Cape Peninsula
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FOOD CERTIFICATION AUDITS: A CASE STUDY IN THE WESTERN CAPE, SOUTH AFRICA

by

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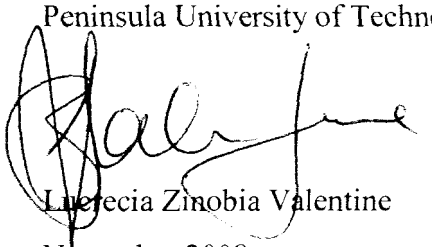
DECLARATION

I, Lucrecia Valentine, hereby declare that the contents of this dissertation submitted for the degree Magister Technologiae at the Cape Peninsula University of Technology, represents my own original unaided work. and that the dissertation has not previously been submitted to any other institution of higher education towards any qualification. I further declare that all sources cited or quoted are indicated and acknowledged by means of a comprehensive list of references. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.



Lucrecia Zinobia Valentine

November 2008

DEDICATION

This study is dedicated to my husband Warren, my daughter Inge and my son, Matthew. Thank you for your support and unconditional love. To my late father, Joseph William Oliver and the most loving and understanding woman, I know, my mother, Ilene June Oliver.

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ABSTRACT

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While there is a standard for quality and environmental auditors, there is no local or international standard for food safety auditing, which means auditors from different certification bodies can use their own discretion when auditing food establishments. There is a requirement to investigate the quality of work performed by South African food safety auditors, in order to establish whether they do in fact add value when conducting registration and certification audits. This is also an indication of the importance of improving and maintaining a high standard of food safety in the food services industry.

The overall concept of food safety in South Africa is clearly not defined, understood by only a few consumers, and not widely accepted. Research has shown that food retailers in South Africa in general do not believe food safety auditors are competent. In the wake of the Sudan Red scare two years ago, a long awaited food safety initiative was launched in February 2006. The scare pertaining to a carcinogenic food dye, which found its way into spices on local supermarket shelves, mobilized food industry role players to improve food safety standards. Under the auspices of the Consumer Goods Council of South Africa (CGCSA), the body responsible for establishing best practices and implementation standards, Food Safety South Africa (FSSA) will enable an organization to determine the exact nature and extent of possible and actual

problems along the food supply chain.

The key objectives of this research study are to determine whether one food certification standard is needed in South Africa and to assess the value added by the food auditors to their clients. Social research will be conducted within the ambit of the dissertation, with case study serving as research method. Both quantitative and qualitative research paradigms will be used to gather data for the research survey in support of the research question, forming the crux of the dissertation which reads as follow: "How can food safety auditors increase value added to the audit process in food environments in South Africa?"

TABLE OF CONTENTS PAGE

CHAPTER 2

A HOLISTIC PERSPECTIVE OF FOOD SAFETY IN SOUTH AFRICA

CHAPTER 3

FOOD SAFETY, A LITERATURE REVIEW

CHAPTER 4

RESEARCH SURVEY DESIGN AND METHODOLOGY

CHAPTER 5

ANALYSIS AND INTERPRETATION OF SURVEY RESULTS

CHAPTER 6

CONCLUSION AND FINAL RECOMMENDATIONS

LIST OF FIGURES

LIST OF TABLES

GLOSSARY OF TERMS

Food safety:	Refers to the conditions and practices that preserve the quality of food to prevent contamination and food borne illnesses.
Audit:	A systematic, independent and documented process for obtaining audit evidence and evaluating it objectively against audit criteria.
Auditor:	A person qualified and competent to conduct audits in terms of international standards.
Quality Auditor:	A person who has the qualification to perform quality audits.
Auditor competence:	The combination of knowledge, abilities and personal attributes to be applied by an auditor.
Internal audits (first party):	Refers to an audit performed by a company or department on its own system, procedures and facilities. The auditors may be from the company's own internal staff or from an external environment.
External audit (third party):	An accreditation body who conducts external audits as a result of successful registration to an accreditation scheme, e.g SABS ISO 9001 or HACCP.
Total Quality Management (TQM)	A movement, an industrial discipline, and a set of techniques for improving the quality of processes. TQM emphasises constant measures and statistical techniques to help improve and then maintain the output quality of processes.

CHAPTER 1: SCOPE OF THE RESEARCH

1.1 INTRODUCTION

While there is a standard for quality and environmental auditors, there is no local or international standard for food safety auditing, which means auditors from different certification bodies can use their own discretion when auditing food establishments. There is a requirement to investigate the quality of work performed by South African food safety auditors, in order to establish whether they do in fact add value when conducting registration / certification audits. Different types of quality management and food safety standards are however being used in the food sector, which means auditors need to be competent and confident in their application of these standards. This is also an indication of the importance of improving and maintaining a high standard of food safety in the food service industry.

A quality audit is a systematic and independent examination to determine whether quality activities and related results comply with planned arrangements and whether these arrangements are implemented effectively and are suitable to achieve the set objectives. Many organizations, use auditing as the primary method of measuring and monitoring their performance and improvement initiatives. Quality audits have progressed from being used solely for non-conformance detection in the mid- twentieth century, to a powerful management mechanism for continuous improvement. It is not only used to ensure total compliance to a standard or a set of procedures, but for developing organizations, through innovation and problem- solving.

Food is important for human survival, and reciprocally food safety has worldwide become an important public health issue. The occurrence of food poisoning can cause irreparable damage to any food producer or food business operator. According to the World Health Organization (WHO), 1.8 million people in less developed countries die annually due to food and water borne diarrhoeal diseases, most of whom are children. When questions arise on why food poisoning has

increased exponentially, a number of possible explanations from the food scientists and technologists were evident. The one issue considered most significant, is the changes in people's lifestyle, which leads to less shopping and longer storage periods of food products. South African food manufacturers have for the last 5 - 10 years experienced the pressure from global food producers and Government, to adopt some form of system to ensure the production and distribution of a safe final food products to their end users. The South African Bureau of Standards (SABS) took the lead in adopting and training in the Codex Alimentarius and HACCP (Hazard Analysis Critical Control Points) standards, originally developed for astronauts. HACCP is a food safety standard that focuses on analyzing the hazards associated with the making of the product, and how to control it in order to achieve a physically, microbiologically and chemically safe end product.

The SABS auditors were the first to audit food establishments to ensure compliance to the then HACCP standard. Many very well established organizations, made use of international auditors due to there lack of confidence in the competence of South African auditors.

1.2 THE RESEARCH PROCESS

According to Watkins (2006:13), an important factor for the research student, is that he or she should be *au fait* with not only the subject matter being researched, but also have extensive insight into the research subject from a theoretical and practical perspective. As stated by Leedy and Ormrod (2001:4) "...the more knowledgeable you are, the better you can understand your problem."

The research process provides insight into the process of 'how' the research will be conducted from formulating the research proposal to final submission of the dissertation. According to Collis and Hussey (2003:16), there are six fundamental stages in the research process, namely:

- The identification of the research topic.
- Definition of the research problem.

- Determining how the research is going to be conducted.
- Collection of the research data.
- Analysis and interpretation of the research data.
- Writing up of the dissertation.

The above research process will be used in the formulation of this research study.

1.3 BACKGROUND TO THE RESEARCH PROBLEM

Auditing has been developed over a number of years and has been viewed as a method of establishing how well a process conforms to a predetermined standard or set of requirements. An auditor would normally complete an audit using a number of approaches, for example first party or internal, second party or supplier, and third party or certification audits. These audit methods together with the experience of an auditor, can result in an audit being perceived as a compliant policing function, creating a perception of 'them and us' within an organization.

Very few South Africans are aware of the safety of the foods they consume. Furthermore, few are aware of the systems that need to be in place in order to manufacture a 'safe' product. South Africa will be hosting the 2010 Football World Cup and much focus is being placed on the importance of roads, public transport, stadiums, etc., however no mention is made of raising our food safety standards. Local food will be consumed by visitors form all over the globe, but nowhere is it highlighted that Government is concerned with the tasks of food safety and the role of health inspectors. It is imperative that South Africa simply cannot afford another food safety scare, as occurred during 2005 when the Kiwi's, (New Zealand Rugby team) on their visit to South Africa, reportedly suffered from food poisoning.

1.3.1 Research problem statement

Against the above background to the research problem, the research problem statement reads as follows:

"The lack of value added by food auditors when conducting and performing food safety audits adversely impact on the confidence of the industry.

1.3.2 Research question

Forming the crux of this dissertation, the following research question will be researched:

"How can food safety auditors increase value added to the audit process in the food industry, and as a result improve the standards within this industry?"

1.3.3 Investigative questions

The investigative questions to be researched in support of the research question, reads as follows:

- What are the primary reasons for the lack of competence in food safety/quality auditors?
- Is there a standard (structured model) auditors can to be measured by.
- Are there processes of regular evaluation?
- What evaluation deems an auditor able/competent to conduct third party audits?

1.4 RESEARCH DESIGN AND METHODOLOGY INCLUDING THE DATA COLLECTION DESIGN AND METHODOLOGY

Case study research will serve as research method in this dissertation. According to Yin (1994:1), case study research can be used in many situations, including:

- Policy, political science, and public administration research.
- Community psychology and sociology research.
- Organizational and management studies
- City and regional planning research, such as studies of plans, neighbourhoods or public agencies.
- Research into the social sciences, the academic disciplines as well as professional fields such as business administration, management sciences, and

social work.

The data collection methodology will be based on both quantitative and qualitative research paradigms. In this respect, questionnaires will be used to gather data with the sample frame being certification auditors, randomly selected. Descriptive and inferential statistics will be used for the purpose of statistical data analysis. Thirty questionnaires were distributed to food safety auditors and an equal number to clients. The process will be further expanded upon in Chapter 4.

1.5 RESEARCH ASSUMPTIONS

The following assumptions pertain to this research study:

- All food manufacturers have stringent control measures applicable to all of their manufacturing processes.
- Companies constructively use their audit reports to improve their food manufacturing processes and ultimately their products.
- There is a limited appreciation of the value of food certification audits in South Africa
- Certification audits represents value added

1.6 RESEARCH CONSTRAINTS

The following constraints pertain to this dissertation:

- The research will be limited to the food manufacturing industry in the Western Cape.
- Employees from food manufacturers may view the research as an audit of their procedures or work instructions.
- The availability of the interviewees may limit the ability to collect the research data.

1.7 CHAPTER AND CONTENT ANALYSIS

The following chapter and content analysis will apply to this research study:

Chapter 1 - Scope of the research: In this chapter, a holistic perspective will be provided of the proposed research to be conducted within the ambit of this dissertation.

Chapter 2 – A holistic perspective of food safety in South Africa: In this chapter, the process and associated questionable value added of food auditors will be elaborated upon.

Chapter 3 – Food Safety: A literature review: In this chapter, a literature review will be conducted on the evolution of food safety and quality management system standards, food safety in South Africa, and the requirements for the audit function within the context of food safety.

Chapter 4 – Survey design and methodology: In this chapter, the survey design and methodology to be used within the ambit of this dissertation will be elaborated upon in detail.

Chapter 5 –Analysis and Interpretation of Data: In this chapter, data gleaned from the research survey conducted within the ambit of Chapter 4 will be analysed and interpreted.

Chapter 6 – Conclusions and Recommendations: In this chapter, the research will be concluded and recommendations made to mitigate the research problem.

1.8 KEY RESEARCH OBJECTIVES

Taking cognizance of the fact that certification bodies in South Africa use different auditing techniques and that food manufacturers have little confidence in the competence of food auditors, the overall objectives of this dissertation are:

- To determine whether a food safety audit standard is needed within the South African food industry.
- To change the negative perception that food manufacturers/producers and consumers have of food auditors.
- To assess the value added, which can be provided, by food auditors.
- To restore the confidence of clients in their food safety auditors.

1.9 THE SIGNIFICANCE OF THE RESEARCH

Currently, no South African model or standard exist to which food safety auditors can be evaluated against. The significance of this study furthermore vests in the restoration of the confidence in food safety auditors by their clients, a much desired requirement in South Africa.

1.10 ETHICS

In the context of research, according to Saunders, Lewis and Thornhill, (2000:130), ". . . ethics refers to the appropriateness of your behaviour in relation to the rights of those who become the subject of your work, or are affected by it". The following ethics will be observed in the research study:

- **Informed consent:** Participants should be given the choice to participate or not to participate, and furthermore be informed in advance about the nature of the study.
- **Right to privacy:** The nature and quality of participants' performance must be kept strictly confidential.
- **Honesty with professional colleagues:** Findings must be reported in a complete and honest fashion, without misrepresenting what has been done or intentionally misleading others as to the nature of it. Data may not be fabricated to support a particular conclusion.
- **Confidentiality/Anonymity:** It is good research practice to offer confidentiality or anonymity, as this will lead to participants giving more open and honest responses.

1.11 CONCLUSION

In this chapter an introduction and motivation was provided to substantiate the need for the research to be conducted. The aim of the research is to address the value added, of food auditors and to determine whether a food safety audit standard is needed within the South African food industry. This chapter served as the basis for the proposed research and provided the necessary background to the following chapter (chapter two), which will provide the reader with insight to the research environment.

CHAPTER 2: A HOLISTIC PERSPECTIVE OF FOOD SAFETY IN SOUTH AFRICA

2.1 INTRODUCTION AND BACKGROUND

Food safety embraces anything from processing, preparation or handling of food, to ensure that it is safe for human consumption. According to Wikipedia (2008: **O**nline), food safety is a scientific discipline describing the handling, preparation, and storage of food in ways that prevent food borne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards. Food can transmit disease from person to person as well as serve as a growth medium for bacteria that can cause food poisoning (Wikipedia, 2008: **O**nline). The food chain, like any other is only as strong as its weakest link, and the responsibility of food safety lies not only with the producers, manufacturers and processors of food, but also with governments and consumers alike (Griffith & Marais, 2007:47-48).

The food industry in South Africa includes the dairy, processing, meat, fish, agriculture, beverage, liquor, wine, spices and additives industries. Agriculture encompasses wheat products, wine, fresh, frozen and processed fruit and vegetables. More specific to the Boland and Swartland areas of the country does the agricultural industry provide work for a large part of the population, even though it is largely season bound. South Africa is a large fresh produce and wine exporter, and competes with various countries like South America, America and the UK. This implies that the country needs to be on the forefront with regards to pesticide usage, produce handling regulations and food safety practices. Almost 50% of South Africa's water is used for agriculture, with almost 1.3 million hectares under irrigation. While about 13% of South Africa's land can be used for crop production, only 22% of this land is fertile or have high potential soil (SouthAfrica, 2008:**O**nline).

Farming remains vital to the economy and development of the country. South Africa is the top exporter of avocadoes, tangerines and ostrich products, and the

second biggest exporter of grapefruit, third biggest of plums and pears and fourth biggest of table grapes in the world. According to the department of trade and industry, farming contributes to at least 8% to the country's total exports. The largest export groups are wine, citrus, sugar, grapes, maize, fruit juice, wool and deciduous fruit such as apples, pears, peaches and apricots (SouthAfrica.info, 2008:**O**nline).

2.2 FOOD SAFETY LEGAL REQUIREMENTS

There are at least 14 legal documents governing the food safety industry in South Africa, but only three of these are concerned with law enforcement (Jackson, 2006:18). According to Jackson (2006:18), law enforcement is the responsibility of local authorities, which ironically do not report back to the national departments who in turn are responsible for setting these laws that local authorities are required to enforce. These legal documents governing the food industry in South Africa include:

- The Foodstuffs, Cosmetics and Disinfectants Act, Act 54 of 1972.
- The Health Act, Act 63 of 1977.
- The Medicine and Related Substances Control Act, Act 101 of 1965.
- The International Health Regulations Act, Act 28 of 1974.
- The Meat Safety Act, Act 40 of 2000.
- The Agricultural Product Standards Act, Act 119 of 1990.
- The Liquor Product Act, Act 60 of 1989.
- The Animal Disease Act, Act 35 of 1984.
- The Fertilizer, Farm Feeds, Agriculture Remedies and Stock Remedies Act, Act 36 of 1947.
- The Plant Breeders Act, Act 15 of 1976.
- The Agricultural Pests Act, Act 36 of 1983.
- The Plant Improvement Act, Act 53 of 1976.
- The Genetically Modified Organisms Act 25 of 1997.

2.3 FOOD SAFETY INITIATIVES

2.3.1 In South Africa

Food Safety South Africa (FSSA), an organization falling under the auspices of the Consumer Goods Council of South Africa (CGCSA), the body responsible for establishing best practices and implementing standards, will enable the CGCSA to determine the exact nature of possible and actual problems along the food supply chain (Herman, 2006a:5). According to Herman (2006:5), the FSSA focuses on three key areas, namely risk management, scientific development- including a virtual laboratory- and standards.

The Food Safety Initiative, a single authoritative source of information on all food safety-related matters in Southern Africa, was established in February 2006 (Herman: 2006b:5). It was at the launch of this very important body that Terry Bennet, general manager of aquaculture, observed that (cited by Herman, 2006b:5), 'South Africa in terms of food safety is a Third World country, and it does not require First World standards.'

2.3.2 In Europe

The Global Food Safety Initiative (GFSI) was established in May 2000 and was co- ordinated by the Food Business Forum and the Food Marketing Institute in the United Kingdom (Manning and Baines, 2004:598). The GFSI is a retailed network of more that 40 food safety experts and their trade associations' world-wide. According to Manning and Baines (2004:598), citing from the GFSI document the following: "...The (GFSI) document in not intended to replace the requirements of any legislation, where the legislation requires a higher standard for a specific industry sector". Furthermore it is stated that the GFSI document serves as, "...a framework in which food safety schemes can be benchmarked as appropriate and effective."

2.3.3 In Australia

"With varying legislation in place, the management of food safety, in a consistent manner across Australia has been difficult" (Roberts & Deery, 2004:151). This according to Roberts and Deery (2004:151) citing Souness (1999), was the reason behind the Australia New Zealand Food Authority's (ANZFA) development of a national food regulatory system in 1994. The ANZFA then produced a set of food standards that covered food safety through every stage in the food chain, 'from the farm to the plate'. This meant that all aspects of the food industry were accounted for from agriculture to food service (Roberts and Deery, 2004: 151). The authors are furthermore of the opinion that the focus of any food safety legislation, should be to minimize risks.

2.3.4 In Canada

With the rise in reported incidence of infections from food-born pathogens, the United States Department of Agriculture has implemented a mandatory Hazard Analysis Critical Control Point (HACCP) programme as a three phase introduction to the Pathogen Reduction Act for Meat and Poultry (USDA,1996) (Nyuyen, Wilcock and Aung, 2004:655). All registered food manufacturing plants in Canada, which export food products to the USA were required to meet the given regulations. According to Nyuyen *et al.* (2004:655), most of the Canadian federally registered food manufacturing plants exporting to the USA, have successfully implemented a HACCP-based food safety management programme.

2.3.5 In the United States

The United States Department of Agriculture (USDA) and the Food and Drug Administration (FDA), have primary responsibility for ensuring the safety of foods (The GAO Report, 2005:6).The safety and quality of the U.S. food supply is governed by a complex system that is administered by 15 agencies. In terms of research gleaned from the GAO Report (2005:8), many proposals have been made to consolidate the U.S. food safety system. In 2004 another attempt was made to Senate to establish a single food safety agency to protect public health, to ensure food safety, to improve research and food security (The GAO Report, 2005:6).

2.4 CONSUMER CONFIDENCE

2.4.1 In South Africa

When purchasing any food product, consumers consider it reliable and they have the right to assume that it is reliable. If a problem arises for example a dented/ damaged package or container or any spoiled goods, the South African consumer tend to be apathetic, shrug and throw the product away. When a small percentage do complain, they happily accept a reimbursement or a replacement product (Anonymous 2, 2006: **O**nline).

If the South African consumer expect proper risk management in the food industry, the approach described above is totally unacceptable. This indifferent attitude of our consumers encourages poor food safety standards, allowing some of our local organizations to turn a blind eye to insufficient and inadequate systems. In Europe and the United States, any food scare, no matter how insignificant, is immediately reported to the relevant authorities who will deal with the issue as a matter of urgency. This action will result in either no action from the guilty party, voluntary withdrawal or compulsory recall of products from the supermarket shelves. An investigation will then be launched to find the root cause of the problem, which would invariably result in an upgrade of the risk management system in order to improve food safety (Anonymous 2, 2006: **O**nline).

The analogy can be drawn that while consumers are major role players in promoting food safety and risk management in South Africa, they do not exercise their rights as consumers. Consumer education in all the aspects of food purchasing, food handling and food storage is of vital importance (Anonymous 2, 2006: **O**nline).

2.4.2 In the United Kingdom

"Consumers have lost confidence in the quality and safety of the food they eat," according to Shears, Zoller and Hurd (2004:336) citing Shears *et al.* (2001).

According to de Jonge, Frewer, van Trijp, Renes, de Witt and Timmers (2004:839) citing Frewer, Raats and Shepherd (1993), increased media attention to food safety issues, consumer studies and the establishment of new regulatory bodies such as the European Food Safety Authority and the national food safety agencies, demonstrate that food safety has emerged as and continues to be, an important issue in society in the United Kingdom. Due to this heightened attention to food safety, consumer perceptions may be negatively influenced or unnecessarily raise their concerns (de Jonge, Frewer *et al.*, 2004:839).

According to Shears *et al.* (2004:336), building and maintaining consumer confidence is the job of the politicians. Their decisions however should be based on scientific applications, but the scientists should at all times be independent of politics. Scientific results and recommendations according to Shears *et al.* (2004:336), must be public, open, transparent and trustworthy.

2.4.3 In the United States

"Food Safety is an important issue facing consumers, the food industry and the government" (Yee, Yeung and Morris, 2005:841). Yee *et al.* (2005:841), are of the opinion that due to the fact that most consumers are not able to determine food safety risks, their perception of food safety is in part, a matter of trust in the food chain. According to de Jonge *et al.*(2004:837) citing Pan European Conference on Food Safety and Quality (2004) it is assumed that public trust in the food industry, government and public policy, is on the decline and that most consumers are extremely worried about the safety of the food they eat.

In terms of the White Paper from the Centre for Science in the Public Interest on, Building a Modern Food Safety System (Smith De Waal, Plunkett & David, 2007:1), the food safety system in America is 'broken', and due to this fact, many Americans are hospitalized and fewer may die from preventable food borne illnesses. Furthermore, even food regulated by the Food and Drug Administration (FDA), have caused a number of recent national outbreaks and recalls resulting in the consumer confidence in the safety of their food supply, being adversely impacted upon (Smith De Waal & Plunkett, 2007:1). In addition in terms of the

White Paper, it is the responsibility of the American Congress to act timely in order to create a solid food safety system, with adequate resources and authority to meet the demands of a modern and globalized food system. More importantly, to restore the public's confidence - before another outbreak occurs (Smith De Waal & Plunkett, 2007:1).

2.5 FACTORS INFLUENCING FOOD SAFETY PRACTICES

According to Dr. Lucia Anelic, head of the Food Safety Initiative, South African food manufacturers are highly responsible and have impressive procedures and programmes in place to ensure that consumers are protected (Anonymous 3, 2006: **O**nline).

2.5.1 Hygiene

David Watson, Managing Director of Sunspray Food Ingredients in South Africa, is of the opinion that hygiene should be high on our priority lists when addressing food safety (Anonymous 3, 2006: **O**nline). According to Watson, one cannot just take a generic programme and implement it, without considering factors like the facility itself, the equipment, pallets and packing material, and lastly the correct cleaning material. Poor hygiene attracts pests and buildings should have proper lighting, ventilation and limited access for pests and rodents. Cleaning schedules should be in place as proof that regular sanitation does in fact take place.

2.5.2 Governmental Support

According to Rolf Uys, AIB audit manager (Uys, 2007:25) government health services have broken down. Uys is of the opinion that there is a general lack of resources and skills when it comes to performing health inspections at food factories. This according to Uys (2007:26), may be the reason why food manufacturers are taking short cuts and compromising quality.

2.5.3 Lack of discipline / commitment

Workers, in the food factory environment have to be constantly reminded of food safety principles and practices (Uys, 2007:26). Uys is furthermore of the opinion that food safety should be reflected in every worker's key performance monitoring areas.

2.6 FACTORS IMPACTING THE FOOD INDUSTRY

2.6.1 Food borne illnesses

Food- borne illnesses according to Samba (2003:**O**nline), presents a major and continuing challenge to Africa, as it adversely affects health, lowers economic productivity, and in several instances, results in disability and even death. Every consumer is at risk of food borne illness, however conversely every incident of food borne illness is potentially preventable. Knight and Lendal (1989), according to Amjadi and Hussain (2005:167), list the following critical offences in food handling as operation and/or behavioural errors that can lead to outbreaks of food borne illnesses in food and beverage operations:

- Failure to properly cook or heat food.
- Failure to properly cool food.
- Infected employees who practice poor personal hygiene.
- Food prepared a day or more before serving.
- Raw contaminated ingredients incorporated into foods that receive no further cooking.
- Food being allowed to remain at bacteria incubation temperatures.
- Cross contamination.

In South Africa food poisoning is a disease, however poor surveillance or document systems are failing consumers. Only a few hundred cases are being reported each year, whereas the incidences are most likely in the region of hundreds of thousands.

According to Packman (2007:22), statistics from various surveillance organisations in the UK reported that in 1985, food poisoning cases topped 20 000 per annum, however has grown steadily to reach 105 000 reported cases in 1997,

after leveling off at some 80 000 cases per annum in 2005.

Smith De Waal and Robert (2005:1), are of the opinion that many countries have inadequate reporting mechanisms to track food borne illnesses. Due to this reason, data on food borne diseases are extremely scares calling for improvements to better identify causes of these food borne diseases.

2.6.2 Economic costs

Food borne disease outbreaks according to Smith, De Waal and Robert (2005:8), can create a considerable economic burden on any country. The costs incurred by a consumer include medical and legal costs, including the cost of absenteeism from either work or school. The loss of income due to food borne illness, among the working class families, can enhance the cycle of poverty. Many countries, since the globalization of the food trade, have suffered economic consequences when unsafe food result in the cancellation of export contracts (Smith, De Waal and Robert, 2005:9).

Furthermore according to Smith, De Waal and Robert (2005:9), tourism can also be affected by food borne outbreaks. Being a haven for 'travelers diarrhea,' can harm a country's reputation as tourist destination and as a result have huge consequences on that country's economy (Smith, De Waal & Robert, 2005:9).

2.6.3 Increased food prices versus quality of essential products

Food prices around the globe are on the rise. The question therefore needs to be asked whether manufactures are compromising the quality of the most essential products. According to Watkinson and Makgetla (2002:1), workers spend more than a third of their income on food. In their report Watkinson and Makgetla (2002:1), stated that the very poor spend up to and sometimes even more than 50 per cent of what they earn on food. Furthermore according to Watkinson and Makgetla (2002:4), the quality of some products have declined following deregulation due to:

- The lack of business interest in complying with food legislation.

- Low government capacity to monitor and enforce product quality legislation.
- Low levels of consumer education.

2.7 STANDARDS

2.7.1 ISO 9000:2000

In response to the need to bring into equilibrium dozens of national and international quality standards that existed throughout the world during the 1970's and 1980's, the International Standards Organization (ISO) formed a Technical Committee, commonly referred to as 'TC176', represented by an international team represented by 75 nations (Davis and Goetsch, 2002:4). The objective of the TC176 was to develop a universally accepted set of quality standards, which is known as the ISO 9000 series of standards, first released in 1987. This standard was then updated and rereleased in 1994 and the term 'family of standards' was attributed thereto. It was then updated once again and released in 2000 and this time around the TC176 aligned ISO 9000 to the concept of TQM (Davis & Goetsch, 2002:5).

2.7.2 HACCP

Hazard Analysis Critical Control Points (HACCP) is a scientific and systematic system for assuring food safety (Nyuyen *et al.*, 2004:656). According to Nyuyen *et al.* (2004:656) citing Adams (1994) and Bennet and Steed (1999), it was developed in Pillsbury in the 1960's for the United States Army and NASA program in an effort to achieve zero defects and ensure total food safety . Nyuyen, *et al.*,(2004:656) citing Food Safety Enhancement Programme (1993), Bennet and Steed (1999) and Eyles (1995), are of the opinion food safety cannot be achieved by conventional inspection , resulting in the HACCP being emphasized 'in-process' control rather than 'post-process' inspection .

2.8 THE REGISTRATION/AUDIT PROCESS

2.8.1 ISO

According to Davis and Goetsch (2002:294), certain steps need to be taken in preparation for ISO 9000 certification, and that these steps should be in a certain order. Davis and Goetsch (2002:294), states that those leaders who believe that ISO certification is needed, should firstly get the support and backing of top management before embarking on preparation for certification. In total there are fifteen steps to be followed before the organization can consider a registration audit (Davis and Goetsch, 2002:295).The steps required for registration, the follows:

- Commitment by Top Management.
- Decision to proceed, develop Rough Order of Magnitude (ROM) cost for registration and publicise ISO 9000 registration project to employees.
- Form the steering committee.
- Train the steering committee.
- Select and train internal auditors.
- Assess current conformance to the standards.
- Plan registration preparation projects.
- Select project teams.
- Train project teams.
- Activate project teams.
- Project feedback and monitoring team.
- Registration selection.
- Preliminary assessment audit and documentation review.
- Final pre-audit touch up.
- Registration audit.

2.8.2 HACCP

A HACCP study consists of seven principles. These principles identify specific food safety hazards (biological, chemical, physical or allergens) that can adversely

affect the safety of food and specific preventative measures for their control (SANS, 2007). The HACCP principles enjoy international acceptance, and the details of this approach have been published by the Codex Alimentarius Commision (1993) and the National Advisory Committee on Microbiological Criteria for Foods in America.

- **Principle1**: Conduct a hazard analysis
- **Principle 2**: Determine the Critical Control Points (CCP).
- **Principle 3**: Establish critical limits to ensure that each CCP is under control.
- **Principle 4**: Establish a monitoring system to ensure control over each CCP by scheduled testing or observation.
- **Principle 5**: Establish the corrective action to be taken when monitoring indicates that a CCP is moving out of control.
- **Principle 6**: Establish validation and verification procedures and conduct a review to confirm that the HACCP system is working effectively.
- **Principle 7**: Establish documentation on the procedures and records appropriate to these seven principles.

The above aspects will be elaborated upon in Chapter 3, Paragraph 3.11.2.

2.9 CONCLUSION

In this chapter a holistic perspective of food safety in South Africa has been elaborated upon. The chapter also focused on food safety in various leading countries with specific emphasis on consumer confidence. Factors influencing food safety practices and factors impacting the food industry were also discussed. In addition, similarities and differences between the ISO 9000 and HACCP standards were highlighted. In the next chapter, a literature review will be conducted on the concept of 'food safety'.

CHAPTER 3: FOOD SAFETY-A LITERATURE REVIEW

3.1 INTRODUCTION AND BACKGROUND

The safety of food has over the last 50 years become more and more of a public issue than ever before. Manufacturers are now more aware of the importance of producing a product that is not only attractive and nutritious, but also safe for its end users. Government has therefore placed an enormous amount of pressure on food manufacturers, to ensure the production of food that are safe, by means of implementing an acceptable standard or system. Taking a 'systems approach' to food safety, involves looking at all the parts of the handling and preparation process. This is achieved by appointing qualified and competent individuals to ensure that all the processes within the system are synchronized, and working to the benefit of all.

The South African National Standard (SANS), provides guidelines for quality and/or environmental management systems (SANS, 2002). Currently there is no local standard for auditing establishments, which have a food safety system in place. This is mainly why the guidelines set out in the ISO 19011, have been adopted by most certification auditors for auditing food environments. The ISO 19011, clearly outlines the process to determine the competence of an auditor needed in a specific audit situation (SANS, 2002).

3.2 FOOD BORNE ILLNESSESS, FOOD BORNE DISEASES, FOOD POISONING

Food is essential to life, but if contaminated, can cause illnesses and even death (Griffith, 2006:6). Griffith (2006:6), is furthermore of the opinion that death as a result of food contamination, fortunately only happens in the minority of cases. The World Health Organization's (WHO) definition embraces all food and water borne illnesses regardless of the presenting symptoms, and includes any disease of an infectious or toxic nature caused by, or thought to be caused by, the

consumption of food or water Schmidt, (1995) cited by Griffith, (2006:6). Furthermore food borne disease therefore includes illness caused by various chemical, physical or microbiological hazards, which may be present in food or water.

According to Griffith (2006:7), the history of food safety is as old as human history and may have originated with the recognition and avoidance of foods that were naturally toxic. Today, with many years of experience with food safety and over 150 years of food microbiology, it is assumed that many of our food safety problems have been resolved. However according to Griffith (2000) and Redmond and Griffith (2003) (cited by Griffith, 2006:9), the exact opposite is true with increasing reports of food borne diseases. According to the FAO/ WHO Pan European Conference on Food Safety February 2002, '*Food borne disease caused by microbiological hazards is a large and growing public health problem*', '*Most countries with systems for reporting food borne disease have documented significant increases.*

According to Amjadi and Hussain (2005:169), most victims of food borne illnesses do not identify the source of their symptoms. Amjadi and Hussain (2005:169), are of the opinion that the public is indeed becoming more aware that certain types of illnesses may be food related. It is further stated that all foodservice operations have the potential to cause food borne illness through errors in purchasing, receiving, storing, preparing and serving food. Knight and Lendal (1989) cited by Amjadi and Hussain, (2005:169), identified a few critical offences in food handling as 'operation and/or behavioural errors,' that can lead to outbreaks of food borne illnesses in food and beverage operations.

Gleaned from 'Food safety around the World', Smith De Waal & Robert (2005: **O**nline) cite the following observations. Every consumer is at risk of food borne illness, however conversely every incident of food borne illness is potentially preventable. Much can be done in the food chain, from production at farm level to the final presentation and consumption of food stuffs to prevent food borne illness. The first step in preventing food borne illness is to be well informed about the basics of food safety; the hazards and risks, and how to recognise and

eliminate them through the use of best food safety practices. Food borne illness may be caused by physical, chemical or biological food hazards, but of these three, biological contamination is by far the most common cause of food borne illness. It severely impacts health, especially the most vulnerable groups, example the elderly, pregnant women, the very young and those with diminished immunity. The safety of food can only be assured if all those involved from farm right through to those consuming the food, understand and play their part. Food safety is truly everybody's business and everyone's responsibility.

Packman (2007:22), is of the opinion that many food borne illness cases were related to food service and home production, but a significant number originated from manufactured foods, that should be 'HACCP safe'. For the purpose of clarity, this statement relates to organisations, which supposedly have a system in place to detect any problems in their manufacturing processes.

3.3 FOOD SAFETY PRACTICES

Food safety, embraces anything from processing, preparation or handling of food, to ensure that it is safe for human consumption. The food chain, like any other is only as strong as its weakest link, and the responsibility of food safety lies not only with the producers, manufacturers and processors of food, but also with governments and consumers themselves. This requirement calls for Government to pass and enforce appropriate food safety legislation (Griffith & Marais, 2007:47-48).

To celebrate 50 years of Food Safety in Europe, the European Commission has published an illustrated book outlining the changes, challenges and successes in this field. In its foreword, the Commissioner of Health, Markos Kyprianou (Kyprianou, 2007: **O**nline), points to the fact that European lifestyle are so much different to what they were half a century ago, and so too the patterns of food consumption. The days of rationing, predominantly local production, limited preservation and labour intensive preparation, are long gone. European citizens today are accustomed to choice, convenience, quality and competitive prices when it comes to food they buy. The public's appreciation of the complex processes

involved in getting food from the farm, through the factory to the table, is greater than ever before. The general awareness of the safety risks that can arise at any point in the food chain if appropriate precautions are not applied is high amongst most consumers. As a result, the primary expectation of the European consumers today is that proper measures are in place to ensure that food sold in the European Union (EU) is safe to eat.

According to Kyprianou (2007:**O**nline), the EU food safety policy has evolved and adapted in line with many other changes, such as the way food is produced, processed and marketed. New techniques in farming and food industry require new regulatory approaches and with every new challenge or threat that emerged, an effective and proportionate response had to be developed. The result today, is a solid body of legislation and complementary provisions, encompassing the whole of the animal and human food chain, 'from farm to fork' (Kyprianou, 2007: **O**nline).

Many food companies in South Africa implemented ISO 9001 before adopting HACCP systems, the opinion being, that is was 'easier' (Jackson, 2006:18). This perception is linked to the investment required to ensure that food handling facilities are suitably constructed to ensure safe food. This may be stating the obvious, but the lack of effective Good Hygiene Practices (GHP) and Good Manufacturing Practices (GMP) has often been overlooked in the ISO 9001 audits of food companies. This has resulted in the foundation of many of the subsequent HACCP systems being weak, which is further exacerbated by having the same ISO 9001 quality auditors now performing the HACCP audits. Since these auditors are well trained in the 'paperwork' aspects of a food safety management system, which is similar to ISO 9001 quality management system, the pre requisite programmes, managing good hygiene and good manufacturing practices, are often neglected and glossed over (Jackson, 2006:18).

These deficiencies have been questioned by retail food safety auditors, causing concern about auditor competence in general. A further problem was identified regarding sector, knowledge of products and processes being audited. The lack of auditing resources has resulted in food safety auditors auditing all food sectors

serviced by the auditing companies and certification bodies. Consequently, the sector specific food safety issues may have been overlooked, leading to a false sense of security in certified HACCP management systems (Jackson, 2006:18).

3.4 FOOD SAFETY IN SOUTH AFRICA

Limited research is available on the techniques used by auditors in the food industry. When it comes to food safety in South Africa, the country is viewed as a 'Third World' country. Speaking at the eight month update of the Food Safety Initiative, Terry Bennet from Irvin and Johnson, concluded that South Africa does not require First World standards, and that food safety is only for those who can afford it (Herman, 2006a:1). Of importance is the fact that those who can afford to shop at premium retailers such as Woolworths, are assured of getting safe food, versus the *spaza* shops in townships, where chances of getting food that is safe, are very slim. Rolf Uys, from AIB International SA, is of the opinion that the main problem was that, "……we don't know what's happening in SA, especially in the rural areas, because it is not measured" (Herman, 2006a:1). Furthermore, Uys was of the opinion that in three out of ten food processing and manufacturing factories he audited, he found evidence of rodents; another area where the health department was absent (Herman, 2006a:1).

The Food Safety Initiative (FSI) according to Starke (2006:27), is an authoritative source of information on food safety-related matters in Southern Africa, also recognized that there may be a lack in the competence of food safety auditors and this can be seen in their objectives, which states that they will optimize food safety activity, by:

- Compiling minimum food hygiene standard acceptable to all members, and
- ensuring that food safety auditors are adequately trained and certified appropriately.

Starke (2006:27), is further of the opinion that the FSI recognizes that food safety is non-competitive and is working to optimize food safety auditing of all players so as to avoid costly duplication, and to endorse food safety auditor training and certification. As part of the FSI's launch in Cape Town in February 2006, John

Marais of Safe Quality Products, SA, cited by Starke (2006:27-28), gave a presentation on behalf of SAFSIS (South Africa Food Safety Inspection Service) on: 'The Review of Food Safety Auditing in South Africa'. Marais noted the confusion and uncertainty around some supplier audits for food retailers, and argued for a harmonized food audit standard with local and international acceptance by all role players. According to Marais (cited by Starke, 2006:27-28), sector-specific auditors must be identified and trained. Furthermore according to Marais, such auditors should be South African Auditor Training and Certification Association (SAATCA) registered, and he reminded manufacturers of their right to know if an auditor is qualified and competent in their specific food sector and have the assurance that an audit will add value.

'Prevention is better than cure', is a commonly used adage. The food and beverage industry faces a constant liability exposure from faulty (contaminated) products resulting from errors and omissions (Alexander Forbes Risk Services Division, 2006:32-33). Incidents of product contaminated threaten the well-being of consumers, while added to this are the risks presented by errors in design, packaging, labelling or storage of products. The potential of causing bodily injury, sickness, disease, death or even damage to a third party's property, is always present and it is clear that product liability pitfalls facing the food and beverage industry are of extreme concern. South African businesses are increasingly entering the international business arena by exporting and marketing their products to wholesalers and retailers in countries all over the world. This not only introduces a heightened risk of defective product-related litigation, but also brings the threat of strict liability and the imposition of punitive and exemplary damages to the fore. Although the imposition of strict liability in delictual cases for product liability is not part of South African law as yet, numerous calls for reform in this regard have been raised. It remains to be seen whether the legislature will heed to these calls (Alexander Forbes Risk Services Division, 2006:32-33).

According to Jackson (2006:16), a plethora of food safety audits systems are available in South Africa, but many of these auditing systems are overlapping due to conflicting requirements. Furthermore, according to Jackson (2006:16), one of the reasons for this overlap is the perceived lack of confidence in government and

certification agencies. Jackson also argues that this can be contributed to two factors, namely:

- The lack of a centralized food control government agency in South Africa, which makes the regulatory approach to food safety fragmented and conflicting and,
- the development of HACCP certification in South Africa, which has followed in the footsteps of ISO 9001 quality management systems.

The progression from ISO to HACCP has been a challenge according to Jackson (2006:18), since food safety which is not negotiable, has succeeded the quality management system, which is negotiable, based on the customer requirements.

3.5 FOOD SAFETY WORLDWIDE

Smith and Riethmuller (1999:724), are of the opinion that food safety is a high profile issue, facing consumers, agricultural marketers, farmers and government. Food safety, in Australia is an important topic, since incidents involving a range of products created unfavourable publicity and resulted in negative images of the food sector (Smith and Riethmuller, 1999:724). Furthermore according to Smith and Riethmuller (1999:724), consumers are exposed to stories in the media and therefore take note of incidents around the world. Consumer concern about the food that they eat is a phenomenon that is increasing, highlighted by food scares (Smith and Riethmuller, 1999:726). Smith and Riethmuller (1999:726), further states that there are specific issues of concern about food quality, which include: bacteriological contamination, chemical residues, food irradiation and the use of antibiotics. It is very apparent that food safety is becoming an issue of importance to consumers when deciding what to purchase, even though specific concerns may vary from country to country. International trade is another area which is receiving attention, when it comes to food safety. This however, cannot be avoided due to the increased internationalisation of the food industry (Smith and Riethmuller, 1999:727).

There are thee major reasons according to Henson and Traill (1993) (cited by Smith and Riethmuller, 1999:727), why food safety issues have become a huge

part of international trade negotiations, namely:

- International agencies in the likes of the FAO have developed networks to exchange information about potential health hazards.
- As incomes increase, consumers demand higher levels of insured quality in the food they consume.
- Harmonisation of international food safety standards is an important issue that is not likely to be completely resolved in the near future.

3.6 CONSUMER CONFIDENCE IN FOOD SAFETY

"Consumers in the USA, Japan and Australia have to some degree lost confidence in the ability of governments, marketers and farmers to provide them with safe food" (Smith and Riethmuller, 1999:726). Consumers rely on the food industry and government to assess food risks for them, since they are not in a position to do so. Confidence in these organizations, once lost may be hard to regain (Smith and Riethmuller, 1999:726).

The Food Marketing Institute (FMI) of America published and adopted a document in November 2007, termed Food Safety: The Supermarkets Perspective (Anonymous 1, 2007: **O**nline). With the adoption of this document, the FMI's board of Directors reconfirmed the industry's commitment to improving food safety. A Food Safety Task Force was reinstated in June of 2007, and they identified and published the following four priorities.

- Strengthen consumer confidence in the safety of the food supply.
- Develop programs to help reduce food borne illness.
- Educate consumers how to select nutritious and wholesome food.
- Develop public policies to improve the safety of America's food supply.

Furthermore, in spite of the FMI Board approved policy (Anonymous 1, 2007: **O**nline), consumer confidence is very dependent on events in the market place. A decrease in consumer confidence can be contributed to media coverage of recent outbreaks, recalls and safety scares. This in itself poses new challenges to ensuring the safe supply of food in an ever changing market place. According to the FMI Board approved policy (Anonymous 1, 2007: **O**nline), consumer

confidence in the safety of the food they purchase at supermarkets, reached an all time low, during 2007. The FMI Board approved policy (Anonymous 1, 2007: **O**nline), further states that government together with industry must address the dynamic changes in the market place in order to secure high levels of confidence. These changes include handling new food sources, advances in production and distribution methods and the growing volume and diversity of imports. The overarching approach to these changes should be to protect the food source from unintentional or deliberate contamination.

The Global Food Safety Initiative (GFSI) was launched in May 2000 and was co-ordinated by the Food Business Forum and the Food Marketing Institute in the UK (Manning and Baines, 2004:599). The GFSI is a retailed network of more that 40 food safety experts and their trade associations' world- wide. Their objectives according to Manning and Baines (2004:599), are to:

- Enhance food safety.
- Ensure consumer protection.
- Strengthen customer confidence.
- Benchmark requirements of food safety systems.
- Improve cost efficiency throughout the food supply chain

The level of public trust in farmers, manufacturers and retailers, as well as regulatory institutions in the EU, does have an impact on the confidence of consumers in food safety, in general (de Jonge *et al.* 2004:837). Furthermore, reduced consumer confidence and an increase in public distrust, may economically impact on food safety. According to de Jonge *et al.* (2004:838) citing the Economic Communities (2003), the production of food and beverages in the EU is the second largest manufacturing sector, accounting for 5 per cent of manufactured exports and 11.5 percent of manufacturing employment.

De Jonge *et al.* (2004:839), citing Frewer, Raats and Shepherd (1993) are of the opinion that increased media attention to food safety issues, consumer studies and the establishment of new regulatory bodies, such as the European Food Safety Authority and the National Food Safety agencies, demonstrate that food safety has emerged as and continues to be an important issue in society. Due to this

heightened attention to food safety, consumer perceptions may be negatively influenced or unnecessarily raise their concerns. De Jonge *et al.* (2004: 839) citing Siegrist, Earle and Gutscher (2003), define confidence as, "...the belief that future events will occur as expected". And in the context of food safety, this would be the belief that the consumption of food products will not result in adverse health effects, as this is under normal conditions the expected outcome of consumption. According to the European Parliament and The Council of the European Union (2002), cited by de Jonge *et al.* (2004:839), it is not allowed to put unsafe food on the market and it is very likely that most consumers expect that food products are safe and of good quality. Beardsworth and Keil (1997) (cited by de Jonge *et al.* 2004:839), are of the opinion that despite the fact that consumers are no longer directly involved in the production and processing of food which might negatively effect consumer confidence, research has indicated, that food safety is not the focus of consumer concern in day to day activities. Consumer confidence according to de Jonge *et al.* (2004:839), in food safety can be defined as the consumer's general expectation that food products will not cause any harm to their health or to the environment.

Both food safety incidents and media attention that focuses on food safety, can influence the extent to which people perceive a particular food as risky (de Jonge, *et al.*, 2004:840). Various problems with food safety over the past years have frequently been the focus of media attention in Europe, according to de Jonge *et al.* (2004: 840) citing Frewer, Raats and Shepherd (1993). Furthermore, given that previous research has shown that media coverage of food related risks negatively impacts consumer perceptions, the occurrence of safety incidents and media coverage of food related risks have to be taken into account as potential determinants of consumer confidence in food safety.

3.7 EVOLUTION OF STANDARDS

The development of the Hazard Analysis Critical Control Points (HACCP) and the International Standards Organisation (ISO) calls for closer scrutiny.

3.7.1 HACCP

In the 1960's, a concept known as HACCP was developed by the Pillsbury Company, in collaboration with the United States army and the United States National Aeronautical and Space Administration (NASA). NASA wanted a zero defects program to guarantee the safety of the foods that astronauts were to consume in space. Pillsbury therefore introduced and adopted HACCP, a system which could provide the greatest safety, while reducing dependence on end-product inspection and testing. HACCP emphasized control of the process as far in the processing system as possible, by utilizing operator control and/or continuous monitoring techniques at critical control points. International trends have also led to the adoption of the HACCP approach due to an increase of food scares/incidents, globalization of trade in food and politics of trade in food. Trends in South Africa have then as a result also led to the adoption of the HACCP approach due to:

- International market demand,
- local food legislation, and
- food safety problems in South Africa.

A standard, according to Pember (2006:21), in modern business parlance has a very precise meaning, being "...a published document which sets out specifications and procedures designed to ensure that a material, product, method or service is fit for its purpose and consistently performs the way it was intended to". Pember (2006:21), further states that a standard is an agreement determined by consensus and prescribes a minimum conformance level or more usually, accepted best practice, for a product, procedure or service.

The National Standards Policy Advisory Committee (NSPAC) according to Pember (2006: 21), defines a standard as, "...a prescribed set of rules, conditions, or requirements concerning definitions of terms; classification of components, specifications of materials, performance, or operations, delineation of procedures; or measurement of quantity and quality in describing materials, products, systems, services, or practices." This definition is still as valid today as it was 30 years ago

when first posited. According to Pember (2006:22) it is noted on the American National Standards Institute site, that standards are nothing new, they have probably existed since the beginning of civilization. Pember (2006:22), is further of the opinion that as human life became more complex, a need for commonality to facilitate communication was recognized, particularly on issues pertaining to survival such as the gathering or production of food and especially trade. Furthermore from such simple beginnings, civilization has developed to the extent that standards are now commonplace and influence many of the actions and interactions of man across the globe ranging from health and safety, to trade and commerce, to building and construction, to technology and even record keeping.

3.7.2 ISO

According to Davis and Goetsch (2002:3), widely accepted standards lead to more efficient use of resources for producers, more equitable international competition, and lower cost to customer. The world according to Davis and Goetsch (2002:3), has too many competing standards, such as standards for electrical power generation and distribution (50Hz vs. 60 Hz), units of measure (metric vs. the English System), television broadcast standards, and many others.

The present situation according to Davis and Goetsch (2002:3), has improved immensely, from what might have been without the worldwide movement following World War II, to rationalise the thousands of conflicting standards around the globe. The ISO based in Geneva Switzerland, has been the standard bearer for that effort. ISO was established in 1947 to promote standards in international trade, communications and manufacturing and is a worldwide federation of national standards organizations from 130 nations. Since in most countries standardization is a function of government, nearly all of the 130 member bodies are government organizations (Davis and Goetsch, 2002:3).

Motwani, Kumar and Cheng (1996:72) citing Greene (1991),are of the opinion that 60 per cent of all quality problems are associated with five issues, which according to them are addressed in the ISO standards These are:

- Document control,

- design control purchasing consistency,
- inspection and testing, and
- process control.

3.8 THE REQUIREMENTS FOR A HACCP SYSTEM

All consumers have the right to assume that the food bought and consumed by them is safe. Food safety refers to the presence and levels of food borne hazards of the food product, when eaten (SANS, 2007). According to SANS (2007), it is of paramount importance that all food handlers are aware of the requirements for food safety. All types of organisations, irrespective of their size, type and their product within the food chain should support food safety initiatives. The SANS 2007 standard stipulates principles and controls required to ensure a safe food product to the end user (SANS, 2007).

The principles addressed are globally recognised as significant to ensure a safe food product for the consumer. Also to produce a generic structure for more specific requirements, this is pertinent to a particular food sector. All the principles within the SANS 2007 standard should be considered in all food sectors, in order to confidently guarantee food safety (SANS, 2007). The most capable food safety systems are executed, managed and updated within a framework of a structured management system, and then eventually included into all management activities of any given organization. The successful utilization of all the principle with the above mentioned standard, demands the full commitment and involvement of not only management, but the entire workforce, in order for an organization to reap maximum benefits.

3.9 WHAT IS AN AUDIT

According to ISO 9000, 2001 (the quality management system fundamentals and vocabulary code of practice), "...an audit is a systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled." This definition is encapsulated in the graphical depiction thereof in Figure 3.1. Audits represent a

random sample of a process; not all processes, records, documents, procedures, etc. are audited. An audit is normally seen as a 'snapshot' of the degree of compliance to a particular quality system, at the time of the audit. In many instances, audits are used as a resource for the organizations' risk management, governance and internal control needs. The audit process goes from a checklist or program driven process to an interactive analysis of non-compliance.

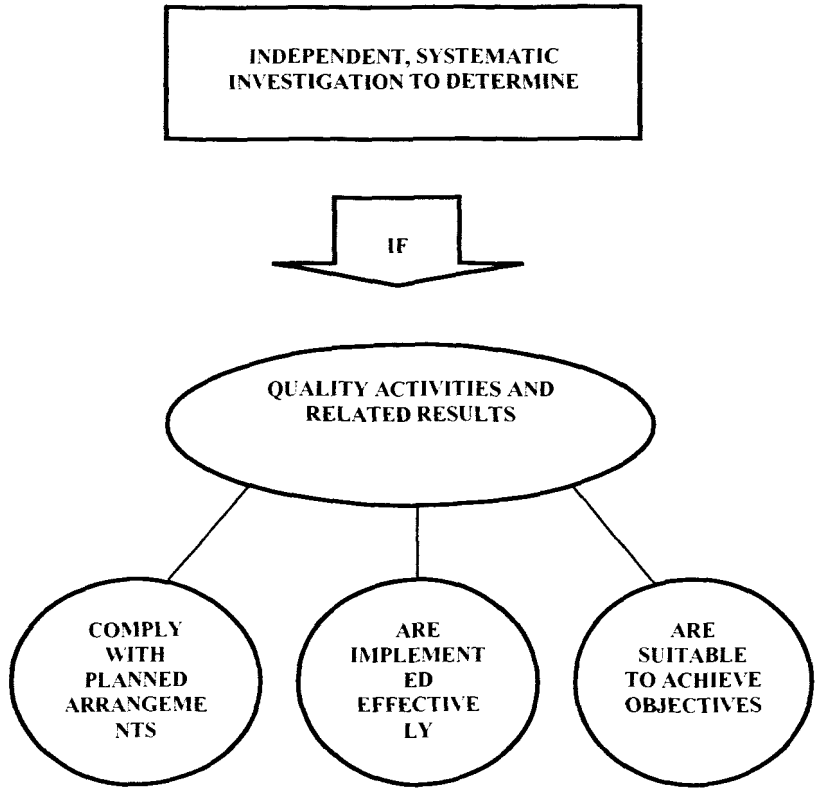

FIGURE 3.1: The definition of a quality audit (**Source**: TIQMS, 2005:17).

Auditing has traditionally been regarded as an 'added cost'; in use as a tool for continuous improvement. There is no doubt about the fact that, through quality auditing, companies can verify their practices and improve the consistency of their products and services. Auditing activities and continual improvement efforts are designed to meet customers' expectations and can be used as a predictor of a company's future success in the marketplace. Further research, using a quantitative approach to discover the extent of auditing and how it is used throughout the specific industry, would be beneficial (Hepner, Wilcock and Aung,

2004:553-554).

According to Dew (1994:1), an audit can be a positive useful tool for finding the opportunities for improvement. Dew suggests that the area to be audited should be defined by the management, based on what management wishes to learn. The auditor enters the work area to find out how work processes are being conducted, and see whether the actual performance is in line with expectations. The auditor searches for improvement opportunities and examples of excellence in the organization.

The ISO 9000 and HACCP standards both emphasises the importance of audits as tools for monitoring and verifying the effective implementation of an organisation's quality and/or food safety system. Audits are essential for assessing conformity of activities.

3.10 THE PURPOSE OF AN AUDIT

According to Rajendran and Devadasan (2005:364), quality audits are not only meant for checking the systems for their compliance with quality system standards, they can also be used for exercising continuous quality improvement and reaching the benchmarks of Total Quality Management (TQM). In order to gain the objective evidence required to prove conformance to any quality standard, an organisation's processes need to be monitored. This in essence is the purpose of an audit. The statements below are the most commonly cited objectives for performing an audit.

- To determine the extent to which the quality management system complies with the requirements of a specified quality standard.
- It is a complete assessment of the effectiveness and efficiency of the whole quality management system.
- To determine if the quality related activities and related results correspond to the planned arrangements and procedures in order to meet quality objectives as specified in the quality management system.
- To evaluate suppliers ability to fulfil contractual requirements.

Quality audits in the last 20 years, according to Karapetrovic and Willborn

(2000:679), have gained prominence as a tool for assessing the effectiveness of quality assurance efforts and more recently for the evaluation of compliance with applicable quality standards, such as ISO 9000. Furthermore according to Karapetrovic and Willborn (2000:679), quality auditors examine whether or not quality processes, resources and objectives are what they should be. The quality auditors, first assess compliance of the quality assurance procedures and related documentation with applicable standards as guidelines, also known as the audit criteria. They then evaluate whether actual quality activities conform to the documented procedures and whether these are effectively implemented and suitable for achieving quality objectives (Karapetrovic and Willborn, 2000:679).

According to Karapetrovic and Willborn (2001:367), differences in opinion occur with regards to the usefulness and benefits that may be gleaned from the audit process. When quality audits are concerned, a large spectrum of views on this issue emerges. Beeler (1999:76), for instance claims that, "...audits cannot drive continuous improvement. If conducted properly, they can contribute to it". Beeler (1999:76) citing Willborn (1990), Barthelemy and Zairi (1994) and Peters (1998), believe that dynamic and proactive auditing can induce improvement, while static auditing ensures compliance with the necessary minimum standard. Karapetrovic and Willborn (2001:367), present several conditions for a successful audit use in improvement efforts, including the constant change of excellence models and interdependence of audits.

Various kinds of audits occur in industry, but are usually categorised into three types of audits. The three types of audits referred to are:

- The first party, also known as 'internal audits,'
- the second, better known as 'supplier audits,' and
- third party audits, which are also known as 'certification audits'.

All these audits are in theory concerned with monitoring various aspects of a process or a system and fulfilling the objectives mentioned above. Karapetrovic and Willborn (2001:679), are of the opinion that the evaluation of the system effectiveness can be a powerful management tool for quality improvement.

3.11 THE REGISTRATION/AUDIT PROCESS

Auditing is an important function for the effective deployment of quality systems. It is not only aimed to ensure that there are total compliance with set procedures and agreed standards all the time and at all stages of the productive or organizational process, but is also meant to develop organizations through continuous improvement, innovation and establishing a problem solving culture. There are many advantages to auditing, and the list below is representative of some of the primary advantages (UNISA, 2006:3):

- Audits give confidence to people making a product that is found to be correct.
- Positive work is highlighted and good work by individuals or departments are recognized.
- The auditee (client) gets an unbiased assessment of the effectiveness of his/her quality system.
- A basis for corrective action /improvement is established.
- Areas of opportunity are identified.

Furthermore, audits are essential both internally for continuous improvement and externally for registration/certification and supply chain evaluation (UNISA, 2006: 3-5).

According to Karapetrovic and Willborn (2002:24), quality audit as a methodology for evaluating system, product and/or process performance against established requirements, has experienced substantial growth in worldwide use in recent years. The authors are of the opinion that this is mainly due to the increase in ISO 900 registrations, which topped 350 000 in 2000. Based on the fundamental principles of independence, objectivity and professionalism, the audit is an irreplaceable tool when confirmation of compliance is sought (Karapetrovic and Willborn, 2002:24).

3.11.1 ISO

There are eight sequential steps in the ISO registration process according to Davis and Goetsch (2002:243), namely:

- Decision by the organisation to conform to ISO 9000 and to seek registration.
- Internal preparation by the organization to achieve conformance.
- Internal determination that the organization has achieved conformance and that the Quality Management System (QMS) is functioning.
- Accredited ISO 9000 registrar engaged to certify the organisation.
- Preliminary assessment and document review by the registrar.
- Formal QMS audit and certification assessment by the registrar.
- Elimination of non- conformances preventing registration.
- Registration awarded by the registrar.

According to Davis and Goetsch (2002:294), certain steps need to be taken in preparation for ISO 9000 certification. Furthermore, for several of these steps a certain order should be followed. Davis and Goetsch (2002:294), states that those leaders who believe that ISO certification is needed, should firstly get the support and backing of top management before embarking on preparation for certification. In total there a fifteen steps (Refer to Paragraph 2.8.1, Chapter 2) to be followed, before the organization can consider a registration audit (Davis and Goetsch, 2002:295).

"ISO 9000 refers to a group of standards containing clauses directed at the quality management process of an organisation" (Nyuyen *et al.*, 2004:658). According to Nyuyen *et al.* (2004:658) citing Stringer (1994) and Surak and Simpson (1994), the standards define a quality framework within which a registered company must operate as a minimum criterion for a quality management system. These standards are reviewed regularly, to ensure their ongoing relevance. Attaining ISO registration according to Nyuyen *et al.*, (2004:658) citing Surak (1999), does not equate with achieving a world class quality system, since the ISO standards describe only the minimum criteria for a quality management system.

3.11.2 HACCP

The implementation of HACCP, should be a two stage process (Nyuyen, Wilcock and Aung, 2004:656). The first stage according to Nyuyen, Wilcock and Aung (2004:656) citing Bennet and Steed (1999), should be the implementation of

Prerequisite Programmes, which is defined by the National Advisory Committee on Microbiological Criteria for Foods as, "...procedures including good manufacturing practices that address operational conditions, providing the foundation for a HACCP system".

A common problem of some failed efforts to implement HACCP successfully according to Nyuyen *et al.* (2004:656), is the identification of many processes considered to be Critical Control Points (CCPs). According to Nyuyen *et al.*, (2004:656), excessive and inappropriate critical control points can make the HACCP plan too cumbersome for many manufacturing processes, and make those processes that are truly critical to the operation look less important.

Nyuyen *et al.* (2004:656), states that the purpose of Prerequisite Programmes is to decrease the number of CCPs by emphasizing the performance, documentation and verification of supporting systems. The Prerequisite Program consists of six elements, which are premises, storage and transportation, equipment, training, sanitation and pest control and recalls (or traceability), and for each of these elements, the production or manufacturing facility must have a documented program. There are a number of questions that an organisations' prerequisite manual should answer according to Nyuyen *et al.* (2004:656), namely:

- What is done?
- How is it done?
- How often is it done?
- Who is responsible?
- What are the deviations?
- What records are maintained?

A HACCP study consists of seven principles. These principles identify specific food safety hazards (biological, chemical, physical or allergens) that can adversely affect the safety of food and specific preventative measures for their control (SANS, 2007). The HACCP principles (listed in Chapter 2, Paragraph 2.8.2), have international acceptance, and the details of this approach have been published by the National Advisory Committee on Microbiological Criteria for Foods in 1992 and Codex Alimentarius Commision in 1993.

- **Principle 1**: Conduct a hazard analysis. This principle describes where the HACCP team should start, e.g. the selection of the team members, description of the product and uses of the product.
- **Principle 2**: Determine the Critical Control Points (CCPs). When all food safety hazards and preventative measures have been described, the HACCP team establishes the point where control is critical for managing the safety of the product.
- **Principle 3**: Establish critical limits to ensure that each CCP is under control. The critical limits describe the difference between safe and unsafe product at the CCP. These involve measurable parameters and are also known as the 'absolute tolerance' for the CCP.
- **Principle 4**: Establish a monitoring system to ensure control over each CCP by scheduled testing or observation. The HACCP team specifies monitoring requirements for management of the CCP within its critical limits. This involves specifying monitoring actions in terms of frequency and responsibility.
- **Principle 5**: Establish the corrective action to be taken when monitoring indicates that a particular CCP is moving out of control. Corrective action procedures and responsibility for their implementation need to be specified at this point. Action to bring the process back under control and actions to deal with product produced while the process was out of control, are included.
- **Principle 6**: Establish validation and verification procedures and conduct a review to confirm that the HACCP system is working effectively. Validation and verification procedures could include supplementary tests and procedures to confirm that the HACCP plan and system are working effectively. The HACCP plan and system need to be reviewed as soon as any changes are brought about within the food business operation and the food handling process.
- **Principle 7**: Establishing documentation on the procedures and records appropriate to these seven principles and their application. Developing and keeping of documentation are crucial to demonstrate that the HACCP plan and system are operating under control and that appropriate corrective action has been taken for any deviation from critical limits.

3.12 AUDITS AS A CONTINUOUS IMPROVEMENT TOOL

'Continuous improvement'- the phrase itself, has become increasingly popular over the past ten years (Caffyn, 1999:1138). It is associated with various organisational developments, including lean manufacturing techniques, total quality management, employee involvement programmes, customer service initiatives and waste reduction. According to Caffyn (1999:1138), continuous improvement is something many organisations are striving towards. Some organisations refer to it as continuous improvement, while others view it as a small part of the bigger picture e.g. TQM or business excellence. Furthermore according to Caffyn (1999:1138), continuous improvement is not something that can be achieved overnight; it is a slow developmental process, which starts of with tentative first attempts and the self - conscious adoption of new ways of doing things to a point where improvement efforts become part of organisational life.

Many organisations use various self assessment tools and techniques and employ other positive approaches to quality management, but still fail to sustain continuous improvement (Kaye and Anderson 1999:485). A vast number of models and approaches are available for today's dynamic and complex business environment, and the Malcolm Baldrige National Quality Award, the Deming Model, Total Quality Management, serves as examples to name but a few. Total Quality Management, for example, has since the early 1980's emerged as a significant element of business strategy (Bardoel and Sohal, 1999:263). Even though many models have been developed over the years, there seem to be no one ultimate remedy, which guarantees quality improvement. Most managers do not have the time nor patience to experiment with all the initiatives available and therefore improvement may not be so successful.

Quality and approaches to it have consequently grown since the beginning of the 20th century. According to Kaye and Anderson (1999:485) citing Bounds, Yorks, Adams and Ranney (1994), there are four major quality eras, namely:

- Inspection,

- statistical quality control,
- quality assurance, and
- strategic quality management

Furthermore according to Kaye and Anderson (1999:485) each quality era is built onto the previous. The authors are of the opinion that the first three eras were more focused on the internal operation of an organisation and therefore quality was viewed as 'a problem to be solved'. Then later during the 1980's for the first time, quality was seen as an opportunity, a strategic weapon that could be used against competitors (Kaye and Anderson, 1999:486). The fourth quality era thus focused on the customer, therefore organisations were perceived as being more proactive in anticipating and responding to customer and market needs. Management's commitment and involvement in quality were paramount to ensure fully integrated quality into business plans and strategies, so that it could be adequately deployed throughout the entire organisation. This strategic quality management approach, still proved inadequate to meet today's rapidly changing business environment, which is characterised by uncertainty and unpredictability.

In order to meet these dynamic challenges according to Kaye and Anderson (1999:486) citing Kaye and Anderson (1995), a fifth quality era - competitive continuous improvement has been identified. This era was primarily concerned with the organisation being flexible, responsive and able to adapt quickly to changes needed in their strategies, specifically in the light of feedback from customers and from benchmarking against competitors (Kaye and Anderson, 1999:486). Furthermore, for an organisation to achieve the above mentioned criteria, the implementation of a sound strategy for continuous improvement is of utmost importance.

According to Hepner *et al.* (2004:553), auditing has traditionally been regarded as an 'added cost' and its use as a tool for continual improvement is a more unique approach. Furthermore, there should be no doubt that, through quality auditing companies can verify their practices and improve consistency of their products and services. The question however, is whether audits are being used effectively to drive the continual improvement process?

3.13 AUDITOR COMPETENCE

In performing auditing activities, quality auditors according to Karapetrovic and Willborn (2000:679), must objectively and independently collect and verify evidence, evaluate it against the given audit criteria and only then report their findings. The authors are further of the opinion that, 'objectivity' and 'independence' are two separate, yet interrelated, fundamental principles of auditing. 'Objectivity' according to Karapetrovic and Willborn (2000:679), relates to the consistency of the audit process and results, materiality of evidence, the use of appropriate methodology (e.g. statistical sampling, flowcharts, and checklists), the application of a systematic approach to auditing, as well as being free from bias. Consistency means that two auditors auditing the same system against identical criteria, should come up with similar conclusions. 'Independence', on the other hand according to Karapetrovic and Willborn (2000:680), includes both the auditor's organisational position and his/her state of mind. For an effective and efficient audit to take place, and for an audit to be carried out objectively, auditors must in no way be directly responsible for the auditing function of the organisation where the audit is being performed.

As with all quality professionals, or any professional for that matter, quality auditors have no choice but to adapt to new conditions and demands with higher qualifications and competence (Karapetrovic & Willborn, 2002:25). According to Karapetrovic and Willborn (2002:25) the new ISO 19011 standard for auditing of quality and environmental management, stipulate all requirements. The question whether effectiveness and efficiency of the quality audit can be improved, by imposing a standard and then expanding it into environmental management, still remains.

3.13.1 VALUE ADD DURING THE AUDIT PROCESS

According to ISO and the International Accreditation Forum (IAF) (IAF, 2004: Online), the importance of 'adding value' during a QMS audit, is a controversial topic. But what does 'adding value' really mean? The question remains, whether it is possible to add value without compromising the integrity of the audit or to act as a consultant. Further according to ISO and IAF (2004: Online), all audits

should add value, but in principle this is not always the case. 'Adding value', means making something more useful.

Many organizations, according to the IAF (2004:**O**nline), have used the ISO 9000 series of standards to develop a quality management system to be integrated into the way they do their business. This was done purely to be useful in helping them achieve their strategic business objectives, in other words *add value* to the organization. Conversely, there are other organisations that may have simply created a set of procedures and records that do not reflect the reality of the way the business actually works. They simply add costs, without being useful, more specific, they do not add value (IAF, 2004:**O**nline). Furthermore, in order to add value a third party audit should be useful to:

- The organization to be certified:
- By providing information to top management regarding the organisation's ability to meet strategic objectives.
- By identifying problems which, if resolved, will enhance the organization's performance.
- By identifying improvement opportunities.
- The organisation's customers by enhancing the organisation's ability to provide conforming product.
- The certification body, by improving credibility of the third party certification process.

The performance of auditors, according to Karapetrovic and Willborn (2002:25), has come under considerable criticism with regards to the actual value - added for clients and business in general. Karapetrovic and Willborn (2002:25), are of the opinion that during an audit, both the auditor and the auditee must cooperate in order for them to reach a correct and reliable conclusion. Furthermore, the auditee should be more familiar with the actual process being audited and the auditor on the other hand, should be more knowledgeable about the audit criteria, for example a quality management system standard. Based on this, each party contributes to the value – added component of an audit. The auditor, by assessing the system, provides independent and objective evidence of the process strengths and weaknesses, and the auditee by capitalizing on the strengths and eliminating

the weaknesses, more specific improving the process in the most effective and efficient manner (Karapetrovic and Willborn, 2002:25).

3.13.2 AUDITOR INDEPENDENCE

According to Alleyne, Devonish and Alleyne (2006:621), auditor independence has been a major concern. Furthermore, the 'independence' of auditors has been based on 'fact and appearance'. "Independence, in fact refers to the actual objective state of the relationship between auditing firms and their client, while independence in appearance refers to the subjective state of that relationship as perceived by clients and third parties" (Alleyne *et al.*, 2006:621-622) citing Arens et al., (2006) and Whittington and Pany (2004). Auditors according to Alleyne *et al.* (2006:622), have to serve two opposing interests, namely 'client companies' and the 'general public'. Furthermore according to Alleyne *et al.* (2006:622) citing Rizzo *et al.* (1970), several role conflicts exists, namely:

- Conflict between a particular role and the individual's values-person role conflict.
- Intra-sender role conflict, which includes a number of roles being allocated to one individual.
- Role overload conflict, where many roles are imposed on the individual, taking into account his or her ability to fulfil these roles in light of available resources.
- Inter-sender role conflict, which according to Koo and Sim (1999) as cited by Alleyne *et al.* (2006:622), appears through mutually opposing expectations of role, conflicting policies and needs of others, and incompatibility criteria.

The inter-sender role conflict is the most important conflict for the auditor (Alleyne *et al.*, 2006:622). The auditor's independence and ability to conduct a just audit, may be negatively impacted by auditor conflict (Alleyne *et al.*, 2006:622) citing Schultz (1994). In many cases, if an auditor tries to be ethical in a conflict situation, he/she may be replaced with another auditor by management. This according to Alleyne *et al.*, (2006:623), may result in the auditor 'buckling' under management's pressure, which in turn will result in auditors compromising his/her independence.

Independence according to Alleyne *et al.* (2006:623) citing Firth (1980), is an important attribute of an auditor, as it is regarded as a fundamental principle of the auditor's work. Furthermore, when definite independence is lacking, the audit itself has little value. Auditor independence in the current audit environment where serious failures have occurred is a major concern to most researchers, regulators and the public.

3.14 CONCLUSION

In this chapter a literature review on aspects impacting on food safety was conducted. Food borne illnesses, food poisoning and food borne diseases was emphasised as catalysts for poor food safety practices. Food safety in South Africa and around the globe was also discussed in detail. The following chapter will focus on the survey design and methodology to elicit perspective from food auditors and their clients on the value-add of food auditing in South Africa.

CHAPTER 4: RESEARCH SURVEY DESIGN AND METHODOLOGY

4.1 INTRODUCTION

In this chapter the survey design and methodology to be used within the ambit of this dissertation will be elaborated upon in detail. For this survey 30 food safety auditors and 30 clients of the food safety auditors were randomly selected, from certification bodies within the Western Cape. According to Jaftha (2007:74) citing Welman and Kruger (2001), the design of any study is concerned with the plan to assemble suitable data for investigating the research hypothesis/questions. Jaftha (2007:74) supports the view of Leedy (1993), and adds that the methods used to gather information depend on the type of data and the problem to be researched.

4.2 AIM OF THIS CHAPTER

The purpose of this chapter is to determine why food auditors fail to add value, when conducting certification audits. This objective maps to the research problem set for this dissertation, which reads as follows:
"The lack of value added by food auditors when conducting and performing food safety audits impacts adversely on the confidence levels of food producers".

According to Yin (1994:19), a research design can be defined as, "...the logical sequence that connects the empirical data to a study's initial research question and ultimately, to its conclusions. Colloquially, a research design *is an action plan from here to there*, where *here* may be defined as the initial set of questions to be answered, and *there* is some set of conclusions (answers) about these questions". "Methodology refers to the overall approach of the research process, from the theoretical underpinning to the collection and analysis of data" (Collis and Hussey, 2003:54).

4.3 THE TARGET POPULATION

With any survey, it is necessary to clearly define the target population which can be defined as, "that group which constitutes the defined population from a statistical viewpoint" (Watkins, 2006:109). The target population is, "...the complete group of objects or elements relevant to the research project" (Hair, Babin, Money and Samouel, 1999:209). The target population, according to Watkins (2006:109), must specifically be chosen in order to validate the practicality of the concepts to be presented. The risk of bias, which cannot be eliminated statistically, should be based on the very definition of the target population as well as the number of participants chosen.

According to Collis and Hussey (2003:155), a sample is made up of some of the members of a 'population' (the target population), the latter referring to a body of people or to any other collection of items under consideration for the purpose of research. The sampling frame according to Vogt (1993:202) as cited by Collis and Hussey (2003:155), represents a list or record of the population from which all the sampling units are drawn.

The target population consisted of two distinct groups, namely food safety auditors and their clients. Thirty questionnaires were returned by each of the target population on which the descriptive and inferential statistics (see Chapter 5), will be based.

4.4 DATA COLLECTION

Emory and Cooper (1995:278), distinguish between three primary data collection methods namely:

- Personal interviewing,
- telephone interviewing, and
- self administered questionnaires.

Research often involves a survey, making use of questionnaires to gather information in order for the researcher to arrive at an educated conclusion. The data collected and then later analysed, serves as factual platform for the research

project. According to Mouton (2001:104), data may be gathered by a variety of data collection methods. Furthermore according to Mouton (2001:104-105,107), your data collection process should be documented accurately and in as much detail as possible. The reasons according to Mouton (2001:104-105), are as follows:

- To serve as a historical record for yourself and other possible researchers, and
- as a form of quality assurance.

'Quality research data forms the core of quality research' (Watkins, 2008:139). Quality research data furthermore according to (Watkins, 2008:139), is dependent on the appropriate identification of participants with a specific area of research with the specific purpose to elicit accurate and relevant data. Data collection methods used in the survey, falls within the context of a survey, defined by Collis & Hussey (2003:60), as: "A sample of subjects being drawn from a population and studied to make inferences about the population"

The data collection method used fall within the ambit of both definitions attributed to the concepts 'survey' and 'field study'. For clarity Remenyi *et al* (2002:290), cited by Watkins (2008:67), define the concept of 'survey' as:"...the collection of a large quantity of evidence usually numeric, or evidence that will be converted to numbers, normally by means of a questionnaire". According to Gay and Diebl (1992:238), a 'survey' is an attempt to collect data from members of a population in order to determine the current status of that population with respect to one or more variables. Kerlinger (1986:372), defines 'field study' as non-experimental scientific inquiries aimed at discovering the relations and interactions among ... variables in real ... structures. As with the case of most academic research, the collection of data forms an important part of the overall dissertation content.

According to Trochim (2006:**O**nline), survey research has been identified as one of the most important areas of measurement in applied social research. Further according to Trochim (2006:**O**nline), the broad area of survey research comprehensively includes any measurement procedures that involve asking questions of respondents. A 'survey' can be anything from a short paper-and-

pencil feedback form to an intensive one-on-one in-depth interview (Trochim, 2006: Online).

4.5 SURVEY RESEARCH DESIGN

According to Leedy & Ormrod (2001:196), "...a survey is simple in design: The researcher poses a series of questions to willing participants: summarizes: the responses with percentages, frequency counts, or more sophisticated statistical indexes; and then draws inferences about a particular population from the responses of the sample". Surveys can be divided into two broad categories: the questionnaire and the interview (Trochim, 2006:Online). According to Trochim (2006:Online), questionnaires are usually paper-and-pencil instruments that the respondent completes and interviews are completed by the interviewer based on what the respondent says.

The statements or questions within the survey should according to Watkins (2008: 143), be designed with the following principles in mind:

- Avoidance of double - barreled questions or statements.
- Avoidance of double - negative questions or statements.
- Avoidance of prestige bias.
- Avoidance of leading questions or statements.
- Avoidance of the assumption of prior knowledge.

Furthermore according to Watkins (2008:151), surveys amongst others can be designed to determine 'consensus', 'probability', 'perceived quality' and 'importance'.

4.6 MEASUREMENT SCALES

While various measurement scales are available for academic research, the well – known Lickert scale will be used within the ambit of the research study. Participants are asked to respond to each of the statements, by choosing one of the five agreement choices (Emory & Cooper, 1995:180-181). There are many advantages in using the Lickert scale according to Emory & Cooper (1995:180-

181), namely:

- Easy and quick construction.
- Each item meets an empirical test for discriminating ability.
- The Lickert scale is also treated as an interval scale
- The Lickert scale is probably more reliable than the Thurston scale, and it provides a greater volume of data than the Thurston differential scale.

According to Watkins (2008:162), interval scales have the benefit that the scale data can be analysed by virtually the full range of statistical procedures. Furthermore, interval scales facilitate meaningful statistics when calculating means, standard deviations and Pearson correlation coefficients.

4.7 SURVEY DESIGN

According to Mouton (2001:152) surveys are studies that are usually quantitative in nature and which aim to provide a broad overview of a representative sample of a large population. Collis & Hussey (2003:60), are of the opinion that, "if research is to be conducted in an efficient manner and make the best of opportunities and resources available, it must be organized". Furthermore, if it is to provide a coherent and logical route to a reliable outcome, it must be conducted systematically using appropriate methods to collect and analyse data. A survey should be designed in accordance with the following stages:

- **Stage one:** Identify the topic and set some objectives.
- **Stage two:** Pilot a questionnaire to find out what people know and what they see as the important issues.
- **Stage three:** List the areas of information needed and refine the objectives.
- **Stage four:** Review the responses to the pilot.
- **Stage five:** Finalise the objectives.
- **Stage six:** Write the questionnaire.
- **Stage seven:** Re-pilot the questionnaire.
- **Stage eight:** Finalise the questionnaire.
- **Stage nine:** Code the questionnaire.

Watkins (2008:140) is of the opinion that the survey design most commonly used

in businesses and management, is 'descriptive survey'. The descriptive survey is according to Collis & Hussey (2003:60-66), is frequently used in business research in the form of attitude surveys. The descriptive survey as defined by Ghauri, Grønhaug and Kristianslund (1995:60), has furthermore the characteristics to indicate how many members of a particular population have a certain characteristic.

4.8 SURVEY SENSITIVITY

Research for this dissertation is not conducted in an environment of a sensitive nature. Therefore this will not be applicable under Chapter 4.

4.9 SURVEY VALIDITY AND RELIABILITY

According to Collis and Hussey (2003:186), 'validity' is concerned with the extent to which the research findings accurately represents what is happening. More specific, whether the data is a true picture of what is being studied. According to Cooper and Schindler (2006:318-320), three major forms of validity can be identified, namely 'content validity', 'criterion - related validity' and 'construct validity'.

Reliability (also referred to as trustworthiness), is concerned with the findings of the research (Collis and Hussey, 2003:186). The findings can be said to be reliable if the researcher and anyone else repeated the research and obtained the same results. There are three common ways of estimating the reliability of the responses to questions in questionnaires or interviews, namely the 'test re-test method', 'split-halves method and the 'internal consistency method', (Watkins, 2008:68). According to Babbie (2005:285), survey research is generally weak on validity and strong on reliability.

4.10 QUESTIONNAIRE FORMULATION

When considering the questions for the questionnaire, one should always keep in mind the purpose of the research project. The most important aspect of designing a questionnaire according to Watkins (2008:142), is that the respondents should understand the questions. This in turn will ensure that answers will not be based on vague assumptions, which will account for incorrect and unreliable data. Each statement or question should be made up of clear, unambiguous statements. The design of the questionnaire according to Watkins (2008:141), can be spilt into three categories:

- Developing question content.
- Design the question sequence and overall questionnaire layout.
- Select the question type for each question and specify the wording.

The information gathered in from each question, should be meaningful, otherwise the question should not be considered. According to Jaftha (2007:75) citing Babbie and Mouton, (2003) , using both questions and statements in a questionnaire allows for more flexibility in the design of the items and makes the questionnaire more interesting. According to Watkins (2008:67), a questionnaire is a list of carefully structured questions, chosen after considerable testing with the view to elicit responses from a chosen sample. The aim is to establish what a selected group of participants do, feel or think (Watkins, 2008:67). Furthermore according to Jaftha (2007:75), questions in a questionnaire can be open – ended or close – ended. Open ended questions, according to Fellows and Lui (1997) cited by Jaftha (2007:75), are easy to ask but difficult to answer and even more complicated to analyse. Close – ended questions according to Jaftha (2007:76) citing Babbie and Mouton (2003), provide greater standardization of responses and provides easier processing of the responses since no subjective interpretation is required.

According to Watkins (2008:142), the following guidelines should be adhered to when designing a questionnaire:

- Questions should be simple, understandable and not too long.
- The correct information should be elicited from the respondent.

- Omit leading or loaded questions. Be especially aware of questions starting off with factual information
- Ensure that the participants selected have the necessary information at his or her disposal to be able to answer the questions.
- Questions, which can be embarrassing to the respondents, should be avoided.
- Avoid questions, which will not be answered honestly by respondents.
- 'Pre – test' the questionnaire for clarity of questions and ease of use before distributing to respondents.
- If the questionnaire is distributed electronically, ensure that hyperlinks (if applicable) work and that answers can be submitted electronically.

4.11 LIST OF QUESTIONS/STATEMENTS TO AUDITORS

The following list of questions/statements was posed to the auditors in the survey:

Question 1: All food safety auditors need to go for regular evaluations to determine their competence.

Question 2: Food safety auditors need to be evaluated regularly on their knowledge of changing standards.

Question 3: All auditors should be measured to a unified standard.

Question 4: Food safety auditors need to go through an induction programme before they are deemed competent to perform certification audits.

Question 5: Food auditors do not need to have training and experience in a food related field to become a food safety auditor.

Question 6: An auditor, coming from a specific sector, eg agriculture, should only be allowed to audit organizations in the agricultural industry.

Question 7: Qualifications should not be the deciding factor on an auditor's competence.

Question 8: Due to the fact that most audits are lengthy and repetitive, auditors may loose focus in the process.

Question 9: Feedback from clients, on the auditor's presentation and audit practices is required as a guide for improvement.

Question 10: Client feedback is not essential when addressing performance appraisal of auditors.

Question 11: There should be a link between performance of auditors and

associated incentives paid.

Question 12: When evaluating the ever changing food standards, food auditors should be given sufficient time to familiarize themselves with the requirements of new standards, in order to confidently audit against such new standards.

Question 13: Ever changing standards in the food industry, contribute to the lack of competence of auditors.

Question 14: All food auditors need to be a member of a formal registration scheme.

Question 15: The South African Registration Scheme, SAATCA, should be transparent in their methods of evaluating third party auditors and make all findings known to certification bodies.

Question 16: Organisations do not have an obligation to inform, educate or train their clients on new food safety standard and food regulations.

Question 17: Most certification bodies are calibrated in terms of current food safety standards.

Question 18: Certification managers should consult their auditors, before registering for a new standard.

Question 19: Although most certification managers do not perform certification audits, they should be well informed about the latest changes in food safety standards.

Question 20: Certification managers should encourage training in conflict management, as auditors find themselves dealing with different kinds of personalities and are often the object of conflict.

4.12 LIST OF QUESTIONS/STATEMENTS TO CLIENTS OF AUDITORS

The following list of questions/statements was posed to the clients of auditors in the survey:

Question 1: All food safety auditors need to go for regular evaluations to determine their competence.

Question 2: Food safety auditors need to be evaluated regularly on their knowledge of changing standards.

Question 3: All auditors should be measured to a unified standard.

Question 4: Food safety auditors need to go through an induction programme before they are deemed competent to perform certification audits.

Question 5: Food auditors do not need to have training and experience in a food related field to become a food safety auditor.

Question 6: An auditor, coming from a specific sector, e.g. agriculture, should only be allowed to audit organizations in the agricultural industry.

Question 7: Qualifications should not be the deciding factor on an auditor's competence.

Question 8: In your opinion, do auditors loose focus during the audit process, due to the lengthy and repetitive nature of the process.

Question 9: Feedback from clients on the auditor's findings and required procedures are imperative for sustained business improvement.

Question 10: Client feedback is essential when addressing issues pertaining to auditor performance within their organisations.

Question 11: When evaluating the ever changing food standards, food auditors should be given sufficient time to familiarize themselves with the requirements of new standards, in order to conduct a quality audit.

Question 12: Ever changing standards in the food industry, contribute to the lack of competence of most auditors.

Question 13: All food auditors need to be a member of a formal registration scheme or ruling body, which clients must consider a prerequisite before allowing an auditor on site.

Question 14: The South African registration scheme, SAATCA, should be transparent in their methods of evaluating third party auditors and make all findings known to clients who want to apply for certification.

Question 15: The food industry must be assured that all auditors are well informed and competent when it comes to the latest technologies and developments within the food industry.

Question 16: The food safety representative of a food business operation has the right to report any unprofessional behaviour from auditors to a controlling body.

Question 17: Most audit managers do not perform audits, instead they do marketing.

Question 18: Auditors due to the high level of controversy that often exist between client and auditor should have special training in conflict management.

4.13 CONCLUSION

The objective of this chapter was to describe the survey methodology adopted in this research study. The research survey design and methodology was discussed under the following headings:

- Introduction
- Target population
- Data collection
- Survey research
- Measurement scale
- Survey design
- Survey sensitivity
- Questionnaire construction

In the next chapter, a data analysis (descriptive and inferential statistics) will be conducted and the survey results interpreted.

CHAPTER 5: ANALYSIS AND INTERPRETATION OF SURVEY RESULTS

5.1 INTRODUCTION

This chapter focuses on the analysis of the survey conducted amongst certified food auditors and their clients to determine whether value was added by food auditors when conducting and performing food safety audits, and whether lack of that value added, impact adversely on the confidence levels of food producers. The data obtained from the completed questionnaires are presented and analysed in this chapter.

To serve the purpose of this research, descriptive and inferential statistics were used to analyse the data. The data has been analysed by using SAS software. As descriptive statistics, frequency tables displayed in Paragraph 5.2 shows the distributions of statement responses. As a measure of central tendency, the means and standard deviations of all the statements are also displayed in Paragraph 5.2. Comparative statistics for comparing the responses of the auditors and their clients for the same questions using Analysis of Variance and Kruskal Wallis tests are shown in Paragraph 5.3 and in Annexure B.

5.2 ANALYSIS METHOD

5.2.1 Validation survey results

A descriptive analysis of the survey results returned by the research questionnaire respondents are reflected below. The responses to the questions obtained through the questionnaires are indicated in table format for ease of reference. Each variable is tested to fall within the set boundaries. The database was developed in order to test for responses that were out of the set boundaries.

5.2.2 Data format

The data was provided in its original format of questionnaires, which was captured on a Microsoft Access database. It was then imported into SAS-format through the SAS ACCESS module. This information was then analysed and interpreted.

5.2.3 Preliminary analysis

The reliability of the variables (statements) in this survey is tested by using the Cronbach Alpha tests (See Paragraph 5.3.1). Descriptive statistics was performed on all variables; displaying means, standard deviations, frequencies, percentages, cumulative frequencies and cumulative percentages. These descriptive statistics and graphical displays can be found in Paragraphs 5.3.2 and 5.3.3. (In this respect, see Annexure A).

5.2.4 Inferential statistics

The following inferential statistics are performed on the data:

- Cronbach Alpha test.
- ANOVA for comparison of auditors and clients.
- Kruskal-Wallis tests for comparison of auditors and clients.

5.2.5 Technical report with graphical displays

This report is written with explanations of all variables and their outcome. Comparisons are performed where required and statistical probabilities are attached to indicate the magnitude of differences or associations. All inferential statistics are discussed in Paragraph 5.3.4.

5.2.6 Assistance to researcher

The conclusions made by the researcher, was validated by the statistical report. Help is given to interpret the outcome of the data. The final report written by the

researcher was validated and checked by a qualified statistician to exclude any misleading interpretations.

5.2.7 Sample

The target population consisted out of certified auditors in the Western Cape. A sample was randomly selected. From a sample of 30 auditors and 30 clients 18 auditors and 21 clients responded to the questionnaires.

5.3 ANALYSIS

The data analysis gleaned from the respondent questionnaires (18 auditors and 21 clients) are analysed below.

5.3.1 Reliability testing

Cronbach's Alpha is an index of reliability associated with the variation accounted for by the true score of the 'underlying construct'. Construct is the hypothetical variables that are being measured (Cooper & Schindler, 2006:216-217). More specific, Cronbach's alpha measures how well a set of items (or variables) measures a single uni-dimensional latent construct.

A reliability test (Cronbach's Alpha Coefficient) was done on the statements (items) made in the auditor and the client surveys. Negative phrased questions were reversed scored. These questions are indicated with an "n" on the end. The Cronbach's Alpha Coefficients reported in table 5.2 for the auditor survey, which are more than the acceptable value of 0.70, prove the auditor questionnaire to be reliable and consistent. The Cronbach's Alpha Coefficients for the client survey however proof to be more complex. For the client survey, after the negative phrased questions were reversed scored it still proof to not have consistency (see Table 5.1). This however proof that the client questionnaire may by multi dimensional and it measures more than one construct. This problem can be dealt with, by determining whether there are more dimensions in which this questionnaire operates in (in other words that the statements describe more than

one latent variable), by doing a factor analysis on the client questionnaire or by deleting the items that add to the inconsistency of the questionnaire. The latter path was followed.

Shown in Table 5.1 are the results of the statements used as measuring instrument for the client questionnaire. It shows the correlation between the respective item and the total sum score (without the respective item) and the internal consistency of the scale (coefficient alpha) if the respective item would be deleted. By deleting the items (statements) one by one each time with the statement with the highest Cronbach Alpha value, the Alpha value will increase. In the right-most column of Table 5.1, it can be seen that the reliability of the scale would be higher if any of these statements is deleted. As a result, the items (statements) will be deleted from the scale, one by one, until a final set that makes up a reliable scale is attained. (It is of importance to note that the fewer items in a scale, the less reliable the scale)

After deleting statements q07, q08 and q12 the alpha coefficients were calculated on the remaining items (statements) and the results showing a Cronbach's alpha coefficient of more than 0.70 are shown in Table 5.3 (Nunnaly, 1978:48).

TABLE 5. 1: Cronbach's Alpha Coefficient for the client questionnaire.

Statements	**Variable nr.**	**Correlation with total**	**Cronbach's Alpha Coefficient**
1. All food safety auditors need to go for regular evaluations to determine their competence	Q01	-0.0375	0.6090
2. Food safety auditors need to be evaluated regularly on their knowledge of changing standards.	Q02	0.5478	0.5566
3. All auditors should be measured to a unified standard.	Q03	0.5902	0.5493
4. Food safety auditors need to go through an induction programme before they are deemed competent to perform certification audits.	Q04	0.3001	0.5698
5. Food auditors do need to have training and	Q05n	0.5112	0.5292

Statements		Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
	experience in a food related field to become a food safety auditors			
6.	An auditor, coming from a specific sector, e.g. agriculture, should only be allowed to audit organizations in the agricultural industry.	Q06	0.0968	0.6014
7.	Qualifications should be the deciding factor on an auditor's competence.	Q07n	0.0185	0.6249
8.	In your opinion, do auditors loose focus during the audit process, due to the lengthy and repetitive nature of the process.	Q08	-0.1069	0.6289
9.	Feedback from clients on the auditor's findings and required procedures are imperative for sustained business improvement.	Q09	0.4812	0.5535
10.	Client feedback is essential when addressing issues pertaining to auditor performance within their organizations	Q10	0.0859	0.5965
11.	When evaluating the ever changing food standards, food auditors should be given sufficient time to familiarize themselves with the requirements of the new standards, in order to conduct a quality audit.	Q11	0.3916	0.5679
12.	Ever changing standards in the food industry, contribute to the lack of competence of most auditors.	Q12	-0.1247	0.6574
13.	All food auditors need to be registered members of a formal registration scheme or ruling body, which clients must consider a prerequisite before allowing an auditor on site.	Q13	0.5888	0.5060
14.	The South African registration scheme, SAATCA, should be transparent in their methods of evaluating third party auditors and make all findings known to clients who want to apply for certification.	Q14	0.2449	0.5762
15.	The food industry must be assured that all auditors are well informed and competent when	Q15	0.4235	0.5455

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
it comes to the latest technologies and developments within the food industry.			
16. The Food Safety Representative of a food business operation has the right to report any unprofessional behaviour from auditors to a controlling body.	Q16	0.4562	0.5918
17. Most audit managers do not perform audits, instead they do marketing.	Q17	0.3743	0.5569
18. Auditors, due to the high level of controversy that often exists between client and auditor, should have special training in conflict management.	Q18	-0.0265	0.6089
Cronbach's Coefficient Alpha for standardized variable			**0.6781**
Cronbach's Coefficient Alpha for raw variables			**0.5957**

TABLE 5. 2: Cronbach's Alpha Coefficient for the auditors questionnaire.

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
1. All food safety auditors need to go for regular evaluations to determine their competence.	Q01	0.2093	0.7514
2. Food safety auditors need to be evaluated regularly on their knowledge of changing standards.	Q02	0.3390	0.7459
3. All auditors should be measured to a unified standard.	Q03	0.2860	0.7479
4. Food safety auditors need to go through an induction programme before they are deemed competent to perform certification audits.	Q04	0.3325	0.7422
5. Food auditors need to have training and experience in a food related field to become a food safety auditors	Q05n	0.0641	0.7638
6. An auditor, coming from a specific sector, e.g. agriculture, should only be allowed to audit	Q06	0.4661	0.7294

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
organizations in the agricultural industry.			
7. Qualifications should the deciding factor on an auditor's competence.	Q07n	0.5138	0.7264
8. Due to the fact that most audits are lengthy and repetitive, auditors may loose focus on the process.	Q08	0.2233	0.7519
9. Feedback from clients on the auditor's presentation and audit practices is required as a guide for improvement.	Q09	0.6021	0.7222
10. Client feedback is essential when addressing performance appraisal of auditors.	Q10n	0.3110	0.7440
11. There should be a link between performances of auditors and associated incentives paid.	Q11	0.0562	0.7675
12. When evaluating the ever changing food standards, food auditors should be given sufficient time to familiarize themselves with the requirements of the new standards, in order confidently audit against such new standards.	Q12	-0.1184	0.7618
13. Ever changing standards in the food industry, contribute to the competence of auditors.	Q13n	0.0880	0.7624
14. All food auditors need to be registration scheme.	Q14	0.7675	0.7109
15. The South African registration scheme. SAATCA, should be transparent in their methods of evaluating third party auditors and make all findings known to certification bodies.	Q15	0.4479	0.7344
16. Organisations do have an obligation to inform, educate or train their clients on new food safety standards and food regulations.	Q16n	0.6071	0.7178
17. Most certification bodies are calibrated in terms of current food safety standards.	Q17	0.0789	0.7621
18. Certification managers should consult their auditors, before registering for a new standard.	Q18	0.0943	0.7590
19. Although most certification managers do not perform certification audits, they should be well	Q19	0.58350	0.7235

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
informed about the latest changes in food safety standards.			
20. Certification managers should encourage training in conflict management, as auditors find themselves dealing with different kinds of personalities and are often the object of conflict.	Q20	0.5726	0.7282
Cronbach's Coefficient Alpha for standardized variable			**0.7637**
Cronbach's Coefficient Alpha for raw variables			**0.7532**

TABLE 5. 3: Cronbach's Alpha Coefficient for the client questionnaire after items were deleted .

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
1. All food safety auditors need to go for regular evaluations to determine their competence	Q01	-0.0414	0.7329
2. Food safety auditors need to be evaluated regularly on their knowledge of changing standards.	Q02	0.6444	0.6828
3. All auditors should be measured to a unified standard.	Q03	0.6631	0.6786
4. Food safety auditors need to go through an induction programme before they are deemed competent to perform certification audits.	Q04	0.2426	0.7103
5. Food auditors do need to have training and experience in a food related field to become a food safety auditors	Q05n	0.4882	0.6793
6. An auditor, coming from a specific sector, e.g. agriculture, should only be allowed to audit organizations in the agricultural industry.	Q06	0.0434	0.7397
9. Feedback from clients on the auditor's findings and required procedures are imperative for sustained business improvement.	Q09	0.5230	0.6850
10. Client feedback is essential when addressing	Q10	0.1667	0.7161

Statements	Variable nr.	Correlation with total	Cronbach's Alpha Coefficient
issues pertaining to auditor performance within their organizations			
11. When evaluating the ever changing food standards, food auditors should be given sufficient time to familiarize themselves with the requirements of the new standards, in order to conduct a quality audit.	Q11	0.4822	0.6922
13. All food auditors need to be registered members of a formal registration scheme or ruling body, which clients must consider a prerequisite before allowing an auditor on site.	Q13	0.6255	0.6551
14. The South African registration scheme, SAATCA, should be transparent in their methods of evaluating third party auditors and make all findings known to clients who want to apply for certification.	Q14	0.2951	0.7061
15. The food industry must be assured that all auditors are well informed and competent when it comes to the latest technologies and developments within the food industry.	Q15	0.4541	0.6842
16. The Food Safety Representative of a food business operation has the right to report any unprofessional behaviour from auditors to a controlling body.	Q16	0.1430	0.7280
17. Most audit managers do not perform audits, instead they do marketing.	Q17	0.3007	0.7042
18. Auditors, due to the high level of controversy that often exists between client and auditor, should have special training in conflict management.	Q18	0.1690	0.7161
Cronbach's Coefficient Alpha for standardized variable			**0.7497**
Cronbach's Coefficient Alpha for raw variables			**0.7163**

Thus if the items (statements) q12n, q08 and q07n are deleted from the questionnaire the questionnaire becomes more consistent and thus more reliable.

Although analysis are done on these questions that were deleted in the following paragraph, note thereof must be taken in order to make the correct conclusions and inferences.

5.3.2 Descriptive statistics

In tables 5.4 and 5.5 the descriptive statistics for all the variables in the auditor and the client questionnaires are shown, with the frequencies in each category and the percentage out of total questionnaires. It is of importance to note that the descriptive statistics are based on the total sample. In some cases there were no answers given (left blank) in the questionnaire. These are shown as "unknown". These descriptive statistics are also shown in Annexure A.

TABLE 5. 4: Descriptive statistics for client responses

Variables	Categories	Frequency	Percentage out of total
1. All food safety auditors need to go for regular evaluations to determine their competence	Strongly disagree	0	0.0%
	Disagree	0	0.0%
	Undecided	1	4.8%
	Agree	9	42.9%
	Strongly agree	10	47.6%
	Unknown	1	4.8%
2. Food safety auditors need to be evaluated regularly on their knowledge of changing standards.	Strongly disagree	0	0.0%
	Disagree	0	0.0%
	Undecided	0	0.0%
	Agree	6	28.6%
	Strongly agree	15	71.4%
	Unknown	0	0.0%
3. All auditors should be measured to a unified standard.	Strongly disagree	0	0.0%
	Disagree	0	0.0%
	Undecided	1	4.8%
	Agree	9	42.9%
	Strongly agree	11	52.4%
	Unknown	0	0.0%
4. Food safety auditors need to go	Strongly disagree	0	0.0%

Variables		Categories	Frequency	Percentage out of total
	through an induction programme before they are deemed competent to perform certification audits.	Disagree	1	4.8%
		Undecided	0	0.0%
		Agree	6	28.6%
		Strongly agree	14	66.7%
		Unknown	0	0.0%
5.	Food auditors do not need to have training and experience in a food related field to become a food safety auditors	Strongly disagree	17	81.0%
		Disagree	3	14.3%
		Undecided	0	0.0%
		Agree	0	0.0%
		Strongly agree	1	4.8%
		Unknown	0	0.0%
6.	An auditor, coming from a specific sector, e.g. agriculture, should only be allowed to audit organizations in the agricultural industry.	Strongly disagree	1	4.8%
		Disagree	0	0.0%
		Undecided	4	19.0%
		Agree	11	52.4%
		Strongly agree	5	23.8%
		Unknown	0	0.0%
7.	Qualifications should not be the deciding factor on an auditor's competence.	Strongly disagree	3	14.3%
		Disagree	7	33.3%
		Undecided	3	14.3%
		Agree	7	33.3%
		Strongly agree	1	4.8%
		Unknown	0	0.0%
8.	In your opinion, do auditors loose focus during the audit process, due to the lengthy and repetitive nature of the process.	Strongly disagree	0	0.0%
		Disagree	5	23.8%
		Undecided	4	19.0%
		Agree	12	57.1%
		Strongly agree	0	0.0%
		Unknown	0	0.0%
9.	Feedback from clients on the auditor's findings and required procedures are imperative for sustained business improvement.	Strongly disagree	0	0.0%
		Disagree	0	0.0%
		Undecided	1	4.8%
		Agree	8	38.1%

Variables	Categories	Frequency	Percentage out of total
	Strongly agree	12	57.1%
	Unknown	0	0.0%
10. Client feedback is essential when addressing issues pertaining to auditor performance within their organizations	Strongly disagree	0	0.0%
	Disagree	0	0.0%
	Undecided	2	9.5%
	Agree	13	61.9%
	Strongly agree	6	28.6%
	Unknown	0	0.0%
11. When evaluating the ever changing food standards, food auditors should be given sufficient time to familiarize themselves with the requirements of the new standards, in order to conduct a quality audit.	Strongly disagree	0	0.0%
	Disagree	0	0.0%
	Undecided	0	0.0%
	Agree	11	52.4%
	Strongly agree	10	47.6%
	Unknown	0	0.0%
12. Ever changing standards in the food industry, contribute to the lack of competence of most auditors.	Strongly disagree	3	14.3%
	Disagree	5	23.8%
	Undecided	5	23.8%
	Agree	6	28.6%
	Strongly agree	2	9.5%
	Unknown	0	0.0%
13. All food auditors need to be registered members of a formal registration scheme or ruling body, which clients must consider a prerequisite before allowing an auditor on site.	Strongly disagree	0	0.0%
	Disagree	3	14.3%
	Undecided	0	0.0%
	Agree	8	38.1%
	Strongly agree	10	47.6%
	Unknown	0	0.0%
14. The South African registration scheme. SAATCA, should be transparent in their methods of evaluating third party auditors and make all findings known to clients who want to apply for certification.	Strongly disagree	0	0.0%
	Disagree	2	9.5%
	Undecided	4	19.0%
	Agree	9	42.9%
	Strongly agree	6	28.6%
	Unknown	0	0.0%
15. The food industry must be assured	Strongly disagree	0	0.0%

Variables		Categories	Frequency	Percentage out of total
	that all auditors are well informed and competent when it comes to the latest technologies and developments within the food industry.	Disagree	2	9.5%
		Undecided	0	0.0%
		Agree	9	42.9%
		Strongly agree	10	47.6%
		Unknown	0	0.0%
16.	The Food Safety Representative of a food business operation has the right to report any unprofessional behaviour from auditors to a controlling body.	Strongly disagree	1	4.8%
		Disagree	0	0.0%
		Undecided	1	4.8%
		Agree	7	33.3%
		Strongly agree	12	57.1%
		Unknown	0	0.0%
17.	Most audit managers do not perform audits, instead they do marketing.	Strongly disagree	0	0.0%
		Disagree	3	14.3%
		Undecided	13	61.9%
		Agree	3	14.3%
		Strongly agree	2	9.5%
		Unknown	0	0.0%
18.	Auditors, due to the high level of controversy that often exists between client and auditor. should have special training in conflict management.	Strongly disagree	0	0.0%
		Disagree	0	0.0%
		Undecided	2	9.5%
		Agree	11	52.4%
		Strongly agree	8	38.1%
		Unknown	0	0.0%

TABLE 5. 5: Descriptive statistics for auditor responses

Variables		Categories	Frequency	Percentage out of total
1.	All food safety auditors need to go for regular evaluations to determine their competence.	Strongly disagree	0	0.0%
		Disagree	2	11.1%
		Undecided	1	5.6%
		Agree	3	16.7%
		Strongly agree	11	61.1%
		Unknown	1	5.6%

Variables		Categories	Frequency	Percentage out of total
2.	Food safety auditors need to be evaluated regularly on their knowledge of changing standards.	Strongly disagree	0	0.0%
		Disagree	0	0.0%
		Undecided	0	0.0%
		Agree	8	44.4%
		Strongly agree	9	50.0%
		Unknown	1	5.6%
3.	All auditors should be measured to a unified standard.	Strongly disagree	0	0.0%
		Disagree	0	0.0%
		Undecided	0	0.0%
		Agree	10	55.6%
		Strongly agree	7	38.9%
		Unknown	1	5.6%
4.	Food safety auditors need to go through an induction programme before they are deemed competent to perform certification audits.	Strongly disagree	0	0.0%
		Disagree	2	11.1%
		Undecided	0	0.0%
		Agree	5	27.8%
		Strongly agree	10	55.6%
		Unknown	1	5.6%
5.	Food auditors do not need to have training and experience in a food related field to become a food safety auditors	Strongly disagree	11	61.1%
		Disagree	5	27.8%
		Undecided	0	0.0%
		Agree	1	5.6%
		Strongly agree	1	5.6%
		Unknown	0	0.0%
6.	An auditor. coming from a specific sector, e.g. agriculture, should only be allowed to audit organizations in the agricultural industry.	Strongly disagree	4	22.2%
		Disagree	6	33.3%
		Undecided	1	5.6%
		Agree	4	22.2%
		Strongly agree	3	16.7%
		Unknown	0	0.0%
7.	Qualifications should not be the deciding factor on an auditor's competence.	Strongly disagree	2	11.1%
		Disagree	6	33.3%
		Undecided	0	0.0%

Variables	Categories	Frequency	Percentage out of total
	Agree	9	50.0%
	Strongly agree	1	5.6%
	Unknown	0	0.0%
8. Due to the fact that most audits are lengthy and repetitive, auditors may loose focus on the process.	Strongly disagree	1	5.6%
	Disagree	6	33.3%
	Undecided	1	5.6%
	Agree	7	38.9%
	Strongly agree	3	16.7%
	Unknown	0	0.0%
9. Feedback from clients on the auditor's presentation and audit practices is required as a guide for improvement.	Strongly disagree	0	0.0%
	Disagree	3	16.7%
	Undecided	0	0.0%
	Agree	10	55.6%
	Strongly agree	5	27.8%
	Unknown	0	0.0%
10. Client feedback is not essential when addressing performance appraisal of auditors.	Strongly disagree	3	16.7%
	Disagree	7	38.9%
	Undecided	0	0.0%
	Agree	8	44.4%
	Strongly agree	0	0.0%
	Unknown	0	0.0%
11. There should be a link between performances of auditors and associated incentives paid.	Strongly disagree	2	11.1%
	Disagree	5	27.8%
	Undecided	2	11.1%
	Agree	7	38.9%
	Strongly agree	2	11.1%
	Unknown	0	0.0%
12. When evaluating the ever changing food standards, food auditors should be given sufficient time to familiarize themselves with the requirements of the new standards, in order confidently audit against such new standards.	Strongly disagree	0	0.0%
	Disagree	0	0.0%
	Undecided	1	5.6%
	Agree	8	44.4%
	Strongly agree	9	50.0%
	Unknown	0	0.0%

Variables	Categories	Frequency	Percentage out of total
13. Ever changing standards in the food industry, contribute to the lack of competence of auditors.	Strongly disagree	5	27.8%
	Disagree	6	33.3%
	Undecided	2	11.1%
	Agree	5	27.8%
	Strongly agree	0	0.0%
	Unknown	0	0.0%
14. All food auditors need to be registration scheme.	Strongly disagree	0	0.0%
	Disagree	3	16.7%
	Undecided	0	0.0%
	Agree	11	61.1%
	Strongly agree	4	22.2%
	Unknown	0	0.0%
15. The South African registration scheme. SAATCA, should be transparent in their methods of evaluating third party auditors and make all findings known to certification bodies.	Strongly disagree	1	5.6%
	Disagree	0	0.0%
	Undecided	1	5.6%
	Agree	11	61.1%
	Strongly agree	4	22.2%
	Unknown	1	5.6%
16. Organisations do not have an obligation to inform, educate or train their clients on new food safety standards and food regulations.	Strongly disagree	8	44.4%
	Disagree	3	16.7%
	Undecided	2	11.1%
	Agree	4	22.2%
	Strongly agree	0	0.0%
	Unknown	1	5.6%
17. Most certification bodies are calibrated in terms of current food safety standards.	Strongly disagree	2	11.1%
	Disagree	4	22.2%
	Undecided	2	11.1%
	Agree	9	50.0%
	Strongly agree	0	0.0%
	Unknown	1	5.6%
18. Certification managers should consult their auditors, before registering for a new standard.	Strongly disagree	0	0.0%
	Disagree	4	22.2%
	Undecided	1	5.6%

Variables	Categories	Frequency	Percentage out of total
	Agree	9	50.0%
	Strongly agree	2	11.1%
	Unknown	2	11.1%
19. Although most certification managers do not perform certification audits, they should be well informed about the latest changes in food safety standards.	Strongly disagree	1	5.6%
	Disagree	0	0.0%
	Undecided	0	0.0%
	Agree	7	38.9%
	Strongly agree	10	55.6%
	Unknown	0	0.0%
20. Certification managers should encourage training in conflict management, as auditors find themselves dealing with different kinds of personalities and are often the object of conflict.	Strongly disagree	0	0.0%
	Disagree	1	5.6%
	Undecided	1	5.6%
	Agree	8	44.4%
	Strongly agree	8	44.4%
	Unknown	0	0.0%

In Tables 5.6 and 5.7 the means and standard deviations for all the statements in the two surveys are shown in order to determine central location.

TABLE 5. 6: Descriptive statistics all statements in client questionnaire

	Statements	N	Mean	Std Dev
1.	All food safety auditors need to go for regular evaluations to determine their competence	20	4.45	0.6048
2.	Food safety auditors need to be evaluated regularly on their knowledge of changing standards.	20	4.70	0.4702
3.	All auditors should be measured to a unified standard.	20	4.55	0.5104
4.	Food safety auditors need to go through an induction programme before they are deemed competent to perform certification audits.	20	4.55	0.7592
5.	Food auditors do not need to have training and experience in a food related field to become a food safety auditors	20	1.35	0.9933
6.	An auditor, coming from a specific sector, e.g. agriculture, should only be allowed to audit organizations in the agricultural industry.	20	3.90	0.9679
7.	Qualifications should not be the deciding factor on an auditor's competence.	20	2.75	1.2085
8.	In your opinion, do auditors loose focus during the audit process, due to the lengthy and repetitive nature of the process.	20	3.35	0.8751
9.	Feedback from clients on the auditor's findings and required procedures are imperative for sustained business improvement.	20	4.55	0.6048
10.	Client feedback is essential when addressing issues pertaining to auditor performance within their organizations	20	4.20	0.6156
11.	When evaluating the ever changing food standards, food auditors should be given sufficient time to familiarize themselves with the requirements of the new standards, in order to conduct a quality audit.	20	4.50	0.5130
12.	Ever changing standards in the food industry, contribute to the lack of competence of most auditors.	20	2.95	1.2763
13.	All food auditors need to be registered members of a formal registration scheme or ruling body, which clients must consider a prerequisite before allowing an auditor on site.	20	4.20	1.0563

	Statements	N	Mean	Std Dev
14.	The South African registration scheme. SAATCA, should be transparent in their methods of evaluating third party auditors and make all findings known to clients who want to apply for certification.	20	3.95	0.9445
15.	The food industry must be assured that all auditors are well informed and competent when it comes to the latest technologies and developments within the food industry.	20	4.30	0.9234
16.	The Food Safety Representative of a food business operation has the right to report any unprofessional behaviour from auditors to a controlling body.	20	4.40	0.9947
17.	Most audit managers do not perform audits, instead they do marketing.	20	3.20	0.8335
18.	Auditors, due to the high level of controversy that often exists between client and auditor, should have special training in conflict management.	20	4.25	0.6387

TABLE 5. 7: Descriptive statistics all statements in auditor questionnaire

	Statements	N	Mean	Std Dev
1.	All food safety auditors need to go for regular evaluations to determine their competence.	16	4.31	1.0782
2.	Food safety auditors need to be evaluated regularly on their knowledge of changing standards.	16	4.50	0.5164
3.	All auditors should be measured to a unified standard.	16	4.44	0.5124
4.	Food safety auditors need to go through an induction programme before they are deemed competent to perform certification audits.	16	4.31	1.0145
5.	Food auditors do not need to have training and experience in a food related field to become a food safety auditors	16	1.75	1.1832
6.	An auditor, coming from a specific sector, e.g. agriculture, should only be allowed to audit organizations in the agricultural industry.	16	2.69	1.4477

	Statements	N	Mean	Std Dev
7.	Qualifications should not be the deciding factor on an auditor's competence.	16	2.88	1.2042
8.	Due to the fact that most audits are lengthy and repetitive, auditors may loose focus on the process.	16	3.44	1.2633
9.	Feedback from clients on the auditor's presentation and audit practices is required as a guide for improvement.	16	3.88	1.0247
10.	Client feedback is not essential when addressing performance appraisal of auditors.	16	2.88	1.2042
11.	There should be a link between performances of auditors and associated incentives paid.	16	3.19	1.3276
12.	When evaluating the ever changing food standards, food auditors should be given sufficient time to familiarize themselves with the requirements of the new standards, in order confidently audit against such new standards.	16	4.56	0.5124
13.	Ever changing standards in the food industry, contribute to the lack of competence of auditors.	16	2.50	1.2111
14.	All food auditors need to be registration scheme.	16	3.81	0.9811
15.	The South African registration scheme. SAATCA. should be transparent in their methods of evaluating third party auditors and make all findings known to certification bodies.	16	4.00	0.9661
16.	Organisations do not have an obligation to inform, educate or train their clients on new food safety standards and food regulations.	16	2.00	1.2111
17.	Most certification bodies are calibrated in terms of current food safety standards.	16	3.00	1.1547
18.	Certification managers should consult their auditors, before registering for a new standard.	16	3.56	1.0308
19.	Although most certification managers do not perform certification audits, they should be well informed about the latest changes in food safety standards.	16	4.31	1.0145
20.	Certification managers should encourage training in conflict management, as auditors find themselves dealing with different kinds of personalities and are	16	4.25	0.8564

Statements	N	Mean	Std Dev

often the object of conflict.

5.3.3 UNI-VARIATE GRAPHS

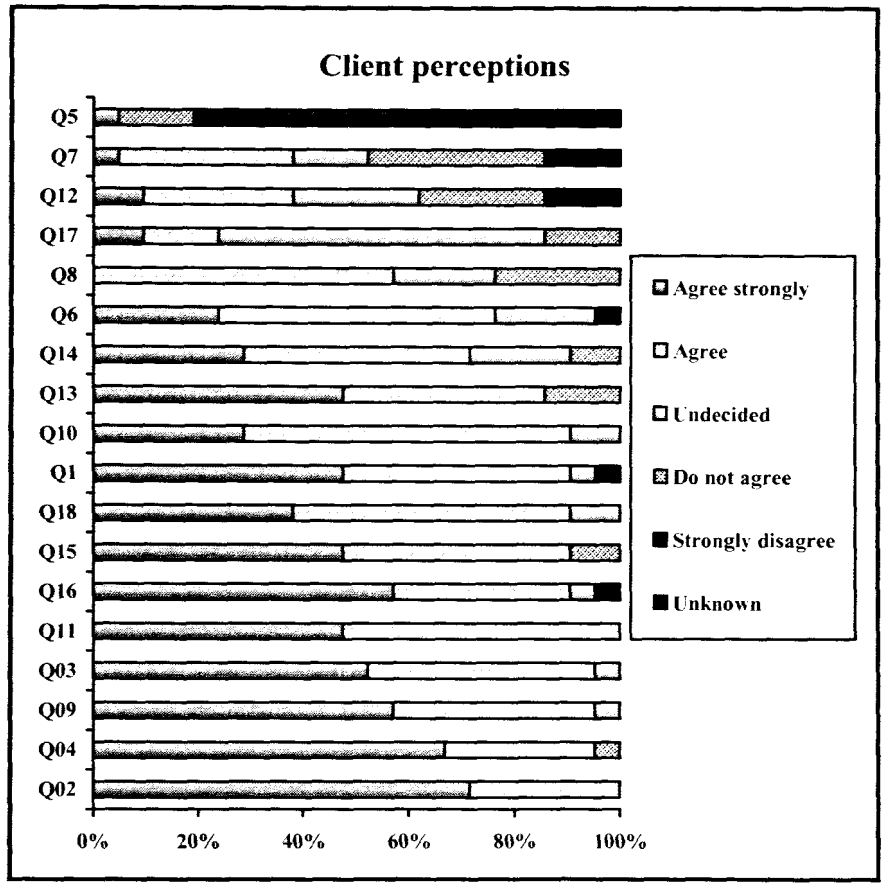

FIGURE 5. 1: 100% stack bar for Client perceptions

It is of importance to note should be taken that there is a high undecided factor for statement q17, "Most audit managers do not perform audits, instead they do marketing". This can be due to the fact that the clients do not have knowledge of what the audit managers are doing. The statements were mostly positive except for statements q05 and q17 which were stated negatively and thus a negative outcome would be positive.

However for statements q12 and q07 although also negatively put, the clients were equally split with respect to whether they agree or disagree.

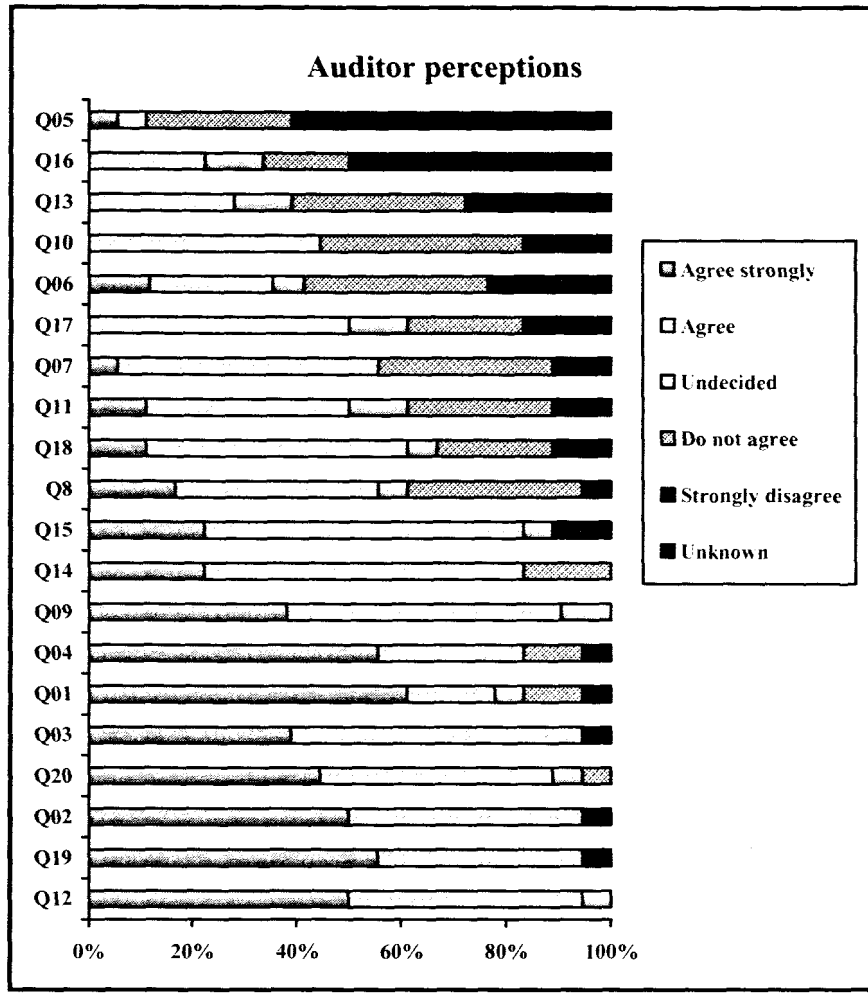

FIGURE 5. 2: 100% stack bar for auditor perceptions

The statements are sorted from the most positive response on the statements to the least positive response and then represented in Figure 5.2. Overall most of the respondents agreed to strongly agree with all of the statements. The statements where there were negative responses are those that were stated negatively and thus a negative response can then be seen as positive.

5.3.4 COMPARATIVE STATISTIC

The auditors and clients are compared with respect to their responses on the statements. An analysis of variance is performed on the responses in the statements to determine whether there are differences between the mean answer of the auditors and the clients. Because doubt existed whether the information is normally distributed, the Kruskal Wallis test for independent samples is also used to determine differences between auditor and client responses.

SAS computes a P-value (Probability value) that measure statistical significance for each of these tests. Results will be regarded as significant if the p-values are smaller than 0.05, because this value presents an acceptable level on a 95% confidence interval ($p \leq 0.05$). The p-value is the probability of observing a sample value as extreme as, or more extreme than, the value actually observed, given that the null hypothesis is true. This area represents the probability of a Type 1 error that must be assumed if the null hypothesis is rejected (Cooper & Schindler, 2006:509).

The p-value is compared to the significance level (α) and on this basis the null hypothesis is either rejected or not rejected. If the p value is less than the significance level, the null hypothesis is rejected (if p value $<\alpha$, reject null). If the p value is greater than or equal to the significance level, the null hypothesis is not rejected (if p value $\geq\alpha$, don't reject null). Thus with $\alpha=0.05$, if the p value is less than 0.05, the null hypothesis will be rejected. The p value is determined by using the standard normal distribution. The small p value represents the risk of rejecting the null hypothesis.

A difference has statistical significance if there is good reason to believe the difference does not represent random sampling fluctuations only. Results will be regarded as significant if the p-values are smaller than 0.05, because this value is used as cut-off point in most behavioural science research.

As a result of the Analysis of Variance there is a statistical significant difference between the means of the auditors and clients for statement Q06 (F=8.2933; P-value=0.0066). The Kruskal Wallis statistics also indicate a difference between the scores for Q06 (Chi-square=5.5467; P-value = 0.0185). The inferential statistics computer printouts contained within the ambit of in Annexure B.

The following graphs illustrate the differences between the auditor and client responses with respect to statement Q06 "An Auditor coming from a specific sector, e.g. agriculture, should only be allowed to audit organizations in the

agricultural industry".

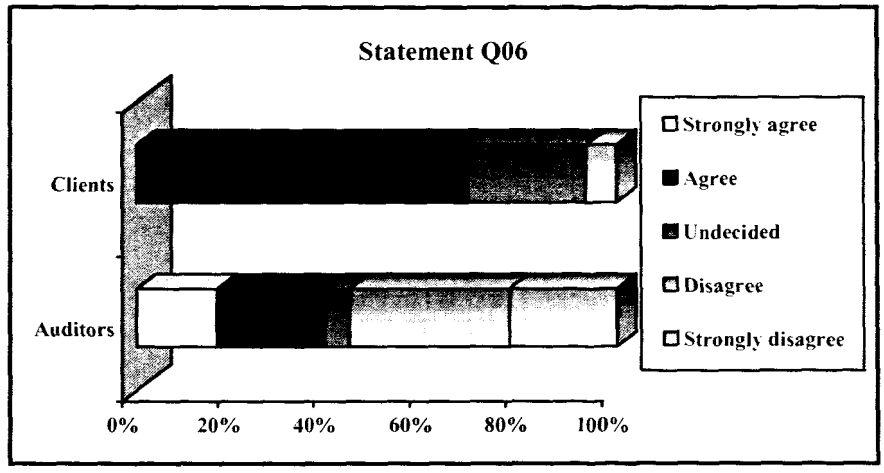

FIGURE 5. 3: 100% stack bar for Q06

CHAPTER 6: CONCLUSION

6.1 BACKGROUND

The overall concept of food safety in South Africa is clearly not defined, understood by only a few consumers, and not widely accepted. Research has shown that food retailers in South Africa in general do not believe food safety auditors are competent. There is a requirement to investigate the quality of work performed by South African food safety auditors, in order to establish whether they do in fact add value when conducting registration/certification audits. Different types of quality management and food safety standards are being used in the food sector, which means auditors need to be competent and confident in their application of these standards. This is also an indication of the importance of improving and maintaining a high standard of food safety in the food service industry.

In the research thus far, the scope of the research was provided in Chapter one and a holistic perspective of Food Safety in South Africa provided in Chapter two, under the following headings:

- Food Safety Legal Requirements.
- Food Safety Initiatives-around the globe.
- Consumer Confidence.
- Factors influencing food safety practices.
- Factors impacting the food industry.
- Standards.
- The registration process.

In Chapter 3, a literature review was conducted on the issues of Food Safety with specific focus levelled at the following:

- Food borne illnesses, food poisoning and food borne diseases.
- Food safety practices.
- Food safety in South Africa.
- Consumer confidence in food safety.

- Evolution of standards.
- The requirements of a HACCP system.
- What is an audit.
- The purpose of an audit.
- The registration/audit process.
- Audits as continuous improvement tool.
- Auditor competence.

In Chapter 4, the survey design and methodology was elaborated upon in detail to ultimately culminate in Chapter 5, where the survey data was analysed and interpreted. In this final chapter six, the research will be concluded and final analogies drawn.

6.2 THE RESEARCH PROBLEM REVISITED

The research problem which was researched within the ambit of this dissertation reads as follows: "The lack of value added by food auditors when conducting and performing food safety audits adversely impact on the confidence levels of food producers." In the opinion of the researcher research problem will be mitigated should the recommendations made in this chapter be implemented.

6.3 THE RESEARCH QUESTIONS REVISITED

The research question which forms the crux of this dissertation reads as follows: "How can food safety auditors increase value added to the audit process in the food industry, and as a result improve the standards within this industry?"
As in the instance of the research problem, should the recommendations made in Paragraph 6.7 be implemented, this researcher is of the opinion that a viable situation can be provided to the research questions.

6.4 THE INVESTIGATIVE QUESTIONS REVISITED

The investigative questions formulated in support of the research question, can be answered from the research findings and literature review conducted in this dissertation. The investigative questions read as follows:

- What are the primary reasons for the lack of competence in food safety/quality auditors.
- Is there a standard (structured model) to which auditors need to be measured.
- Are there processes of regular evaluation?
- What evaluation deems an auditor able/competent to conduct third party audits?

Details pertaining to the above, are elaborated upon below.

The primary reason for the lack of competence in food safety/quality auditors was highlighted in Chapter 3, Paragraph 3.13. In particular, 'independence', 'objectivity' and 'consistency' was highlighted (Karapetrovic and Willborn, 2002:679). 'Independence' according to Alleyne *et al* (2006:623) citing Firth, (1980), is an important attribute of an auditor, as it is regarded as a fundamental principle of the auditor's work. Furthermore, the authors are of the opinion that, when definite independence is lacking, the audit itself has little value (refer to Paragraph 3.13).

While there is a structured model for quality (SANS, 2002), refer to Chapter 3, Paragraph 3.1, there is not a standard (structured model) whereby food safety auditors can be measured. This standard provides guidelines for auditing quality and/or environmental management systems. It is believed that the ISO 19011 clearly outlines the process to determine the competence of an auditor needed in a specific audit situation (SANS, 2002).

As with all quality professionals, or any professional for that matter, quality auditors have no choice but to adapt to new conditions and demands with higher qualifications and competence (Karapetrovic & Willborn, 2002:25). Furthermore, the new ISO 19011 standard for auditing of quality and environmental management, stipulate all requirements. The question whether effectiveness and

efficiency of the quality audit can be improved, by imposing a standard and then expanding it into environmental management, still remains. The performance of auditors, according to Karapetrovic and Willborn (2002:25), has come under considerable criticism with regards to the actual value - added for clients and business in general.

The ISO 19011:2002 standard (SANS, 2002), provides guidance on the management of audit programmes, the conduct of internal and/or external audits of quality and environmental management systems, as well as the competence and evaluation of auditors. The standard also states that it is intended to be applied to a broad range of users, but does not explicitly mention food certification auditors or audits.

6.5 KEY RESEARCH OBJECTIVES REVISITED

The key research objectives of this dissertation the following:

- To determine whether a food safety audit standard is needed within the South African food industry. Although this research focuses primarily on the issues pertaining to the food industry in South Africa, the literature provides sufficient evidence that a food safety audit standard is needed globally. This is highlighted in Chapter 3, Paragraph 3.4. The FSI recognized that food safety is non-competitive and is working to optimize food safety auditing of all players so as to avoid costly duplication, and to endorse food safety auditor training and certification. As part of the FSI's launch in Cape Town in February 2006, John Marais of Safe Quality Products, SA, cited by Starke (2006:27-28), gave a presentation on behalf of the SAFSIS (South Africa Food Safety Inspection Service) on: 'The Review of Food Safety Auditing in South Africa'. Marais noted the confusion and uncertainty around some supplier audits for food retailers, and argued for a harmonized food audit standard with local and international acceptance by all role players.

- To change the negative perception that food manufacturers have of food auditors. This researcher is of the opinion that this objective is addressed in

Paragraph 3.3 of Chapter 3. Many food companies in South Africa implemented ISO 9001 before adopting HACCP systems, the opinion being that is was 'easier' (Jackson, 2006:18). This perception is linked to the investment required to ensure that food handling facilities are suitably constructed to ensure safe food. This may be stating the obvious, but the lack of effective Good Hygiene Practices (GHP) and Good Manufacturing Practices (GMP) has often been overlooked in the ISO 9001 audits of food companies. This has resulted in the foundation of many of the subsequent HACCP systems being weak, which is further exacerbated by having the same ISO 9001 quality auditors now performing the HACCP audits. Since these auditors are well trained in the 'paperwork' aspects of a food safety management system, which is similar to ISO 9001 quality management system, the pre requisite programmes, managing good hygiene and good manufacturing practices, are often neglected and glossed over (Jackson, 2006:18).

- To assess the value added, if any, by food auditors. This is discussed in chapter 3, Paragraph 3.13.1. According to ISO and the International Accreditation Forum (IAF, 2004:**O**nline), the importance of 'adding value' during a QMS audit, is a controversial topic. Karapetrovic and Willborn (2002:25), are of the opinion that during an audit, both the auditor and the auditee must cooperate in order for them to reach a correct and reliable conclusion. Furthermore, the authors believe the auditee should be more familiar with the actual process being audited, while the auditor on the other hand, should be more knowledgeable about the audit criteria. Based on this, each party contributes to the value – added component of an audit.

6.6 ANALOGIES DRAWN FROM CLIENT AND AUDITOR RESPONSES

The following analogies can be drawn from this analysis of the client responses:

- Food auditors need to have training and experience in a food related field to become a safety auditor.
- Food safety auditors need to be evaluated regularly on their knowledge of

changing standards.

- Food safety auditors need to go through an induction programme before they are deemed competent to perform certified audit.
- Feedback from clients on the auditor's findings and required procedures are imperative and essential for sustained business improvement.
- All auditors should be measured to a unified standard.
- When evaluating the ever changing food standards, food auditors should be given sufficient time to familiarize themselves with the requirements of the new standards in order to conduct a quality audit.
- The Food Safety Representative of a food business operation has the right to report any unprofessional behaviour from auditors to a controlling body.
- The food industry must be assured that all auditors are well informed and competent when it comes to the latest technologies and developments within the food industry.
- Auditors should have special training in conflict management.
- Food auditors need to go for regular evaluations to determine their competence.
- All food auditors as a prerequisite, need to be registered members of a formal registration scheme or ruling body.
- SAATCA should be transparent in their methods of evaluating third party auditors.
- An auditor form a specific sector, should only audit those sectors.
- Auditors loose focus during the audit process.

The following analogies can be drawn from this analysis of the auditor responses:

- When evaluating the ever changing food standards, food auditors should be given sufficient time to familiarize themselves with the requirements of the new standards in order to confidently audit against such new standards.
- Certified managers should be well informed about the latest changes in food safety standards.
- Food safety auditors need to be evaluated regularly on their knowledge of changing standards.
- Certification managers should encourage training in conflict management.
- Food auditors need to have training and experience in a food related field to

become a safety auditor.

- All Auditors should be measured to a unified standard.
- All food auditors need to go for regular evaluations to determine their competence.
- Food safety auditors need to go through an induction programme before they are deemed competent to perform certification audits.

Feedback from clients on the auditor's presentation and audit practices is required as a guide for improvement.

- All food auditors need to be a member of a formal registration scheme; SAATCA should be transparent in their methods of evaluating third party auditors and make all findings known to certification bodies;
- Due to lengthiness and repetitiveness of audits, auditors may loose focus;
- Certification managers should consult their auditors, before registering for a new standard;
- There should be a link between performance of auditors and associated incentives paid;
- Organisations do have an obligation to inform, educate or train there clients on new food safety standard and food regulations; and
- Qualifications should not be the deciding factor on an auditor's competence.

From a holistic perspective, it seems that the auditors and the clients agree in the outcome of their responses in all the statements that were the same, except for the statement that if an auditor comes from a specific sector, they should only be allowed to audit organizations in that sector. There is evidence that the auditors disagree more with this statement than the clients.

6.7 RECOMMENDATIONS

To mitigate the research problem and to provide a solution to the research questions the following:

- The food industry should come to a common definition for competence of food safety auditors.
- One, agreed upon, a national body should assess auditors from the food sector, in terms of qualifications and associated experience.

- A national food safety auditor certification/registration scheme should be established and food safety auditors should go for regular evaluations to keep their certification as a food safety auditor.
- The certification/registration scheme should hold a data base of all certified auditors and proof of their evaluation results, last date of evaluation and contact details to regulate the industry and ensure that value-add is established.
- Food safety auditors should in terms of competence be classified according to levels of competence and knowledge of food safety risks.
- Food auditor competence and national food standards should be benchmarked against a global standard.
- Move away from focusing on the competence of an organisation as a certification body, but focus on the individual in his or her auditing capacity.
- New established standards and or audit processes applicable abroad should be evaluated in terms of South African conditions, and where appropriate, incorporated.

6.8 CONCLUSION

In South Africa it is of major concern, that auditors are seemingly aligned with businesses or food sectors, of which they have no technical knowledge or competence, in the understanding of potential hazards or risks associated with that particular sector, yet audit such business and food sectors. The aim of the study is to eliminate these occurrences through empowerment of food sector auditors with specialist qualifications to enable South Africa to be on an equal footing with standards abroad.

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Descriptive statistics for each variable

CLIENTS

Q01	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	4.76	1	4.76
Undecided	1	4.76	2	9.52
Agree	9	42.86	11	52.38
Strongly agree	10	47.62	21	100.00

Chi-Square Test for Equal Proportions

Chi-Square	13.8571
DF	3
Pr > ChiSq	0.0031

Sample Size = 21

Q02	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Agree	6	28.57	6	28.57
Strongly agree	15	71.43	21	100.00

Chi-Square Test for Equal Proportions

Chi-Square	3.8571
DF	1
Pr > ChiSq	0.0495

Sample Size = 21

Q03	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Undecided	1	4.76	1	4.76
Agree	9	42.86	10	47.62
Strongly agree	11	52.38	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 8.0000

DF 2

Pr > ChiSq 0.0183

Sample Size = 21

Q04	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	1	4.76	1	4.76
Agree	6	28.57	7	33.33
Strongly agree	14	66.67	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 12.2857

DF 2

Pr > ChiSq 0.0021

Sample Size = 21

Q05	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	17	80.95	17	80.95
Disagree	3	14.29	20	95.24
Strongly agree	1	4.76	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 21.7143

DF 2

Pr > ChiSq <.0001

Sample Size = 21

Q06	Frequency	Percent	Cumulative Frequency	Cumulative Percent

Strongly disagree	1	4.76	1	4.76
Undecided	4	19.05	5	23.81
Agree	11	52.38	16	76.19
Strongly agree	5	23.81	21	100.00

Chi-Square Test

for Equal Proportions

Chi-Square	10.0476
DF	3
Pr > ChiSq	0.0182

Sample Size = 21

Q07	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	3	14.29	3	14.29
Disagree	7	33.33	10	47.62
Undecided	3	14.29	13	61.90
Agree	7	33.33	20	95.24
Strongly agree	1	4.76	21	100.00

Chi-Square Test

for Equal Proportions

Chi-Square	6.8571
DF	4
Pr > ChiSq	0.1436

WARNING: The table cells have expected counts less

than 5. Chi-Square may not be a valid test.

Sample Size = 21

Q08	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	5	23.81	5	23.81
Undecided	4	19.05	9	42.86
Agree	12	57.14	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 5.4286

DF 2

Pr > ChiSq 0.0663

Sample Size = 21

Q09	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Undecided	1	4.76	1	4.76
Agree	8	38.10	9	42.86
Strongly agree	12	57.14	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 8.8571

DF 2

Pr > ChiSq 0.0119

Sample Size = 21

Q10	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Undecided	2	9.52	2	9.52
Agree	13	61.90	15	71.43
Strongly agree	6	28.57	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 8.8571

DF 2

Pr > ChiSq 0.0119

Sample Size = 21

Q11	Frequency	Percent	Cumulative Frequency	Cumulative Percent

Agree	11	52.38	11	52.38
Strongly agree	10	47.62	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 0.0476

DF 1

Pr > ChiSq 0.8273

Sample Size = 21

Q12	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	3	14.29	3	14.29
Disagree	5	23.81	8	38.10
Undecided	5	23.81	13	61.90
Agree	6	28.57	19	90.48
Strongly agree	2	9.52	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 2.5714

DF 4

Pr > ChiSq 0.6319

WARNING: The table cells have expected counts less

than 5. Chi-Square may not be a valid test.

Sample Size = 21

Q13	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	3	14.29	3	14.29
Agree	8	38.10	11	52.38
Strongly agree	10	47.62	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 3.7143

DF 2

Pr > ChiSq 0.1561

Sample Size = 21

Q14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	2	9.52	2	9.52
Undecided	4	19.05	6	28.57
Agree	9	42.86	15	71.43
Strongly agree	6	28.57	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 5.0952

DF 3

Pr > ChiSq 0.1650

Sample Size = 21

Q15	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	2	9.52	2	9.52
Agree	9	42.86	11	52.38
Strongly agree	10	47.62	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 5.4286

DF 2

Pr > ChiSq 0.0663

Sample Size = 21

Q16	Frequency	Percent	Cumulative Frequency	Cumulative Percent

Strongly disagree	1	4.76	1	4.76
Undecided	1	4.76	2	9.52
Agree	7	33.33	9	42.86
Strongly agree	12	57.14	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 16.1429

DF 3

Pr > ChiSq 0.0011

Sample Size = 21

Q17	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	3	14.29	3	14.29
Undecided	13	61.90	16	76.19
Agree	3	14.29	19	90.48
Strongly agree	2	9.52	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 15.3810

DF 3

Pr > ChiSq 0.0015

Sample Size = 21

Q18	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Undecided	2	9.52	2	9.52
Agree	11	52.38	13	61.90
Strongly agree	8	38.10	21	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 6.0000

DF	2
Pr > ChiSq	0.0498

Sample Size = 21

Auditors

Q01	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	5.56	1	5.56
Disagree	2	11.11	3	16.67
Undecided	1	5.56	4	22.22
Agree	3	16.67	7	38.89
Strongly agree	11	61.11	18	100.00

Chi-Square Test

for Equal Proportions

Chi-Square	19.7778
DF	4
Pr > ChiSq	0.0006

WARNING: The table cells have expected counts less

than 5. Chi-Square may not be a valid test.

Sample Size = 18

Q02	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	5.56	1	5.56
Agree	8	44.44	9	50.00
Strongly agree	9	50.00	18	100.00

Chi-Square Test

for Equal Proportions

Chi-Square	6.3333
DF	2
Pr > ChiSq	0.0421

Sample Size = 18

Q03	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	5.56	1	5.56
Agree	10	55.56	11	61.11

Strongly agree	7	38.89	18	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 7.0000

DF 2

Pr > ChiSq 0.0302

Sample Size = 18

Q04	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	5.56	1	5.56
Disagree	2	11.11	3	16.67
Agree	5	27.78	8	44.44
Strongly agree	10	55.56	18	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 10.8889

DF 3

Pr > ChiSq 0.0123

WARNING: The table cells have expected counts less

than 5. Chi-Square may not be a valid test.

Sample Size = 18

Q05	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	11	61.11	11	61.11
Disagree	5	27.78	16	88.89
Agree	1	5.56	17	94.44
Strongly agree	1	5.56	18	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 14.8889

DF 3

Pr > ChiSq 0.0019

WARNING: The table cells have expected counts less

than 5. Chi-Square may not be a valid test.

Sample Size = 18

Q06	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	4	22.22	4	22.22
Disagree	6	33.33	10	55.56
Undecided	1	5.56	11	61.11
Agree	4	22.22	15	83.33
Strongly agree	3	16.67	18	100.00

Chi-Square Test

for Equal Proportions

Chi-Square 3.6667

DF 4

Pr > ChiSq 0.4530

WARNING: The table cells have expected counts less

than 5. Chi-Square may not be a valid test.

Sample Size = 18

Q07	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	2	11.11	2	11.11
Disagree	6	33.33	8	44.44
Agree	9	50.00	17	94.44
Strongly agree	1	5.56	18	100.00

Chi-Square Test

for Equal Proportions

Chi-Square 9.1111

DF 3

Pr > ChiSq 0.0278

WARNING: The table cells have expected counts less

than 5. Chi-Square may not be a valid test.

Sample Size = 18

Q08	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	5.56	1	5.56
Disagree	6	33.33	7	38.89
Undecided	1	5.56	8	44.44
Agree	7	38.89	15	83.33
Strongly agree	3	16.67	18	100.00

Chi-Square Test

for Equal Proportions

Chi-Square	8.6667
DF	4
Pr > ChiSq	0.0700

WARNING: The table cells have expected counts less

than 5. Chi-Square may not be a valid test.

Sample Size = 18

Q09	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	3	16.67	3	16.67
Agree	10	55.56	13	72.22
Strongly agree	5	27.78	18	100.00

Chi-Square Test

for Equal Proportions

Chi-Square	4.3333
DF	2
Pr > ChiSq	0.1146

Sample Size = 18

Q10	Frequency	Percent	Cumulative Frequency	Cumulative Percent

Strongly disagree	3	16.67	3	16.67
Disagree	7	38.89	10	55.56
Agree	8	44.44	18	100.00

Chi-Square Test

for Equal Proportions

Chi-Square	2.3333
DF	2
Pr > ChiSq	0.3114

Sample Size = 18

Q11	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	2	11.11	2	11.11
Disagree	5	27.78	7	38.89
Undecided	2	11.11	9	50.00
Agree	7	38.89	16	88.89
Strongly agree	2	11.11	18	100.00

Chi-Square Test

for Equal Proportions

Chi-Square	5.8889
DF	4
Pr > ChiSq	0.2076

WARNING: The table cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 18

Q12	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Undecided	1	5.56	1	5.56
Agree	8	44.44	9	50.00
Strongly agree	9	50.00	18	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 6.3333

DF 2

Pr > ChiSq 0.0421

Sample Size = 18

Q13	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	5	27.78	5	27.78
Disagree	6	33.33	11	61.11
Undecided	2	11.11	13	72.22
Agree	5	27.78	18	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 2.0000

DF 3

Pr > ChiSq 0.5724

WARNING: The table cells have expected counts less

than 5. Chi-Square may not be a valid test.

Sample Size = 18

Q14	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	3	16.67	3	16.67
Agree	11	61.11	14	77.78
Strongly agree	4	22.22	18	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 6.3333

DF 2

Pr > ChiSq 0.0421

Sample Size = 18

Q15	Frequency	Percent	Cumulative Frequency	Cumulative Percent

0	1	5.56	1	5.56
Strongly disagree	1	5.56	2	11.11
Undecided	1	5.56	3	16.67
Agree	11	61.11	14	77.78
Strongly agree	4	22.22	18	100.00

Chi-Square Test

for Equal Proportions

Chi-Square	20.8889
DF	4
Pr > ChiSq	0.0003

WARNING: The table cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 18

Q16	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	5.56	1	5.56
Strongly disagree	8	44.44	9	50.00
Disagree	3	16.67	12	66.67
Undecided	2	11.11	14	77.78
Agree	4	22.22	18	100.00

Chi-Square Test

for Equal Proportions

Chi-Square	8.1111
DF	4
Pr > ChiSq	0.0876

WARNING: The table cells have expected counts less than 5. Chi-Square may not be a valid test.

Sample Size = 18

Q17	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	1	5.56	1	5.56

Strongly disagree	2	11.11	3	16.67
Disagree	4	22.22	7	38.89
Undecided	2	11.11	9	50.00
Agree	9	50.00	18	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 11.4444

DF 4

Pr > ChiSq 0.0220

WARNING: The table cells have expected counts less

than 5. Chi-Square may not be a valid test.

Sample Size = 18

Q18	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	2	11.11	2	11.11
Disagree	4	22.22	6	33.33
Undecided	1	5.56	7	38.89
Agree	9	50.00	16	88.89
Strongly agree	2	11.11	18	100.00

Chi-Square Test

for Equal Proportions

ffffffffffffffffffff

Chi-Square 11.4444

DF 4

Pr > ChiSq 0.0220

WARNING: The table cells have expected counts less

than 5. Chi-Square may not be a valid test.

Sample Size = 18

Q19	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Strongly disagree	1	5.56	1	5.56

Agree	7	38.89	8	44.44
Strongly agree	10	55.56	18	100.00

Chi-Square Test

for Equal Proportions

fffffffffffffffffff

Chi-Square	7.0000
DF	2
Pr > ChiSq	0.0302

Sample Size = 18

Q20	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Disagree	1	5.56	1	5.56
Undecided	1	5.56	2	11.11
Agree	8	44.44	10	55.56
Strongly agree	8	44.44	18	100.00

Chi-Square Test

for Equal Proportions

fffffffffffffffffff

Chi-Square	10.8889
DF	3
Pr > ChiSq	0.0123

WARNING: The table cells have expected counts less

than 5. Chi-Square may not be a valid test.

Sample Size = 18

Client

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
Q01	21	4.23810	1.13599	89.00000	0	5.00000	Q01
Q02	21	4.71429	0.46291	99.00000	4.00000	5.00000	Q02
Q03	21	4.47619	0.60159	94.00000	3.00000	5.00000	Q03
Q04	21	4.57143	0.74642	96.00000	2.00000	5.00000	Q04
Q05	21	1.33333	0.91287	28.00000	1.00000	5.00000	Q05
Q06	21	3.90476	0.94365	82.00000	1.00000	5.00000	Q06
Q07	21	2.80952	1.20909	59.00000	1.00000	5.00000	Q07
Q08	21	3.33333	0.85635	70.00000	2.00000	4.00000	Q08
Q09	21	4.52381	0.60159	95.00000	3.00000	5.00000	Q09
Q10	21	4.19048	0.60159	88.00000	3.00000	5.00000	Q10
Q11	21	4.47619	0.51177	94.00000	4.00000	5.00000	Q11
Q12	21	2.95238	1.24403	62.00000	1.00000	5.00000	Q12
Q13	21	4.19048	1.03049	88.00000	2.00000	5.00000	Q13
Q14	21	3.90476	0.94365	82.00000	2.00000	5.00000	Q14
Q15	21	4.28571	0.90238	90.00000	2.00000	5.00000	Q15
Q16	21	4.38095	0.97346	92.00000	1.00000	5.00000	Q16
Q17	21	3.19048	0.81358	67.00000	2.00000	5.00000	Q17
Q18	21	4.28571	0.64365	90.00000	3.00000	5.00000	Q18

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.467958
Standardized	0.620002

Cronbach Coefficient Alpha with Deleted Variable

	Raw Variables		Standardized Variables		
Deleted Variable	Correlation with Total	Alpha	Correlation with Total	Alpha	Label
Q01	0.040417	0.484793	0.053709	0.629739	Q01
Q02	0.561206	0.408280	0.604499	0.550138	Q02
Q03	0.506647	0.399268	0.446866	0.574268	Q03
Q04	0.193407	0.445138	0.263876	0.600903	Q04
Q05	-.247264	0.537195	-.295571	0.673734	Q05

Q06	-.192136	0.528663	-.200563	0.662236	Q06
Q07	-.061018	0.516443	0.047557	0.630556	Q07
Q08	0.134930	0.455995	0.144715	0.617478	Q08
Q09	0.511219	0.398527	0.573510	0.554971	Q09
Q10	0.366580	0.421605	0.394139	0.582092	Q10
Q11	0.685055	0.384744	0.735178	0.529276	Q11
Q12	0.239379	0.426998	0.239959	0.604278	Q12
Q13	0.099463	0.466139	0.133560	0.618999	Q13
Q14	0.236549	0.431956	0.167748	0.614321	Q14
Q15	0.315635	0.414142	0.418146	0.578545	Q15
Q16	0.020754	0.483683	0.117844	0.621134	Q16
Q17	-.065821	0.495210	-.019847	0.639403	Q17
Q18	0.367883	0.418427	0.415582	0.578925	Q18

Auditor

Simple Statistics

Variable	N	Mean	Std Dev	Sum	Minimum	Maximum	Label
Q01	18	4.11111	1.45072	74.00000	0	5.00000	Q01
Q02	18	4.27778	1.17851	77.00000	0	5.00000	Q02
Q03	18	4.16667	1.15045	75.00000	0	5.00000	Q03
Q04	18	4.11111	1.40958	74.00000	0	5.00000	Q04
Q05	18	1.66667	1.13759	30.00000	1.00000	5.00000	Q05
Q06	18	2.77778	1.47750	50.00000	1.00000	5.00000	Q06
Q07	18	3.05556	1.25895	55.00000	1.00000	5.00000	Q07
Q08	18	3.27778	1.27443	59.00000	1.00000	5.00000	Q08
Q09	18	3.94444	0.99836	71.00000	2.00000	5.00000	Q09
Q10	18	2.72222	1.22741	49.00000	1.00000	4.00000	Q10
Q11	18	3.11111	1.27827	56.00000	1.00000	5.00000	Q11
Q12	18	4.44444	0.61570	80.00000	3.00000	5.00000	Q12
Q13	18	2.38889	1.19503	43.00000	1.00000	4.00000	Q13
Q14	18	3.88889	0.96338	70.00000	2.00000	5.00000	Q14
Q15	18	3.77778	1.30859	68.00000	0	5.00000	Q15
Q16	18	2.00000	1.32842	36.00000	0	4.00000	Q16
Q17	18	2.88889	1.32349	52.00000	0	4.00000	Q17
Q18	18	3.16667	1.50489	57.00000	0	5.00000	Q18
Q19	18	4.38889	0.97853	79.00000	1.00000	5.00000	Q19
Q20	18	4.27778	0.82644	77.00000	2.00000	5.00000	Q20

Cronbach Coefficient Alpha

Variables	Alpha
Raw	0.576436
Standardized	0.580994

Cronbach Coefficient Alpha with Deleted Variable

	Raw Variables		Standardized Variables		
Deleted Variable	Correlation with Total	Alpha	Correlation with Total	Alpha	Label
Q01	0.542911	0.496991	0.533996	0.515406	Q01

Q02	0.662464	0.490424	0.646553	0.496757	Q02
Q03	0.701719	0.485990	0.663852	0.493837	Q03
Q04	0.558119	0.495864	0.527623	0.516443	Q04
Q05	0.245602	0.556025	0.224069	0.563705	Q05
Q06	0.201322	0.562467	0.256724	0.558821	Q06
Q07	-.393057	0.646448	-.395776	0.647830	Q07
Q08	0.266801	0.551619	0.276872	0.555784	Q08
Q09	0.033227	0.583115	0.075127	0.585386	Q09
Q10	0.144979	0.570558	0.116337	0.579483	Q10
Q11	0.030936	0.588283	0.037768	0.590674	Q11
Q12	0.353553	0.555077	0.292523	0.553413	Q12
Q13	0.200786	0.562212	0.171198	0.571512	Q13
Q14	0.187824	0.564722	0.198987	0.567424	Q14
Q15	0.196146	0.562893	0.200089	0.567261	Q15
Q16	-.491737	0.663853	-.513449	0.662067	Q16
Q17	-.135775	0.614355	-.127067	0.613303	Q17
Q18	0.640556	0.473544	0.646791	0.496717	Q18
Q19	0.027173	0.583531	0.075428	0.585343	Q19
Q20	0.191290	0.565232	0.225027	0.563562	Q20

8

Comparison statistics between auditor and client questionnaires

The NPAR1WAY Procedure

Analysis of Variance for Variable nq01

Classified by Variable gr

gr	N	Mean
1	20	4.450000
2	17	4.352941

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.086566	0.086566	0.1220	0.7290
Within	35	24.832353	0.709496		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq01

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	20	368.0	380.0	29.040719	18.400000
2	17	335.0	323.0	29.040719	19.705882

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	335.0000
Normal Approximation	
Z	0.3960
One-Sided Pr > Z	0.3461
Two-Sided Pr > |Z|	0.6921
t Approximation	
One-Sided Pr > Z	0.3472
Two-Sided Pr > |Z|	0.6944

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.1707

DF	1
Pr > Chi-Square	0.6795

Analysis of Variance for Variable nq02

Classified by Variable gr

gr	N	Mean
1	21	4.714286
2	17	4.529412

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.321097	0.321097	1.3566	0.2518
Within	36	8.521008	0.236695		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq02

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	21	442.50	409.50	28.469044	21.071429
2	17	298.50	331.50	28.469044	17.558824

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	298.5000
Normal Approximation	
Z	-1.1416
One-Sided Pr < Z	0.1268
Two-Sided Pr > |Z|	0.2536
t Approximation	
One-Sided Pr < Z	0.1305
Two-Sided Pr > |Z|	0.2610

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	1.3436
DF	1
Pr > Chi-Square	0.2464

Analysis of Variance for Variable nq03

Classified by Variable gr

gr	N	Mean
1	21	4.476190
2	17	4.411765

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.038995	0.038995	0.1236	0.7272
Within	36	11.355742	0.315437		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq03

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	21	424.50	409.50	29.874738	20.214286
2	17	316.50	331.50	29.874738	18.617647

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	316.5000
Normal Approximation	
Z	-0.4854
One-Sided Pr < Z	0.3137
Two-Sided Pr > |Z|	0.6274
t Approximation	
One-Sided Pr < Z	0.3151
Two-Sided Pr > |Z|	0.6303

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.2521

DF	1
Pr > Chi-Square	0.6156

Analysis of Variance for Variable nq04

Classified by Variable gr

gr	N	Mean
1	21	4.571429
2	17	4.352941

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.448474	0.448474	0.5974	0.4446
Within	36	27.025210	0.750700		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq04

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	21	427.0	409.50	28.979532	20.333333
2	17	314.0	331.50	28.979532	18.470588

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	314.0000
Normal Approximation	
Z	-0.5866
One-Sided Pr < Z	0.2787
Two-Sided Pr > |Z|	0.5575
t Approximation	
One-Sided Pr < Z	0.2805
Two-Sided Pr > |Z|	0.5610

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.3647

DF	1
Pr > Chi-Square	0.5459

43

Analysis of Variance for Variable nq05

Classified by Variable gr

gr	N	Mean
1	21	1.333333
2	18	1.666667

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	1.076923	1.076923	1.0305	0.3166
Within	37	38.666667	1.045045		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq05

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	21	382.50	420.0	27.985067	18.214286
2	18	397.50	360.0	27.985067	22.083333

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	397.5000
Normal Approximation	
Z	1.3221
One-Sided Pr > Z	0.0931
Two-Sided Pr > |Z|	0.1861
t Approximation	
One-Sided Pr > Z	0.0970
Two-Sided Pr > |Z|	0.1940

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	1.7956
DF	1
Pr > Chi-Square	0.1802

Analysis of Variance for Variable nq06

Classified by Variable gr

gr	N	Mean
1	21	3.904762
2	18	2.777778

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	12.310134	12.310134	8.2933	0.0066
Within	37	54.920635	1.484341		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq06

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	21	500.50	420.0	34.180487	23.833333
2	18	279.50	360.0	34.180487	15.527778

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	279.5000
Normal Approximation	
Z	-2.3405
One-Sided Pr < Z	0.0096
Two-Sided Pr > |Z|	0.0193
t Approximation	
One-Sided Pr < Z	0.0123
Two-Sided Pr > |Z|	0.0246

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	5.5467
DF	1
Pr > Chi-Square	0.0185

47

Analysis of Variance for Variable nq07

Classified by Variable gr

gr	N	Mean
1	21	2.809524
2	18	3.055556

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.586691	0.586691	0.3864	0.5380
Within	37	56.182540	1.518447		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq07

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	21	398.0	420.0	33.521188	18.952381
2	18	382.0	360.0	33.521188	21.222222

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	382.0000
Normal Approximation	
Z	0.6414
One-Sided Pr > Z	0.2606
Two-Sided Pr > |Z|	0.5213
t Approximation	
One-Sided Pr > Z	0.2626
Two-Sided Pr > |Z|	0.5251

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.4307
DF	1
Pr > Chi-Square	0.5116

Analysis of Variance for Variable nq08

Classified by Variable gr

gr	N	Mean
1	21	3.333333
2	18	3.277778

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.029915	0.029915	0.0262	0.8723
Within	37	42.277778	1.142643		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq08

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	21	419.0	420.0	32.916530	19.952381
2	18	361.0	360.0	32.916530	20.055556

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	361.0000
Normal Approximation	
Z	0.0152
One-Sided Pr > Z	0.4939
Two-Sided Pr > |Z|	0.9879
t Approximation	
One-Sided Pr > Z	0.4940
Two-Sided Pr > |Z|	0.9880

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0009
DF	1
Pr > Chi-Square	0.9758

(Statement 11 for clients and statement 12 for auditors)

Analysis of Variance for Variable nq11

Classified by Variable gr

gr	N	Mean
1	21	4.476190
2	18	4.444444

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.009768	0.009768	0.0309	0.8613
Within	37	11.682540	0.315744		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq11

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	21	421.0	420.0	31.132471	20.047619
2	18	359.0	360.0	31.132471	19.944444

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	359.0000
Normal Approximation	
Z	-0.0161
One-Sided Pr < Z	0.4936
Two-Sided Pr > |Z|	0.9872
t Approximation	
One-Sided Pr < Z	0.4936
Two-Sided Pr > |Z|	0.9873

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0010
DF	1
Pr > Chi-Square	0.9744

(Statement 12 for clients and statement 13 for auditors)

Analysis of Variance for Variable nq12

Classified by Variable gr

gr	N	Mean
1	21	2.952381
2	18	2.388889

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	3.077534	3.077534	2.0617	0.1594
Within	37	55.230159	1.492707		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq12

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	21	467.50	420.0	34.436969	22.261905
2	18	312.50	360.0	34.436969	17.361111

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	312.5000
Normal Approximation	
Z	-1.3648
One-Sided Pr < Z	0.0862
Two-Sided Pr > |Z|	0.1723
t Approximation	
One-Sided Pr < Z	0.0902
Two-Sided Pr > |Z|	0.1803

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	1.9026
DF	1
Pr > Chi-Square	0.1678

(Statement 13 for clients and statement 14 for auditors)

Analysis of Variance for Variable nq13

Classified by Variable gr

gr	N	Mean
1	21	4.190476
2	18	3.888889

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.881563	0.881563	0.8812	0.3540
Within	37	37.015873	1.000429		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq13

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	21	463.50	420.0	32.436484	22.071429
2	18	316.50	360.0	32.436484	17.583333

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	316.5000
Normal Approximation	
Z	-1.3257
One-Sided Pr < Z	0.0925
Two-Sided Pr > |Z|	0.1849
t Approximation	
One-Sided Pr < Z	0.0964

Two-Sided Pr > |Z|	0.1929

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	1.7985
DF	1
Pr > Chi-Square	0.1799

(Statement 14 for clients and statement 15 for auditors)

Analysis of Variance for Variable nq14

Classified by Variable gr

gr	N	Mean
1	21	3.904762
2	17	4.000000

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.085213	0.085213	0.0964	0.7579
Within	36	31.809524	0.883598		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq14

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	21	396.50	409.50	31.109241	18.880952
2	17	344.50	331.50	31.109241	20.264706

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	344.5000
Normal Approximation	
Z	0.4018
One-Sided Pr > Z	0.3439
Two-Sided Pr > |Z|	0.6878
t Approximation	

One-Sided Pr > Z	0.3451
Two-Sided Pr > |Z|	0.6901

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.1746
DF	1
Pr > Chi-Square	0.6760

(Statement 18 for clients and statement 20 for auditors)

Analysis of Variance for Variable nq18

Classified by Variable gr

gr	N	Mean
1	21	4.285714
2	18	4.277778

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Among	1	0.000611	0.000611	0.0011	0.9733
Within	37	19.896825	0.537752		

Average scores were used for ties.

Wilcoxon Scores (Rank Sums) for Variable nq18

Classified by Variable gr

gr	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1	21	412.0	420.0	32.052841	19.619048
2	18	368.0	360.0	32.052841	20.444444

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	368.0000
Normal Approximation	
Z	0.2340
One-Sided Pr > Z	0.4075

Two-Sided Pr > |Z|	0.8150

t Approximation

One-Sided Pr > Z	0.4081
Two-Sided Pr > |Z|	0.8162

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0623
DF	1
Pr > Chi-Square	0.8029