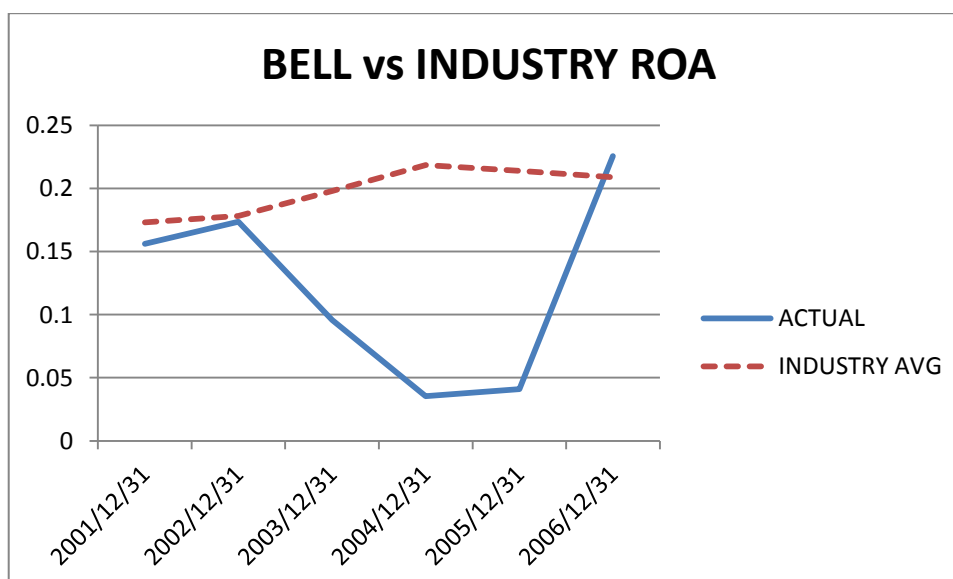


Figure 11: Bell Equipment versus Industry Average ROA

4.2.9 Cargo Carriers Limited Results

Cargo Carriers Limited was completely ISO 9001certified in 2004, so its pre-certification ROA was taken in 2003 and was calculated to be 0.1490 while the industry average at the time was 0.1942 (see Table 28). Four years after certification, the ROA was again calculated for both Cargo Carriers Limited as well as the industry average. Cargo Carriers' ROA improved moderately to 0.1856 while the industry average remained fairly constant at 0.1958 (see Table 29). The result of the difference-in-differences calculation shows that Cargo Carriers had an abnormal increase in ROA of 0.0350 (see Table 30). Cargo Carriers' post-certification performance improved by 24.58% while the industry improved marginally by 0.82%. Figure 12 shows that Cargo Carriers' performance has, at best, been in-line with the industry average.

Difference before certification - 2003	
P(t-5)	0.1490
PI(t-5)	0.1942
P(t-5) - PI(t-5)	-0.0452

Table 28: Cargo Carriers' pre-certification performance

Difference after window period - 2008	
P(t)	0.1856
PI(t)	0.1958
P(t) - PI(t)	-0.0102

Table 29: Cargo Carriers' post-certification performance

Abnormal Performance - 2008	
$[P(t) - PI(t)] - [P(t-5) - PI(t-5)]$	0.0350

Table 30: Cargo Carriers' abnormal performance

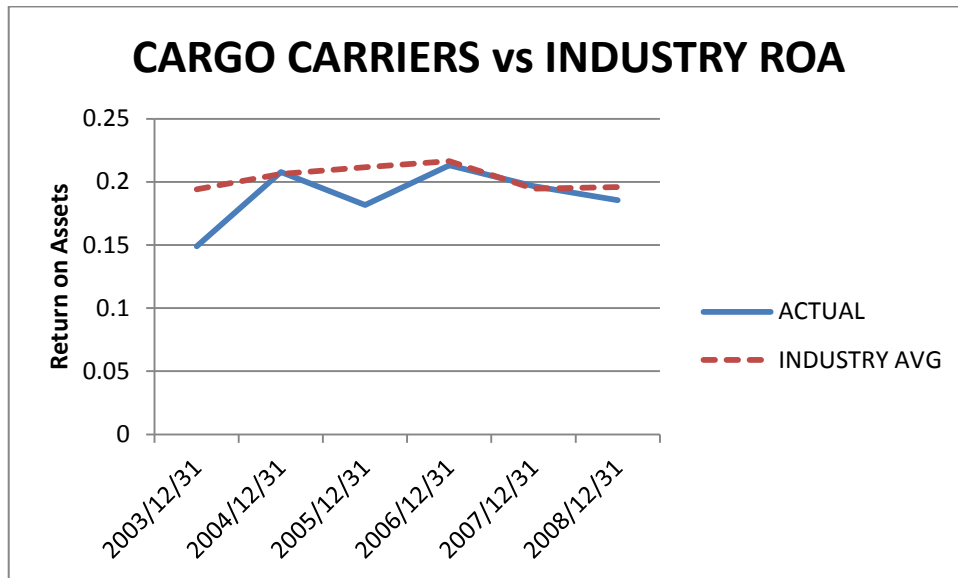


Figure 12: Cargo Carriers versus Industry Average ROA

4.2.10 Wilcoxon signed-rank test results

Table 31 below shows the abnormal changes in ROA of the sample by rank. The rank is based on the size of the abnormal change in ROA regardless of sign. The rank is also based on ascending order of magnitude, i.e. the smallest abnormal change in ROA has the lowest rank.

Name of Company	Abnormal changes ROA	RANK
PRETORIA PORT CEMENT	0.1793	7
MASONITE (AFRICA) LIMITED	0.0149	2
BASIL READ HOLDINGS LIMITED	-0.0469	5
WILSON BAYLY HOLMES-OVCON LIMITED	0.0711	6
CAFCA LTD	0.7231	9
SOUTH OCEAN HOLDINGS LTD	-0.1921	8
DIGICORE HOLDINGS LIMITED	0.0077	1
BELL EQUIPMENT LIMITED	0.0338	3
CARGO CARRIERS LIMITED	0.0350	4

Table 31: Abnormal performance of the sample by rank

Test statistic calculation		
Sum of Positive Ranks		32
Sum of Negative Ranks		13
W-statistic		32
N		9
One-tailed critical value@ alpha = 5%		37
Statistically significant	NO	32 < 37

Table 32: Test for significance

The result of the Wilcoxon signed-rank test is that the null hypothesis cannot be rejected as the test statistic (W) is not greater than the critical value (37). This means that the median difference in performance of the sample before and after

certification is not statistically significantly greater than zero and therefore the null hypothesis cannot be rejected.

4.3 Results pertaining to Hypothesis 2

Name of Company	Assets	Abnormal changes ROA
PRETORIA PORT CEMENT	R 3 477 400 000	0.1793
WILSON BAYLY HOLMES-OVCON LIMITED	R 1 467 410 000	0.0711
BELL EQUIPMENT LIMITED	R 1 323 083 000	0.0338
SOUTH OCEAN HOLDINGS LTD	R 637 528 000	-0.1921
CAFCA LTD	R 432 854 000	0.7231
BASIL READ HOLDINGS LIMITED	R 385 105 000	-0.0469
MASONITE (AFRICA) LIMITED	R 318 599 000	0.0149
CARGO CARRIERS LIMITED	R 279 120 000	0.0350
DIGICORE HOLDINGS LIMITED	R 112 795 000	0.0077

Table 33: Abnormal performance by size of assets

Correlations			
		Size	Abnormal_performance
Size	Pearson Correlation	1	.086
	Sig. (2-tailed)		.827
	N	9	9
Abnormal_performance	Pearson Correlation	.086	1
	Sig. (2-tailed)	.827	
	N	9	9

Table 34: Correlation between size and abnormal performance

The result of the Pearson Correlation shown in Table 34 above shows that there is no correlation between the abnormal performance of the companies in the sample and the size of the companies. The null hypothesis can therefore not be rejected.

4.4 Summary of the results

The results show that ISO 9001 certification did not significantly improve the ROA of the sample as a whole. The results further show that improvements in performance were not related to the size of the company.

CHAPTER 5. DISCUSSION OF THE RESULTS

5.1 Introduction

This chapter will discuss the results of the hypothesis tests and compare these results to the results of previous studies discussed in the literature review. The theory developed in the literature review will then be used to put the results of this study into context and provide possible explanations for the results.

5.2 Discussion pertaining to Hypothesis 1

This study found no significant improvement in the performance of ISO 9001 certified companies after a period of 4 years of certification. This provides evidence to support the findings of (Terlaak & King, 2006) and (Martínez-Costa et al., 2009). Although 7 of the 9 companies analysed showed better than expected performance, the 2 companies that showed below expected performance ranked quite high on the Wilcoxon signed-ranked test and thus rendered the overall abnormal performance for the sample insignificant. Although the abnormal performance of CAFCA limited appears to be an outlier when compared to the rest of the sample, it does not affect the result as the high ranking underperforming companies dominated the result.

Most companies in the sample showed marginal, but statistically insignificant, improvement in their ROA. By examining the graphs of the companies in the sample versus the industry average, with the exception of PPC limited and Digicore limited, the majority of the companies in the sample have not shown consistent improvements in ROA since being certified. One possible explanation for this is that these companies were possibly pressured by external factors to become certified. In so doing, these companies are not focused on the internal benefits such as a reduction in cost, or at least a stabilisation of costs, that correctly implemented ISO 9001 certification can bring. If internal costs were stabilised, profitability would stabilise and this would be evident from the graphs. However, this is not the case since the profitability of these

companies appears to be erratic relative to the industry average. This is consistent with the findings of (Boiral & Amara, 2009) and (Martínez-Costa et al., 2008) who found that companies that were externally pressured to become certified are unlikely to reap the benefits that certification can bring in terms of improved profitability.

5.3 Discussion pertaining to Hypothesis 2

Regarding the effect of size on the performance of certified companies, the study found no statistically significant correlation. Although the study found that PPC Limited showed one of the best improvements in ROA and is the biggest company by assets in the sample, there is no definite trend in the results (see Table 33) to suggest that size might be a moderating factor. The result of the Pearson correlation (see Table 34) statistically confirms this result. This provides no evidence to support Fatima (2014) regarding the possibility that size could have an effect on the impact of ISO 9000 on companies in a 3rd world country.

5.4 Conclusion

In sum, the study could not find any significant improvement in ROA of the sample and did not find any relation between improved ROA and the size of the companies in the sample.

CHAPTER 6. CONCLUSIONS & RECOMMENDATIONS

6.1 Conclusions of the study

The aim of this study was to analyse the financial impact of ISO 9001 certification on manufacturing companies in South Africa. Return on assets was used as the measure of financial performance and the study found no significant improvement in return on assets after four years of certification. This supports the findings of (Martínez-Costa et al., 2009) and yet contradicts the findings of (Simmons & White, 1999), (Corbett et al., 2005), (Heras et al., 2001) and Fatima (2014). The study also finds that size has no influence on whether ISO 9001 certified companies experience improved financial performance. This contradicts the findings of (Levine & Toffel, 2010) who found that the effects of certification were more pronounced in smaller companies as well as Fatima (2014) who found that larger companies benefitted more from certification than smaller companies.

6.2 Recommendations

Perhaps the best advice to give managers interested in getting their companies ISO 9001 certified is to follow the recommendations made by Boiral and Amara (2009). The recommendations are that companies should be internally motivated. That means that companies should focus on the internal benefits that ISO certification can provide. ISO 9001 is intended to standardise and improve the internal processes of a company and this should be the intention of those wishing to be certified. Certification should not be pursued exclusively for its marketing or branding value that it might add.

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