Sudan University of Science and Technology

College of Graduate Studies

Impact of Implementing ISO 22000 in Sudanese Food Industries by Internal Customers Perceptions .A Case Study: Coca Cola Company

اثر تطبيق الايزو 22000 في الصناعات الغذائيه السودانية من خلال انطباعات العملاء. دراسة حاله شركة الكوكا كولا

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Dedication

A special feeling of gratitude to the spirit of my father; to my mother I also dedicates this dissertation work to many friends and church family who have supported me throughout the process. I will always appreciate all they have done, to my supervisor Awadya Alkhatyb, to all my teachers.

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My University Sudan University of Science and Technology, College of Graduate Studies, Total Quality & Excellence Centre to my supervisor Awadya Alkhatyb

To my family

The source of encouragement and inspiration to me throughout my life,

To my friends

The source of support in my determination to find and realise my potential, very special thanks for my dear friend **shimaa**, she is always the secret of my successful and the voice to follow my real dream and my partner to make it true.

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To my colleagues

For their supported partnership throw the entire quality journey;

To every person share me any part of my life and help me to reach here.

Abstract

The worldwide food safety management systems implementation and certification has significantly increased during the last few years, thus reflecting the importance that standards have assumed in some activity sectors**.** Coca cola factory made seeking quality system, HACCP and food safety their principal competitive priorities which have enabled them to provide positive trend in results. There is some evidence to show the impact of implementing certified food safety management system on the quality of good working environment and performance. Therefore, this research will attempt to the impact of the application of food safety management system could have on working environment and result performance. The literature was been reviewed to define the fundamental of ISO 22000 definitions and link it with the challenges and benefits of implementation and the basic frame work. Quantitative methods have been used in this research .data were collected from submission documents, questionnaires were collected and analyses throw branches under study in April 2015 so as to validate the positive trends in working environment ,technical knowledge ,skills and performance at coca cola factory to examine the impact of implementing iso22000 by internal customers perseptions. Results from questionnaires shown positive impacts on working environment and technical knowledge and performance in coca cola factory.

مستخلص البحث

زاد تنفيذ وشهادة نظم إدارة سلامة الأغذية في جميع أنحاء العالم بشكل ملحوظ خلال السنوات القليلة الماضية، مما يعكس أهمية تطبيق المعايير في بعض القطاعات . مصنع الكوكا كولا جعل من نظام الجودة، نظام تحليل المخاطر وسلامة الغذاء الأولويات التنافسية الرئيسية والتي قد مكنه من توفير الاتجاه الإيجابي في النتائج. هناك بعض الأدلة التي تظهر تأثير تنفيذ شهادة نظام إدارة سلامة الأغذية على نوعية بيئة عمل جيدة والأداء. ولذلك، فإن هذا البحث يقوم بدراسة تأثير تطبيق نظام إدارة سلامة الغذاء على بيئة العمل والأداء والتدريب. وقد تم مراجعة الأدبيات لتحديد اساسيات نظام الايزو22000و التعاريف وربطها مع التحديات والفوائد المترتبة على التنفيذ وإطار العمل الأساسي. وقد استخدمت الأساليب الكمية في هذا البحث . جمعت البيانات من وثائق التقديم، تم جمع الاستبيانات وتحليلها من الفروع قيد الدراسة في أبريل 2015، وذلك ل دراسة تأثير ISO22000 والتحقق من صحة الاتجاهات الإيجابية في البيئة، والمعرفة التقنية والمهارات والأداء في مصنع الكوكا كولا من خلال اعتقادات الموظفين، نتائج الاستبيانات أظهرت تأثيرات إيجابية على البيئة والمعرفة التقنية والأداء يعملون في مصنع الكوكا كولا.

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CHAPTER ONE

INTRODUCTION & LITERATURE REVIEW

1.1 Introduction

The worldwide food safety management systems implementation and certification has significantly increased during the last few years, thus reflecting the importance that standards have assumed in some activity sectors.

Delivering safe food products with a level of quality that meets customer requirements is essential to business success. Indeed, in the fierce competition of today's markets, the level of quality needs to exceed what customer already expect, and at a safe condition. Achieving this quality will involve the entire organization and often suppliers and customers as well. It requires good management system and practices throughout the organization. It means having well-trained and motivated employees, standardized work procedures, and effective control. Global consumers nowadays are more concerned about safety of their food.

Food production in the ISO 9001 was the first regulation to be enforced. These standards are still implemented by some companies. Besides the ISO 9001, another set of standards known as the HACCP quality system (Hazard Analysis of Critical Control Points) has also been implemented. Later, as of 2006, Turkey started to enforce the ISO 22000 Food Safety Management System (FSMS) which is a more comprehensive set of standards determined by the International Organization for Standardization. This latest quality system of food safety is being implemented by many food and beverage companies.

Food industry in Sudan has remarkably flourished and diversified in the past decade. Up until 2010 the food manufacturing industry sector constitutes 55% of the manufacturing industry in Sudan.

Food Safety Responsible bodies in Sudan are SSMO (Sudanese Standards and Metrology Org.) and ministry of Health.

1.1.1Statement of the problem research:

The weakness of quality in food industries reflect in the total of products, services, the performance of personnel, in the environment of work.

This study was tried to answer the following questions:

1. Can ISO 22000 improve the quality of working environment provided by Sudanese food industries?
2. Is there any technical training and skills inside Sudanese food industries?

1.1.2 Hypothesis of research:

1. Implementing ISO 22000 systems provide positive trends in working environment of the Sudanese food industries.

2. There is lack of technical knowledge and skills inside Sudanese food industries.

3. Implementing ISO 22000 systems provide positive trends in the performance of the Sudanese food industries.

1.1.3 Importance of the research:

There is no doubt that the food industries play a major role in Sudanese economy. For this reason FSMSs that are merely a license to trade locally and to export are crucial to food organization's economic status.
As food is defined as an article or substance ordinarily eaten or drunk by man (SANS 10330, 2007) the findings and recommendations concluded in this study will be for the benefit of food industry in Sudan.
This study will aim to know the significant of implementing food safety management system in the food industry and conduct a literature review and terms of ISO 22000.

1.1.4 Research objective:

1.1.4.1general objective

To study the impact of implementing ISO 22000 in the quality of food industries by internal customers perceptions.

1.1.4.2specific objective

1. To examine if implementing of ISO 22000 can provide positive trends in the quality working environment.
2. To examine if implementing of ISO22000 can help to provide positive trends results in performance.

1.1.5 Definitions:

Food safety:
Concept that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use (ISO22000:2005).

Food safety hazard:
Biological, chemical or physical agent in food, or condition of food, with the potential to cause an adverse health effect (ISO22000:2005).

Food chain:
Sequence of the stages and operations involved in the production, processing, distribution, storage and handling of a food and its ingredients, from primary production to consumption (ISO22000:2005).

Food safety policy: overall:
Intentions and direction of an organization related to food safety as formally expressed by top management (ISO22000:2005).

Corrective Action:
Actions taken when a process deviates from the standard (ISO22000:2005).

End product:
Product that will undergo no further processing or transformation by the organization (ISO22000:2005).

CCP critical control point:
(Food safety) step at which control can be applied and is essential to prevent or eliminate a food safety hazard or reduce it to an acceptable level (ISO22000:2005).

PRP prerequisite program:
(food safety) basic conditions and activities that are necessary to maintain a hygienic environment throughout the food chain suitable for the Production , handling and provision of safe end products and safe food for human consumption(ISO22000:2005).

Operational PRP Operational Prerequisite Program:
PRP identified by the hazard analysis as essential in order to control the likelihood of introducing food safety hazards to and/or the contamination or proliferation of food safety hazards in the product(s) or in the processing environment(ISO22000:2005).

HACCP: Hazard Analysis and Critical Control Point
"A systematic approach to the identification, evaluation, and control of food safety hazards" (FDA, 2009).

Hazard:
"A biological, chemical, or physical agent that is reasonably likely to cause illness or injury in the absence of its control" (FDA, 2009).

Hazard Analysis:
"The process of collecting and evaluating information on hazards associated with the food under consideration to decide which are significant and must be addressed in the HACCP plan" (FDA, 2009).

Validation:
"(food safety) obtaining evidence that the control measures managed by the HACCP plan and by the operational PRPs are capable of being effective (ISO22000:2005).

Verification:
"Confirmation, through the provision of objective evidence that specified requirements have been fulfilled [ISO 9000:2000, definition 3.8.4].

Correction action:
To eliminate a detected nonconformity (ISO 9000:2000, definition 3.6.6)

Food Safety Management System (FSMS):
Is a network of interrelated elements that combine to ensure that food does not cause adverse human health effects. These elements include programs, plans, policies, procedures, practices, processes, goals, objectives, methods, controls, roles, responsibilities, relationships, documents, records and resources (ISO 22000:2005)

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Good Manufacturing Practices (GMP):
Signifies those aspects of quality assurance which ensure that materials and articles are consistently produced and controlled to ensure conformity with the rules applicable to them as well as with the quality standards appropriate to their intended use by not endangering human health or

causing deterioration in the organoleptic characteristics thereof (SANS 1049:2007).

ISO 22000:
ISO 22000:2005 specifies requirements for a FSMS where an organization in the food chain needs to demonstrate its ability to control food safety hazards in order to ensure that food is safe at the time of human consumption (ISO, 2005:Online).

Quality Management System (QMS):
A QMS can be defined as the managing structure, responsibilities, procedures, processes and management resources to implement the principles thereof, as well as the action lines needed to achieve the quality objectives of an organization (ISO 9001:2008).

1.2 literature review

This section aims to conduct a literature review to validate the concept of FSMSs. Firstly; the section covers the history of ISO and ISO 22000, the history of HACCP. It also defines ISO22000:2005, hazard Analysis Critical Control Points (HACCP), good manufacturing practice (GMP), but also defines QMS, then the benefits and challenges of the FSMS. The fundamental requirements of these FSMS are explored.

1.2.1 History of ISO and ISO 22000

In 1946, representatives from 25 countries joined together to create a common and unified industrial standard; the organization created was the International Organization of Standardization (ISO). ISO has published more than 18,500 international standards in a 60-year time period beginning in 1947. These standards range from agriculture and construction Standards, to mechanical engineering, to state-of-the-art information technology advances (ISO, 2011). Lawrence D. Eicher, the former ISO Secretary-General, stated in the book Friendship among Equals "The essence of ISO's history is made up of the visions, aspirations, doubts, successes, and failures of the people who, over the past fifty years, have created this rather remarkable organization" (Latimer, 1997).
According to Morrison and Morikawa, 2004, there were three major turning points for ISO, the first being the development of the ISO 9000 Quality Management System in the 1980s.

Until this time, ISO was primarily known for creating technical specifications for specific industries such as clothing size and laser technology. The second major turning point for ISO was the development and implementation of the ISO 14000 Environmental Management Standard in 1993 (Morikawa & Morrison, 2004). This was a major step as it started to work with public policy and general public interest. The third major turning point for ISO was the development of standards that support sustainability (Morikawa & Morrison, 2004). This standard was named ISO Horizon 2010: Standards for a Sustainable World. Six decades since its inception, ISO has grown into the world's largest standards development organization with well over 14,000 standards and 148 countries in the federation (Morikawa & Morrison, 2004).

In 2005, there was an international effort to attempt to standardize the food safety system worldwide. This effort resulted in ISO creating the ISO 22000 Food Safety Management System (FSMS) - requirements for any organization in the food chain (Surak, 2007). The ISO 22000 FSMS was created similarly to other ISO management systems, more specifically to the ISO 9001 Quality Management System. The ISO management system forces the continuous process improvement approach through analysis and considerations. The ISO 22000 system also takes an integrated food safety approach in which companies are required to analyze potential food safety hazards in final products and create preventative measures to control the hazards. State of the art food safety systems are relatively new in the industry and are currently being driven by customers rather than government regulation.

1.2.2History of HACCP

The food safety program, HACCP, was first introduced as a joint venture between NASA and the Pillsbury Corporation in the early 1960s (Mayes & Mortimore, 2001). It was initially created to eliminate the microbiological hazards from outer space but also increase the confidence that the space program could effectively maintain personnel safety. The primary basis for eliminating the microbiological hazards was to ensure that astronauts would be safe from sickness since they would be without medical care for several weeks (United National Industrial Development Organization, 2000). Over the past 50 years, the HACCP approach has gained popularity in both the private and public food sectors. A major turning point with the implementation of food safety programs was the major outbreak of *Clostridium Botulinum* in the early 1970's. *Clostridium* Botulinum is a spore shaped bacteria that can be found in any region of the world. The initial symptoms include nausea, vomiting, and diarrhea,

which can lead to paralysis (WHO, 1999a). In response to the outbreak, the United States FDA issued low acid canned food regulations, which are said to be the first government regulated HACCP programs (Keener, 1999).

Another major development for the HACCP program was the establishment of the Codex Alimentarius second edition in 1997. The Codex Alimentarius, which in latin means food law or code, was established by the joint Food Agriculture Organization (FAO)/WHO Committee. This standard on food hygiene was established to protect the health of consumers and to ensure fair practices in the food trade (FAO/WHO, 1999). The basis of the second edition was to establish the principles and guidelines to conducting microbiological risk assessments.

The code recommends that organizations use a HACCP based approach wherever possible to enhance food safety (FAO/WHO, 1999). HACCP has evolved over the years due to the advances in the quality management field, which in turn has allowed food processors to develop a food safety management system (Surak, 2006).

Today, with the assistance of the Food Safety Modernization Act, the FDA, and the US Department of Agriculture requires mandatory food safety programs in all food and feed manufacturing facilities (Keener, 1999). According to the FDA the new FSMA Act "will have a legislative mandate to require comprehensive, science based preventative controls across the food supply" (FDA, 1999).

1.2.3 ISO 22000:2005

Food safety is linked with food-borne hazards present in food at the point of consumption. Since food safety hazards can occur at any stage in the food chain it is essential that adequate control measures be put in place to avoid or minimize food safety hazards (Prati and McIntyre, 2004). ISO 22000 is a standard developed by the International Organization for Standardization (ISO) as a requirement for the food chain organization to enhance food safety (Blank, 2006). It was developed as an improvement to ISO 9000. In comparison with ISO 9000, the standard is more procedure-orientated than principle-based. The ISO 22000 international standard specifies the requirements for a food safety management system. It involves the elements of interactive communication, system management, pre-requisite programmes and HACCP principles. According to ISO (2010), ISO 22000 can be applied independently of other management system standards or integrated with existing management system requirements. This is accomplished by the flexibility of the design in the standard which enables an approach tailor-made for all segments of food safety in the food chain. ISO 22000:2005 is designed

to fit in different approaches since the requirements for food safety are diverse among food producers. The standard does not provide a check-list since procedures due in one production may not be appropriate in another. ISO 22000:2005 is not recognized by GFSI due to the lack of technical specification for sector PRPs. In a combination with PAS 220, ISO 22000 is called FSSC 22000 and is recognized by GFSI (Global food safety initiative).
According to Van der Spiegel (2004) food quality management is complicated because it involves the complex characteristics of food and their raw materials due to variability, restricted shelf life and their large range of (bio) chemical, physical and microbial processes.

Good FSMSs contain the following components:

1. A Quality Management System (QMS) or adherence to the International Organization for Standardization (ISO).
2. Good Manufacturing Practices (GMPs).
3. Hazard Critical Control Points (HACCP).

Henson and Humphrey (2009) explain that FSMSs necessarily involve the following:

1. They provide a basis for making claims about processes and practices relating to how food is produced, transported or processed.
2. They necessarily involve some form of monitoring and enforcement through second party (which is increasingly the case) and third party certification.
3. They are codified into a written statement that sets out rules and procedures and also provides clear instructions as to how rules are to be implemented, monitored and enforced.
4. They include some form of traceability to link particular food products at some point downstream in the value chain, up to the point which the standard specifies and the control processes.

1.2.4 Hazard Analysis Critical Control Points (HACCP)

Ropkins and Beck (2000) defines HACCP as a management tool developed in the late 1960s, to ensure the safety of foods for space travels.
HACCP is a production control system for the food industry. It is a process that identifies where potential contamination can occur at the critical control points (CCPs) and strictly manages and monitors these points as a way of ensuring the process is in control and that the safest

product possible is being produced. HACCP is designed to prevent rather than catch potential hazards (Cross, 1994).
Surak (2003) describes HACCP as a systematic method that serves as the foundation for assuring food safety in the modern world. The HACCP system is designed to be used to prevent the occurrence of food-borne hazards from production through manufacturing, storage and distribution of a food product (Surak, 2003).
Corlett (1998) emphasises that HACCP is a scientifically-based protocol that is applied directly to the food procurement, production and distribution process.

Unnevehr and Jensen (1998) describe the six principles in developing and operating a HACCP program:

1. Assess the hazard, list the steps in the process where significant hazards can occur and describe the prevention measures.
2. Determine critical control ccps in the process.
3. Establish critical limits for each CCP.
4. Establish corrective actions to be taken when monitoring indicates a deviation from the CCP limits.
5. Establish record keeping for the HACCP system.
6. Establish procedures to verify that the HACCP system is working correctly.

1.2.5 Good Manufacturing Practices (GMP)

The South African National Standard (SANS 10049:2011) describes Good Manufacturing Practices (GMP) or prerequisites for HACCP as basic good hygiene practices that need to be in place before HACCP can be implemented.
The World Health Organization (WHO, 2011) defines GMP as that part of quality assurance which ensures that products are consistently produced and controlled to the quality standards appropriate to their intended use and required by the marketing authorization.
Dewanti-Hariyadi (2009) defines GMP as the foundation of the food-processing operation to achieve consistent quality and safety. It also provides the basic requirements that should be fulfilled to assure good practices pertaining to the workers, the facility, the environment, the equipment and process control.

1.2.6 Quality Management System (QMS)

According to CERCO Working Group on Quality (2000) a QMS can be defined as the managing structure, responsibilities, procedures, processes, and management resources to implement the principles and action lines needed to achieve the quality objectives of an organization.

A QMS is defined by Business Dictionary (2011) as a system by which an organization aims to reduce and eventually eliminate non-conformance to specifications, standards, and customer expectations in the most cost-effective and efficient manner.
According to the Department of Trade and Industry (2000) a QMS is defined as a set of co-ordinate activities to direct and control an organization in order to continually improve the effectiveness and efficiency of its performance.

1.2.7 Benefits of FSMS implementation

Development, implementation, integration and improvement of FSMSs have many associated benefits. In literature extensive research has been conducted on these benefits and motivations for FSMS implementation. According to Mensah *et al*. (2011) the benefits for FSMS compliance are:

1. Increased customer satisfaction.
2. Improved internal procedures.
3. Improved product quality.
4. Compliance with regulatory requirements.
5. Improved corporate image.
6. Improved employee morale.
7. Enhanced prospect of trading in other countries.
8. Reduced operating costs.
9. Lower insurance changes.

Mensah *et al*. (2011) notes that the motivations for FSMS compliance are:

1. Product quality improvements.
2. Customer requirements.
3. Regulatory requirements.
4. Enhanced marketing advantage.

Fotopoulos *et al* (2011) suggest that the motives for implementing a FSMS are:

1. Legal requirements.

2. Increase the reputation of the company.
3. Improve competence.
4. Expand foreign markets.
5. Reduce cost.
6. Obtain other third party accreditations.
7. Obtain a leadership position.
8. Improve profit margins.
9. Improve product quality
10. Avoid media pressure.
11. Reduce waste and to reduce customer complaints.
12. Improved corporate image;
13. The acknowledgement of competitors.
14. Prevention of liability claims.
15. The prospect of operational cost reductions.
16. Insurance requirements.
17. Avoidance of potential export barriers.

1.2.8 Challenges of FSMS implementation

FSMS implementation faces various challenges when being implemented and maintained. These challenges usually occur at the implementation stage of the FSMS, but are not restricted to it. Mensah et al. (2011) notes that the challenges for FSMS compliance are:

1. Employee resistance to change.
2. Lack of technical knowledge and skill of employees.
3. Lack of awareness of the requirements.
4. The high cost of development and implementation.
5. Inappropriate infrastructural capabilities for validating and verifying a FSMS.
6. The high cost of education and training.
7. Blame culture.
8. Rapid changes in regulation.
9. Lack of access to adequate information.
10. Lack of government support.

Yapp and Fairman (2006) note that the main barriers seen to prevent regulatory compliance include:

1. Lack of money.

The major financial implications for an organization in terms of FSMS implementation relates to investment in structure, equipment and staff training. FSMS maintenance may also become problematic due to budget constraints.

2. Lack of time.

The lack of time for regulating the FSMS is quite common as well as the lack of time for maintaining the system.

3. Lack of experience.

Upon the implementation of a FSMS it is reasonable to expect that employees will be lacking in experience.

4. Lack of access to information.

FSMS information is not always communicated to all the organization's employees.

5. Lack of interest.

FSMS and its application is not always a priority to all the organization's employees. Therefore they seem to show no or little interest in FSMS implementation.

6. Lack of knowledge.

1.2.9 ISO 22000 Fundamentals

The ISO 22000 incorporated the HACCP principles described in detail in the Codex Alimentarius but also developed a management framework to improve effectiveness and efficiency (Blanc, 2006). The ISO 22000 food safety management standard has the following characteristics:

1. Utilizable in all organizations in the food chain industries.

2. Combines the recognized food safety system elements as defined by Codex.
3. Provides an auditable standard that could be used as part of third party certifications.
4. Ensures that the process used to control food safety is validated, verified, implemented, monitored, and managed; Focuses only on food safety.(Surak, 2006)

One of the key components to the ISO 22000 FSMS is the integration of documented management commitment and support (Nowicki & Sikora, 2007). The integration of these management requirements enhances the ISO 22000 system over the basic HACCP principles.
One of the most significant requirements of the ISO 22000 systems is the commitment and involvement of management in the food safety management system. The primary components of a management system include:

1. Policy- a food safety management policy defines an organization's commitment to food safety. It describes what management will do to ensure proper food safety programs and policies are in place as well as describe the direction of the overall organization.
2. Planning- the primary goal of planning in a management system is to establish goals and objectives for the organization to follow. Prior to the development of the goals, the legal requirements should be analyzed to determine the specific regulatory needs. Developing goals and objectives provides the guidance for the food safety management system.
3. Implementation and Operation- the first step of the implementation and operation is defining the roles and responsibilities of employees that are associated with the food safety management system. The second step is to provide training on the food safety system and then establish internal and external communication.
4. Performance Assessment- a performance assessment is conducted to ensure that goals are consistently being met in an efficient and effective manner.
5. Improvement- Improvement or corrective actions are steps that are taken to eliminate the causes of non-conformity.
6. Actions necessary to address actual or potential problems and to improve the food safety system are implemented through corrective and preventive actions.
7. Management Review- the primary goal of a management review is to evaluate the overall performance of an organization's food safety management system. Top management that is experienced or has a

direct impact on the current food safety system should carry out the review. The management review should be carried out on a regular basis.

Once the system is implemented, management will then review the documentation to ensure effectiveness and determine any areas requiring further improvement. Improvement consists of management reviews, internal audits, corrective actions, verification results, and validation results. Table 1 represents the basic requirements of the ISO 22000 FSMS. The requirements of ISO 22000 are generic and are intended to be applicable to all organizations in the food chain regardless of size (GFSI, 2007).

Table 1:1 ISO 22000 Basic Frameworks

ISO 22000 Clauses	
No	**System Requirements**
4	Food Safety System Requirements
4.1	Establish a food safety management system
4.2	Document your food safety management system
5	Food Safety Management Requirements
5.1	Demonstrate a commitment to food safety
5.2	Establish a food safety policy
5.3	Plan a food safety management system
5.4	Clarify the FSMS responsibilities
5.5	Appoint a food safety team leader
5.6	Establish communications
5.7	Develop emergency response procedures
5.8	Carry out FSMS management reviews
6	Food Safety Resource Requirements
6.1	Provide adequate FSMS resources
6.2	Provide adequate human resources
6.3	Provide adequate infrastructure
6.4	Provide adequate work environment
7	Food Safety Realization Requirements
7.1	Manage the realization for safety products
7.2	Establish the prerequisite programs (PRPs)
7.3	Prepare for a hazard analysis
7.4	Perform organization's hazard analysis

7.5	Establish the operational prerequisite programs
7.6	Establish the HACCP plan
7.7	Update preliminary documents and programs
7.8	Plan and perform verification activities
7.9	Establish a product traceability system
7.10	Control nonconforming product
8	Food Safety Confirmation Requirements
8.1	Confirm and improve food safety methods
8.2	Validate food safety control measures
8.3	Control monitoring and measuring methods
8.4	Verify the food safety management system (FSMS)
8.5	Improve the food safety management system

Source: Blanc, (2006) ISO 22000 from intent to implementation.

1.2.10 previous study

Improving the HACCP system through the application of ISO 22000, Surdick, Matthew, J.

The purpose of this study was to develop the framework and systems to advance the current HACCP food safety program to reflect the standard of ISO 22000. The goals of the study were to conduct an analysis of identified food safety systems to understand the best food safety practices, conduct a GAP analysis of the food safety system at XYZ, and finally to conduct a need assessment focusing on organizational analysis, task analysis, and individual analysis. The methods used in the study include a review of literature of established food safety systems to determine necessary improvements and utilize an ISO 22000 audit checklist to determine the gap between the current food safety system at company XYZ and the ISO standard. The last method used in the study was a semi-structured interview guide to conduct an interview with different levels of management at company XYZ. Information collected from the audit checklist and semi structured interview suggest that the current system established at company XYZ would benefit from the implementation of ISO 22000 principles. The current system at Company XYZ fails to properly train employees and managers on HACCP principles and pre-requisite programs indicated by the results in the audit checklist and semi-structured interview. Implementing a training program that teaches employees and managers the basics of the program and the reason for the program, in addition to improving management involvement will positively affect Company XYZ's food safety system.

Implementation of a quality management system in food production, ***Jenni Nordenskjöld***

The aim of this study was to investigate how the process of implementing a quality management system for food safety was handled in four different food producing companies in Sweden. The aim was also to analyze what difficulties the companies face and the possibilities that arise when certified. Furthermore, the reason for implementation was discussed as well as the main expectations on the certificate. Implementing a quality management system is a good way of ensuring the quality and hygiene of the food production and it also increases the traceability of food products through the whole food chain. A food safety

standard provides a method of preventing problems and crisis and it can also help to handle requirements from authorities, the market and others. The main purpose of a food safety standard is to provide consumers with safe food (Lusk et al, 2011). The quality of foods is often associated with the sensory, nutritional and economic aspects of food (McDonald etal, 2005), but it is so much more than that. The quality of food is also correlated to the product safety, i.e. the guarantee the producer gives to the consumer that the food is safe and will not cause any sickness or harm. For this reason, a number of effective control systems have been created. The standards BRC global standard for food safety, ISO 22000 and IFS Food are widely used and well recognized. These standards include HACCP, quality supervision as well as GMP (Good Manufacturing Practices). There are several benefits of implementing a standard in the business, the competitive advantage is increased and it is easier to establish on new markets. The results of the interviews presented separately and in a summarizing table. The respondents from all companies agreed on the benefits of the standard when it comes to the increased structure and order in the production but not all of them agreed on how the market advantages were affected or on the difficulties that arises when implementing a standard. A conclusion that can be made is that different standards suit different companies, the many detailed requirements of BRC makes it difficult to interpret and to implement in smaller companies or in companies in the charcuterie business. It is also of main importance that everyone working at the company is aware of the standard and the goals it is used to achieve. The implementation of a standard is facilitated if everyone in the company has the same vision and that it is clear to everyone what the vision involves.

CHAPTER TWO

MATERIALS & METHODS

2.1 Research methodology:

This study was based on theoretical background of methodology and the quantities' design using a hypothesis testing approach. In this method "a case study" was conducted in coca cola Company with the aim to holistically examine the implement ability of the ISO 22000 FSMS, which is currently adopted in many food and beverage companies. Our research methodology was supported by the following phase.

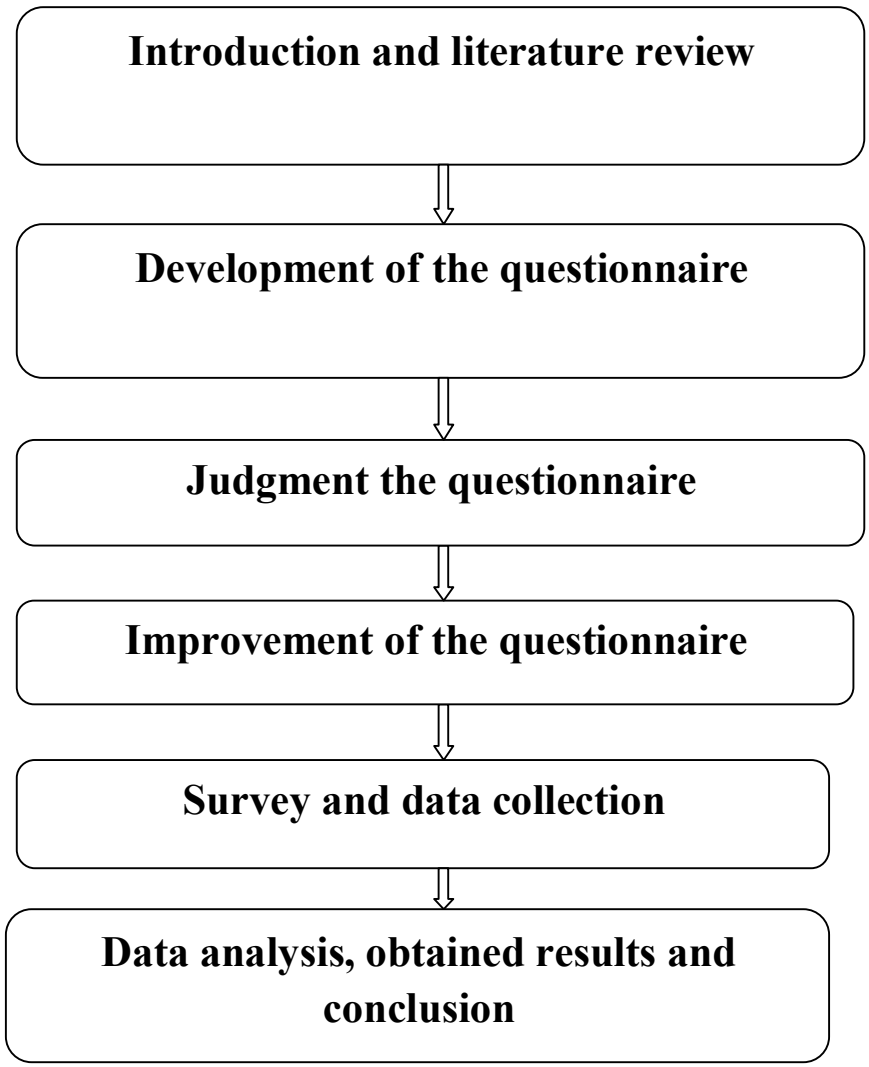

Fig 2:1Research methodology

2.2 Study design:

Researcher developed objectives, design the framework of the research. Dal group was chosen as research area it is one of the important food industries groups in Sudan.

According to objectives of research hypotheses are assumed to evaluate the impact of implementing ISO 22000 on the Sudanese food industries and as a case study in Coca Cola factory.

Questionnaire was conducted and data was analyzed by using SPSS software program me.

2.3 Study area:

This study was conducted in Dal group which it is one of the companies that has the ISO22000 certification in Sudan.

Coca cola is one of the DAL group companies. DAL Group is the largest and most diversified conglomerate in Sudan. The Group operates across six sectors - food, agriculture, engineering, real estate, medical services and education.

2.4 Study population:

This study target population from all departments of Coca-Cola factory

2.5 Sampling:

The sample of this case study at coca cola factory that has ISO22000 FSMS certification was used random sampling technique to select 20samples from population.

2.6 Exclusion criteria:

The participant is excluded if has experience less than 2 years.

2.7 Data collection:

Survey questionnaire was developed using 5point of likert scale (1=strongly disagree; 2=disagree; 3=neutral: 4=agree; 5strongly agree) to obtain feedbacks about the opinions of participant on different variables.

2.8 Data analysis:

After data collection was finished. SPSS11.0 software was used to analyze data.

CHAPTER THREE

ANALYSIS & RESULTS

3.1 Results of the first hypothesis:

Implementing ISO 22000 systems provide positive trends in working environment of the Sudanese food industries.

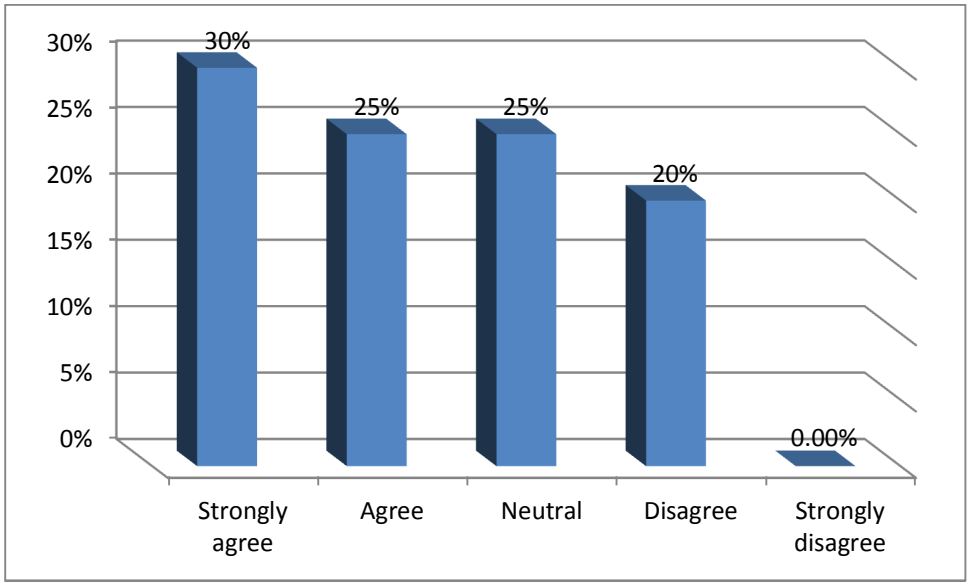

Figure: 3.1 the implementation of ISO 22000 develops considering to lay out and of building associated utilities

Table 3.1 the implementation of ISO 22000 develops considering to lay out and of building associated utilities

Answer	Frequency	Percentage
Strongly agree	6	30%
Agree	5	25%
Neutral	5	25%
Disagree	4	20%
Strongly disagree	0	0.0%
Total	20	100%

From table : 3.1 and figure 3.1 we notice that answer of most of the individuals study are (Strongly agree) by (6) and with (30%), followed by whom answer is (Agree and Neutral) by (5) with (25%), while whom the answer is (Disagree) by (4) with (20%).

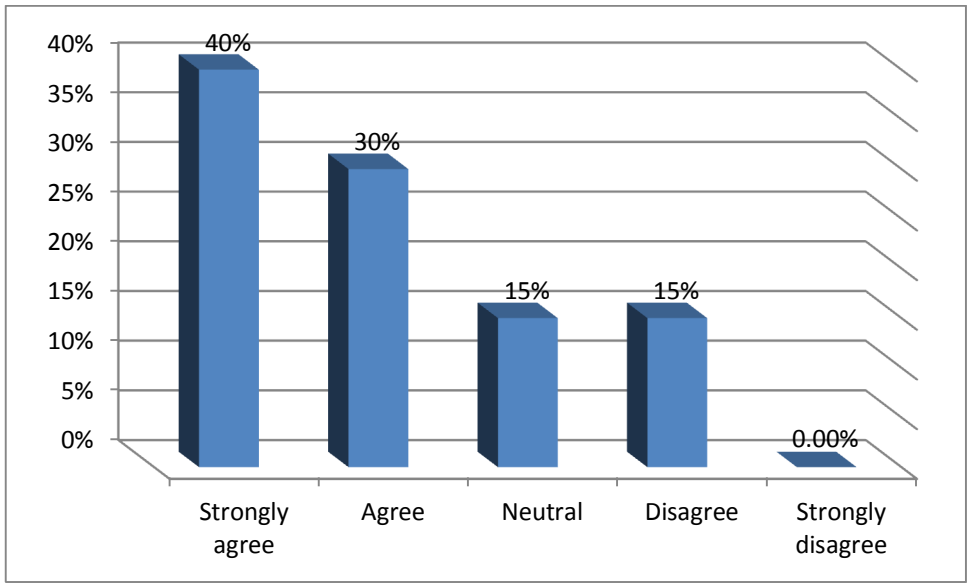

Figure 3.2 the implementation of ISO 22000 enhanced layout of premises including workspace and employee facilities

Table 3.2 the implementation of ISO 22000 enhanced layout of premises including workspace and employee facilities

Answer	Frequency	Percentage
Strongly agree	8	40%
Agree	6	30%
Neutral	3	15%
Disagree	3	15%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.2 and figure 3.2 we notice that answer of most of the individuals study are (Strongly agree) by (8) and with (40%), followed by whom answer is (Agree) by (6) with (30%), while whom the answer is (Neutral and Disagree) by (3) with (15%).

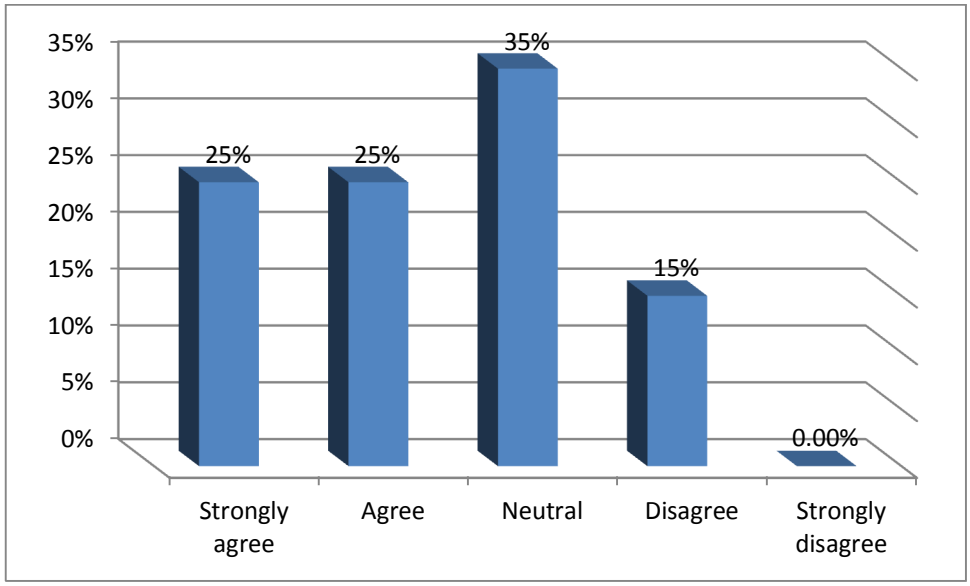

Figure 3.3 the implementation of ISO 22000 develops visual inspection in transportation and storage.

Table 3.3 the implementation of ISO 22000 develops visual inspection in transportation and storage.

Answer	Frequency	Percentage
Strongly agree	5	25%
Agree	5	25%
Neutral	7	35%
Disagree	3	15%
Strongly disagree	0	0.0%
Total	20	100%

From table3.3 and figure 3.3 we notice that answer of most of the individuals study are (Neutral) by (7) and with (35%), followed by whom answer is (Strongly agree and Agree) by (5) with (25%), while whom the answer is (Disagree) by (3) with (15%).

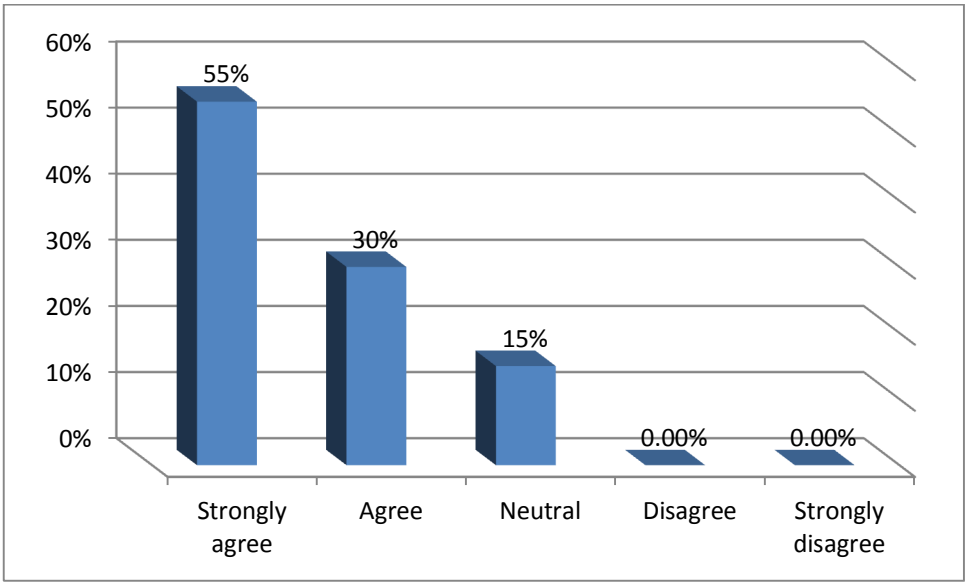

Figure 3.4 the implementation of ISO 22000 enhances controlling personnel hygiene and cleaning

Table 3.4 the implementation of ISO 22000 enhances controlling personnel hygiene and cleaning

Answer	Frequency	Percentage
Strongly agree	11	55%
Agree	6	30%
Neutral	3	15%
Disagree	0	0.0%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.4 and figure 3.4 we notice that answer of most of the individuals study are (Strongly agree) by (11) and with (55%), followed by whom answer is (Agree) by (6) with (30%), while whom the answer is (Neutral) by (3) with (15%).

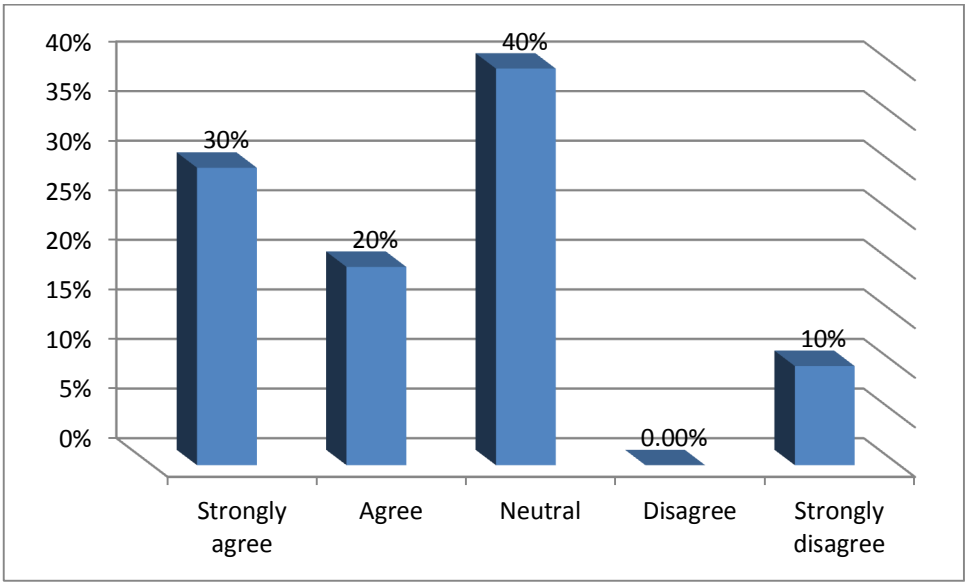

Figure 3.5the implementation of ISO 22000 helps in managing waste effectively.

Table 3.5the implementation of ISO 22000 helps in managing waste effectively.

Answer	Frequency	Percentage
Strongly agree	6	30%
Agree	4	20%
Neutral	8	40%
Disagree	0	0.0%
Strongly disagree	2	10%
Total	20	100%

From table 3.5 and figure 3.5we notice that answer of most of the individuals study are (Neutral) by (8) and with (40%), followed by whom answer is (Strongly agree) by (6) with (30%), while whom the answer is (Agree) by (4) with (20%).

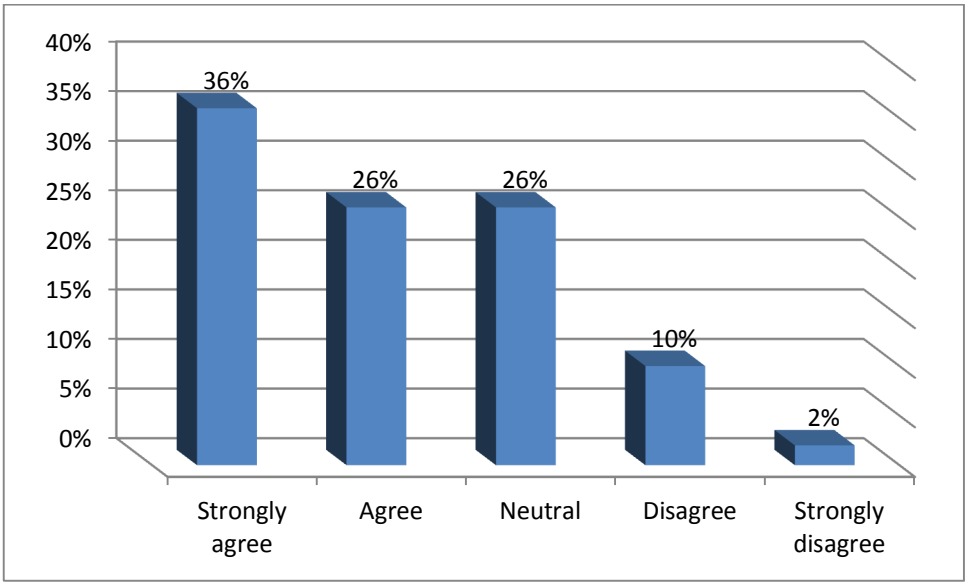

Figure 3.6 Frequency table for the first hypothesis

Table 3.6 Frequency table for the first hypothesis

Answer	Frequency	Percentage
Strongly agree	36	36%
Agree	26	26%
Neutral	26	26%
Disagree	10	10%
Strongly disagree	2	2%
Total	100	100%

From table 3.6and figure 3.6 we notice that answer of most of the individuals study are (Strongly agree) by (36) and with (36%), followed by whom answer is (Agree and Neutral) by (26) with (26%), while whom the answer is (Disagree) by (10) with (10%).

Table 3.7Chi-square test for the first hypothesis

Phrases	Chi-square value	P-value	Median	Trend
The implementation of ISO 22000 develops considering to lay out and of building associated utilities	0.400	0.940	-	-
The implementation of ISO 22000 enhanced layout of premises including workspace and employee facilities	3.600	0.308	-	-
The implementation of ISO 22000 develops visual inspection in transportation and storage.	1.600	0.659	-	-
The implementation of ISO 22000 enhances Controlling personnel hygiene and cleaning.	4.900	0.086	-	-
The implementation of ISO 22000 helps in managing waste effectively.	4.000	0.261	-	-
Hypothesis	**37.600**	**0.000**	**4**	**agree**

From the table3.7 above:

1. The value of chi-square for the first phrase is (0.400) with (p-value=0.940 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
2. The value of chi-square for the second phrase is (3.600) with (p-value=0.308 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study.
3. The value of chi-square for the third phrase is (1.600) with (p-value=0.659 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
4. The value of chi-square for the fourth phrase is (4.900) with (p-value=0. 086 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
5. The value of chi-square for the fifth phrase is (4.000) with (p-value=0. 261 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
6. The value of chi-square for the first hypothesis is (37.6) with (p-value=0.000 < 0.05), this indicates that there is significant differences

at the level (5%) between answers of study individuals and in favor of agree.

3.2 Results of the second hypothesis:

Positive trend of implementing ISO22000 need technical knowledge and skills inside Sudanese food industries.

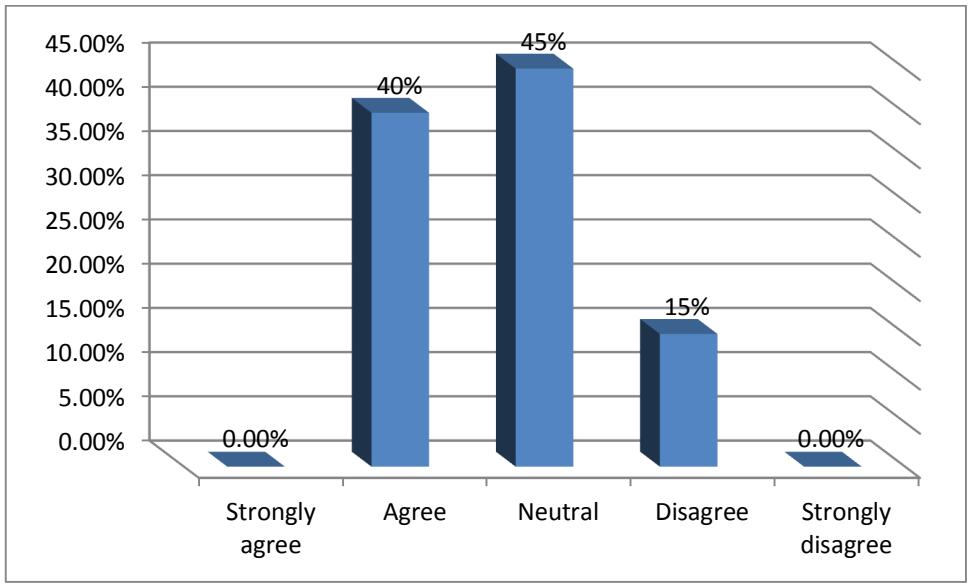

Figure 3.7 Implementing ISO22000 enhance using of software in controlling and analysis

Table 3.8 Implementing ISO22000 enhance using of software in controlling and analysis

Answer	Frequency	Percentage
Strongly agree	0	0.0%
Agree	8	40%
Neutral	9	45%
Disagree	3	15%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.3 and figure 3.7 we notice that answer of most of the individuals study are (Neutral) by (9) and with (45%), followed by whom answer is (Agree) by (8) with (40%), while whom the answer is (Disagree) by (3) with (15%).

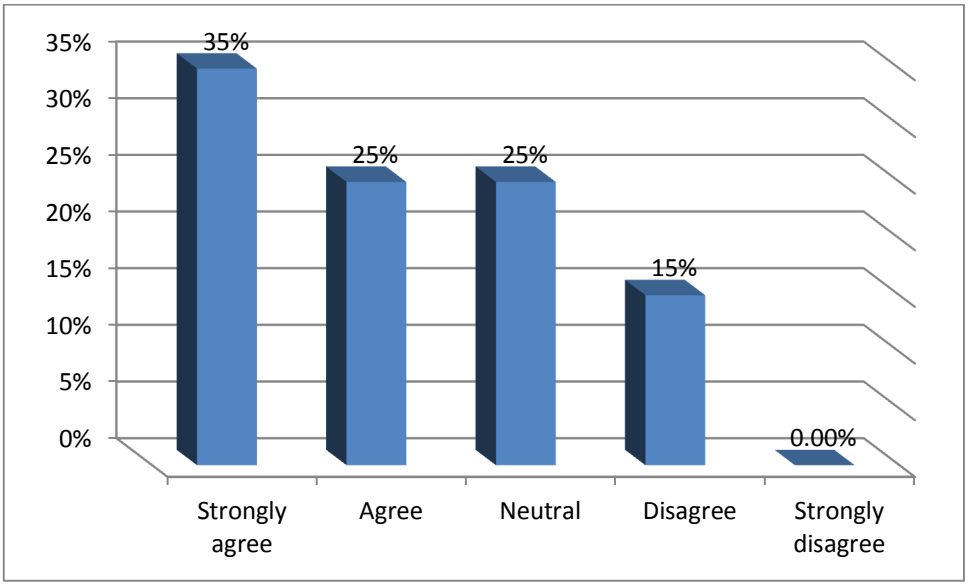

Figure 3.8 Implementing ISO22000 organize knowledge by linking ISO22000 with other implemented standard in company

Table 3.9 Implementing ISO22000 organize knowledge by linking ISO22000 with other implemented standard in company

Answer	Frequency	Percentage
Strongly agree	7	35%
Agree	5	25%
Neutral	5	25%
Disagree	3	15%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.9 and figure 3.8 we notice that answer of most of the individuals study are (Strongly agree) by (7) and with (35%), followed by whom answer is (Agree and Neutral) by (5) with (25%), while whom the answer is (Disagree) by (3) with (15%).

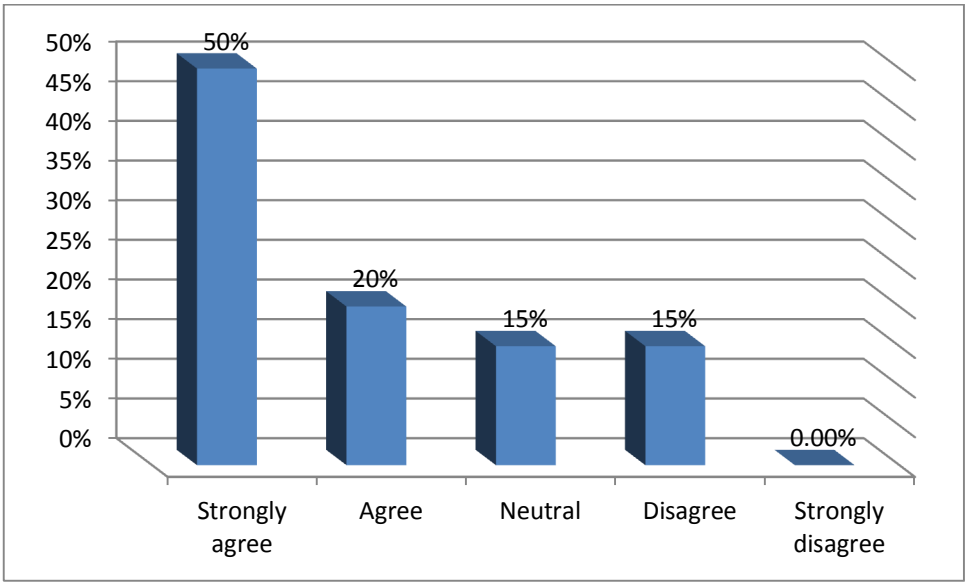

Figure 3.9 the implementing of ISO 22000 enhance hazard analysis

Table 3.10 the implementing of ISO 22000 enhance hazard analysis

Answer	Frequency	Percentage
Strongly agree	10	50%
Agree	4	20%
Neutral	3	15%
Disagree	3	15%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.10 and figure 3.9 we notice that answer of most of the individuals study are (Strongly agree) by (10) and with (50%), followed by whom answer is (Agree) by (4) with (20%), while whom the answer is (Neutral and Disagree) by (3) with (15%).

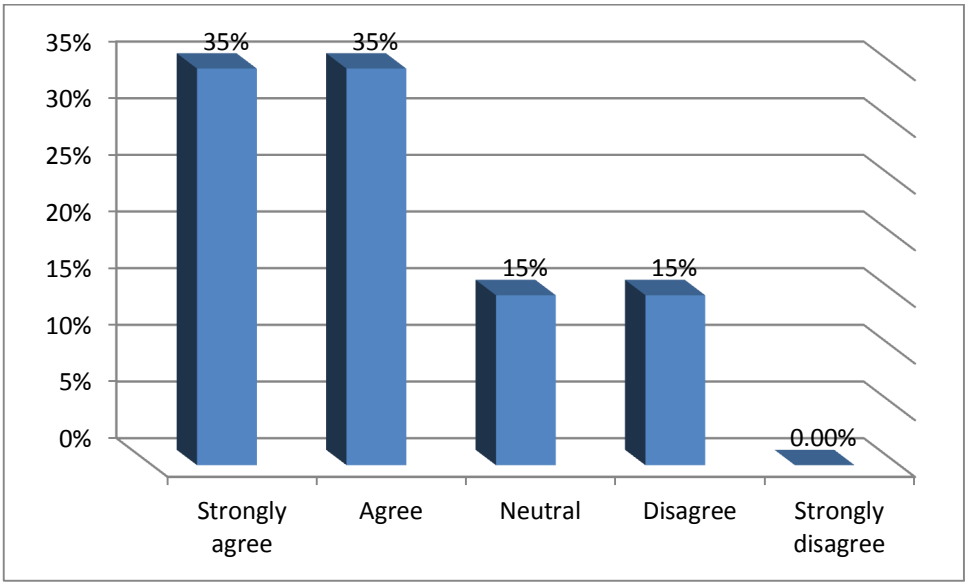

Figure 3.10: Implementing ISO22000 can enhance the competence of staff in food safety

Table 3.11: Implementing ISO22000 can enhance the competence of staff in food safety

Answer	Frequency	Percentage
Strongly agree	7	35%
Agree	7	35%
Neutral	3	15%
Disagree	3	15%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.11and figure 3.10 we notice that answer of most of the individuals study are (Strongly agree and agree) by (7) and with (35%), while whom the answer is (Neutral and Disagree) by (3) with (15%).

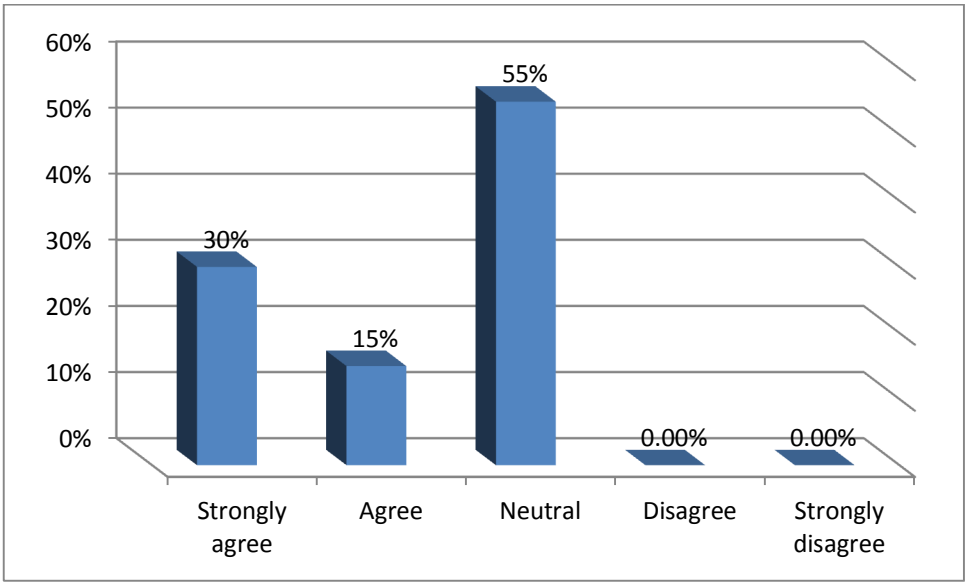

Figure 3.11: Implementing of ISO 22000 lead to better communication between departments internal and external

Table 3.12: Implementing of ISO 22000 lead to better communication between departments internal and external

Answer	Frequency	Percentage
Strongly agree	6	30%
Agree	3	15%
Neutral	11	55%
Disagree	0	0.0%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.12 and figure 3.11 we notice that answer of most of the individuals study are (Neutral) by (11) and with (55%), followed by whom answer is (Strongly agree) by (6) with (30%), while whom the answer is (Agree) by (3) with (15%).

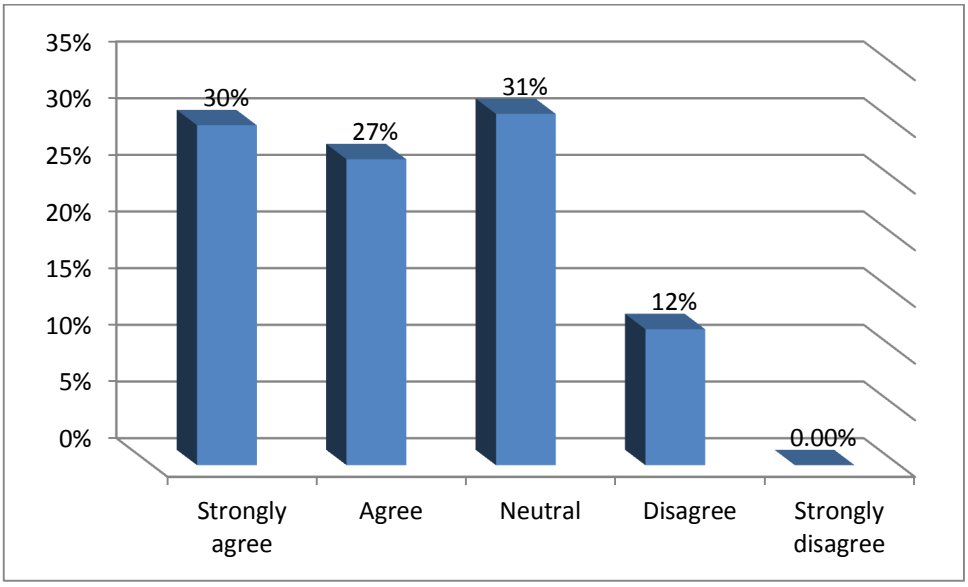

Figure 3.12: Frequency test for the second hypothesis

Table 3.13: Frequency test for the second hypothesis

Answer	Frequency	Percentage
Strongly agree	30	30%
Agree	27	27%
Neutral	31	31%
Disagree	12	12%
Strongly disagree	0	0.0%
Total	100	100%

From table 3.13 and figure 3.12 we notice that answer of most of the individuals study are (Neutral) by (31) and with (31%), followed by whom answer is (Strongly agree) by (30) with (30%), while whom the answer is (Agree) by (27) with (27%).

Table 3.14 Chi-square for the second hypothesis

Phrases	Chi-square value	P-value	Median	Trend
Implementing ISO22000 enhance using of software in controlling and analysis	3.100	0.212	-	-
Implementing ISO22000 organize knowledge by linking ISO22000 with other implemented standard in company	1.600	0.659	-	-
The implementing of ISO 22000 enhance hazard analysis	6.800	0.069	-	-
Implementing ISO22000 can enhance the competence of staff in food safety	3.20	0.362	-	-
Implementing of ISO 22000 lead to better communication between departments internal and external	4.90	0.086	-	-
Hypothesis	**9.36**	**0.025**	**4**	**Agree**

From the table above:

1. The value of chi-square for the first phrase is (0.3.100) with (p-value=0.212 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
2. The value of chi-square for the second phrase is (1.600) with (p-value=0.659 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study.
3. The value of chi-square for the third phrase is (6.800) with (p-value=0.069 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
4. The value of chi-square for the fourth phrase is (3.200) with (p-value=0.362 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
5. The value of chi-square for the fifth phrase is (4.900) with (p-value=0.086 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
6. The value of chi-square for the second hypothesis is (9.360) with (p-value=0.025 < 0.05), this indicates that there is significant differences

at the level (5%) between answers of study individuals and in favor of agree.

3.3 Results of the third hypothesis:

Implementing ISO 22000 systems provide positive trends in the performance of the Sudanese food industries.

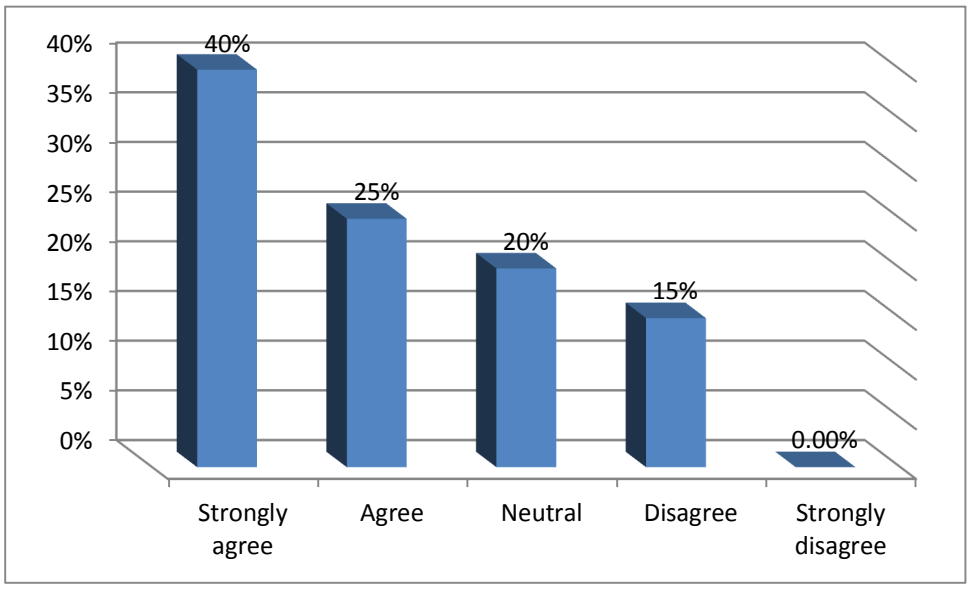

Figure 3.13 the implementation of ISO 22000 create loyalty in the market

Table 3.15 the implementation of ISO 22000 create loyalty in the market

Answer	Frequency	Percentage
Strongly agree	8	40%
Agree	5	25%
Neutral	4	20%
Disagree	3	15%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.15 and figure 3.13 we notice that answer of most of the individuals study are (Strongly agree) by (8) and with (40%), followed by who answer is (Agree) by (5) with (25%), while who the answer is (Neutral) by (4) with (20%).

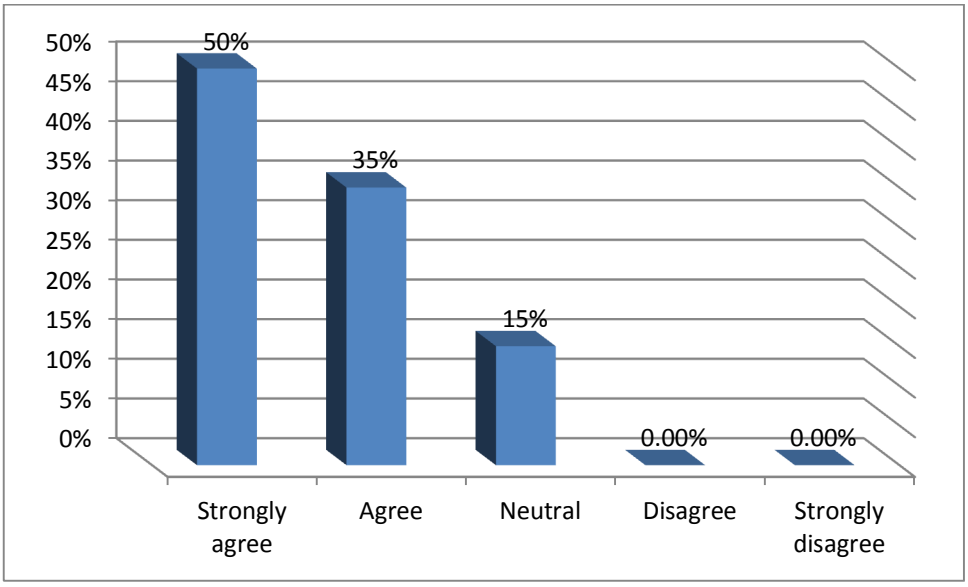

Figure 3.14the implementation of ISO 22000 improve customer satisfaction by present safe product

Table 3.16the implementation of ISO 22000 improve customer satisfaction by present safe product

Answer	Frequency	Percentage
Strongly agree	10	50%
Agree	7	35%
Neutral	3	15%
Disagree	0	0.0%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.16and figure 3.14 we notice that answer of most of the individuals study are (Strongly agree) by (10) and with (50%), followed by whom answer is (Agree) by (7) with (35%), while whom the answer is (Neutral) by (3) with (15%).

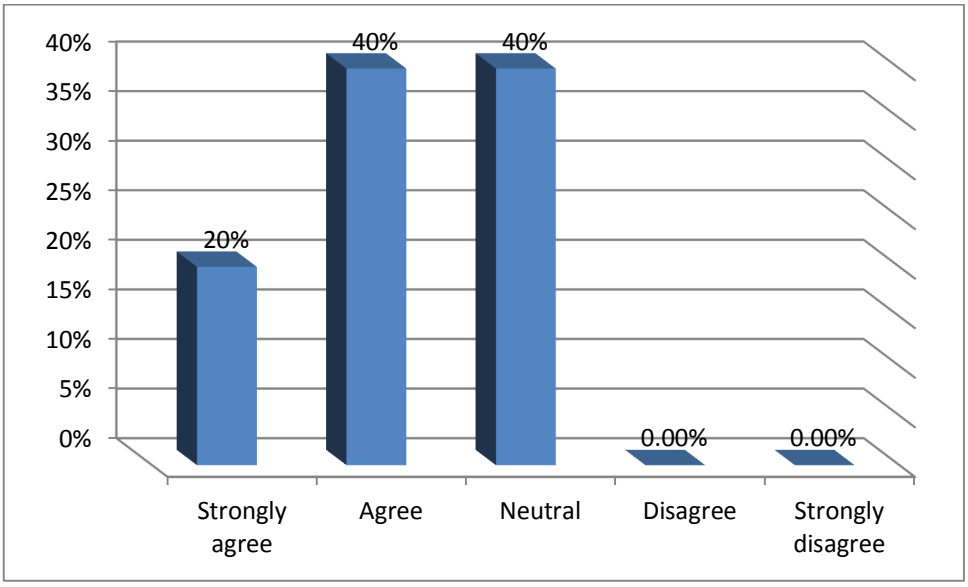

Figure 3.15 the implementation of ISO 22000 improves employee morale

Table 3.17 the implementation of ISO 22000 improves employee morale

Answer	Frequency	Percentage
Strongly agree	4	20%
Agree	8	40%
Neutral	8	40%
Disagree	0	0.0%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.17) and figure 3.15 we notice that answer of most of the individuals study are (Agree and Neutral) by (8) and with (40%), while whom the answer is (Strongly agree) by (4) with (20%).

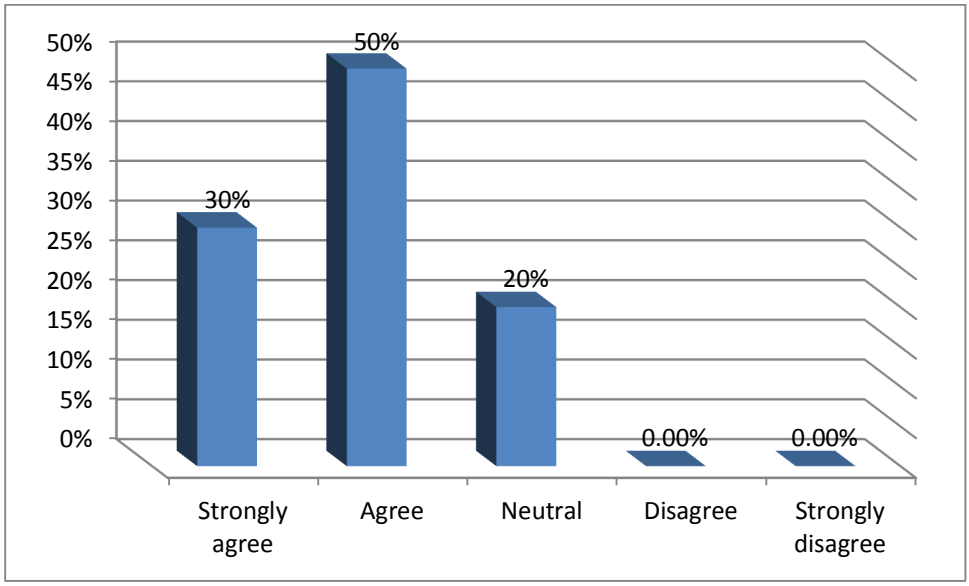

Figure 3.16 the implementation of ISO 22000 enhance image between companies

Table 3.18 the implementation of ISO 22000 enhance image between companies

Answer	Frequency	Percentage
Strongly agree	6	30%
Agree	10	50%
Neutral	4	20%
Disagree	0	0.0%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.18 and figure 3.16 we notice that answer of most of the individuals study are (Agree) by (10) and with (50%), followed by whom answer is (Strongly agree) by (6) with (30%), while whom the answer is (Neutral) by (4) with (20%).

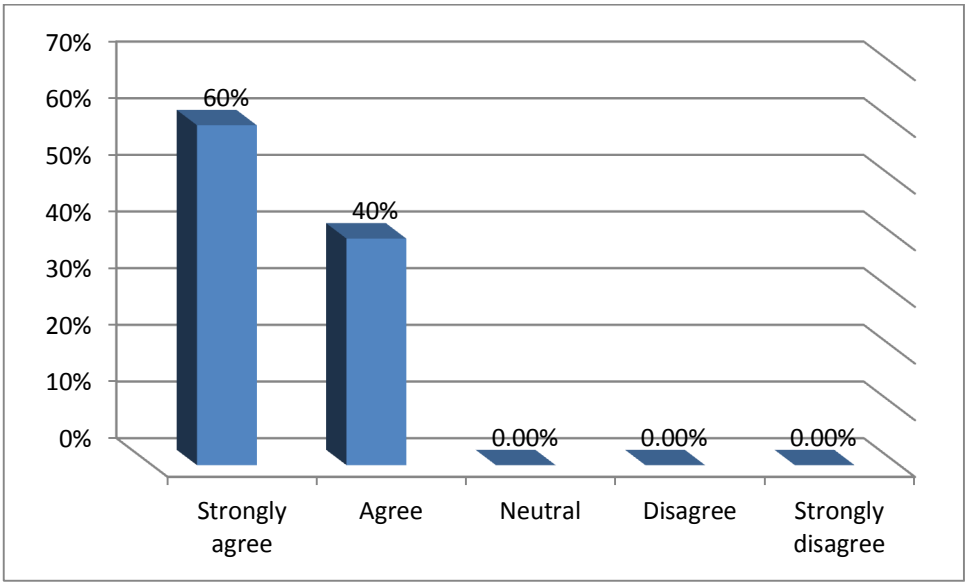

Figure 3.17 the implementation of ISO 22000 lead to Continual improvement.

Table 3.19 the implementation of ISO 22000 lead to Continual improvement.

Answer	Frequency	Percentage
Strongly agree	12	60%
Agree	8	40%
Neutral	0	0.0%
Disagree	0	0.0%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.19 and figure 3.17 we notice that answer of most of the individuals study are (Strongly agree) by (12) and with (60%), while whom the answer is (Agree) by (8) with (40%).

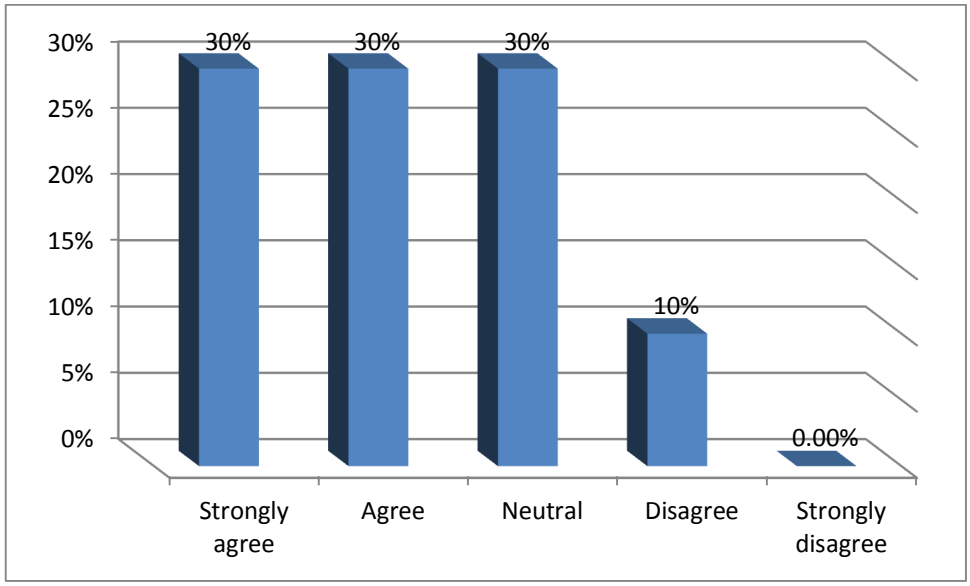

Figure3.18: the implementation of ISO 22000 better communication between departments.

Table3.20: the implementation of ISO 22000 better communication between departments

Answer	Frequency	Percentage
Strongly agree	6	30%
Agree	6	30%
Neutral	6	30%
Disagree	2	10%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.20 and figure 3.18 we notice that answer of most of the individuals study are (Strongly agree, Agree and Neutral) by (6) and with (30%), while whom the answer is (Disagree) by (2) with (10%).

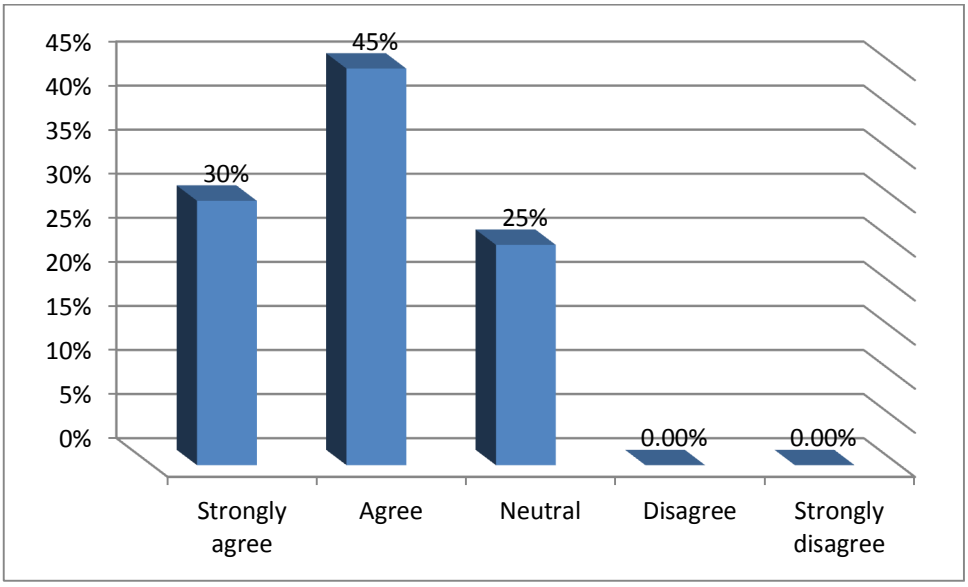

Figure 3.19: the implementation of ISO 22000 develops gaining competitive advantage.

Table3.21:the implementation of ISO 22000 develops gaining competitive advantage.

Answer	Frequency	Percentage
Strongly agree	6	30%
Agree	9	45%
Neutral	5	25%
Disagree	0	0.0%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.21 and figure 3.19 we notice that answer of most of the individuals study are (Agree) by (9) and with (45%), followed by whom answer is (Strongly Agree) by (6) with (30%), while whom the answer is (Neutral) by (5) with (25%).

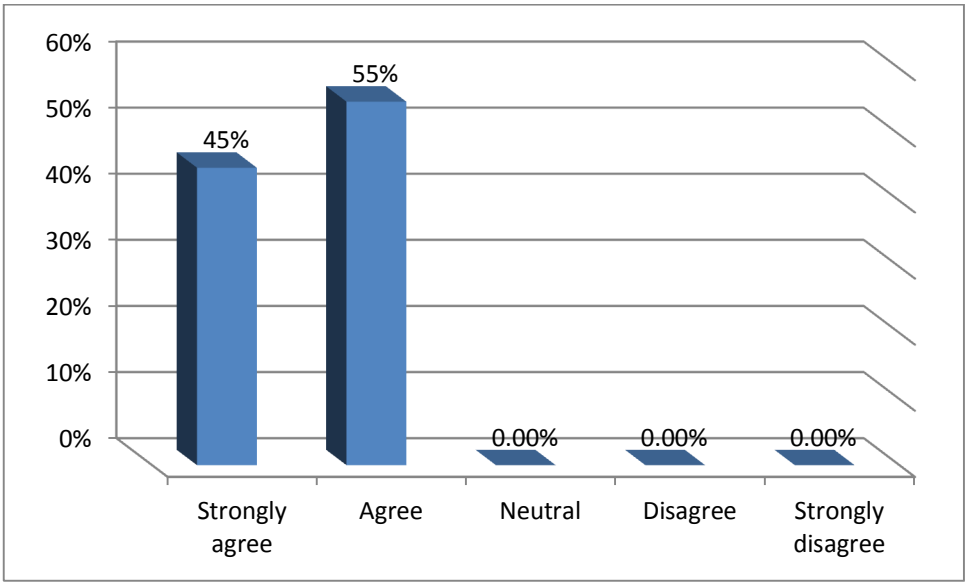

Figure 3.20: the implementation of ISO 22000 develops Improvement in performance.

Table 3.22 the implementation of ISO 22000 develops Improvement in performance.

Answer	Frequency	Percentage
Strongly agree	9	45%
Agree	11	55%
Neutral	0	0.0%
Disagree	0	0.0%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.22 and figure 3.20 we notice that answer of most of the individuals study are (Agree) by (11) and with (55%), while whom the answer is (Strongly agree) by (9) with (45%).

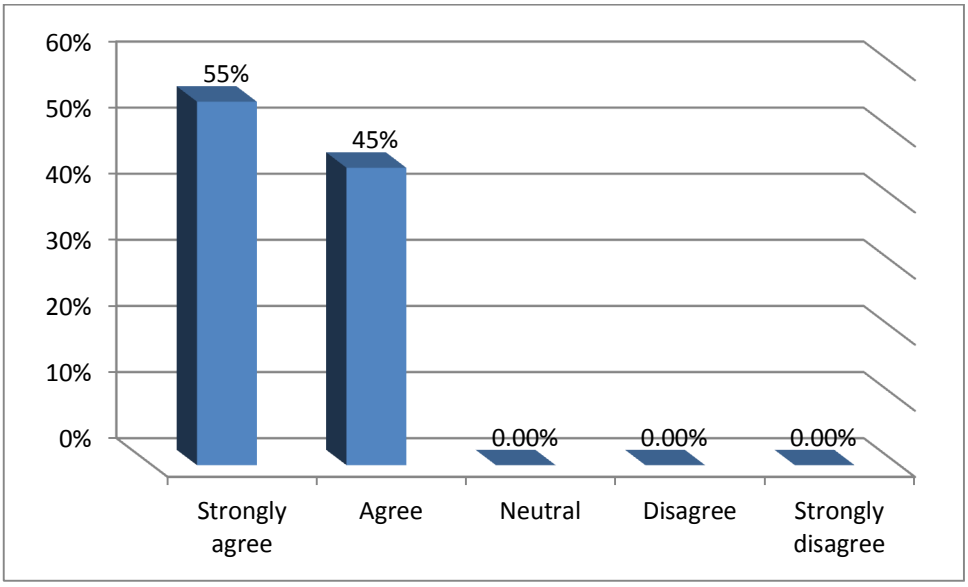

Figure 3.21: the implementation of ISO 22000 develops mentioned CCP in the food safety.

Table 3.23: the implementation of ISO 22000 develops mentioned CCP in the food safety.

Answer	Frequency	Percentage
Strongly agree	11	55%
Agree	9	45%
Neutral	0	0.0%
Disagree	0	0.0%
Strongly disagree	0	0.0%
Total	20	100%

From table 3.23 and figure 3.21 we notice that answer of most of the individuals study are (Strongly agree) by (11) and with (55%), while whom the answer is (Agree) by (9) with (45%).

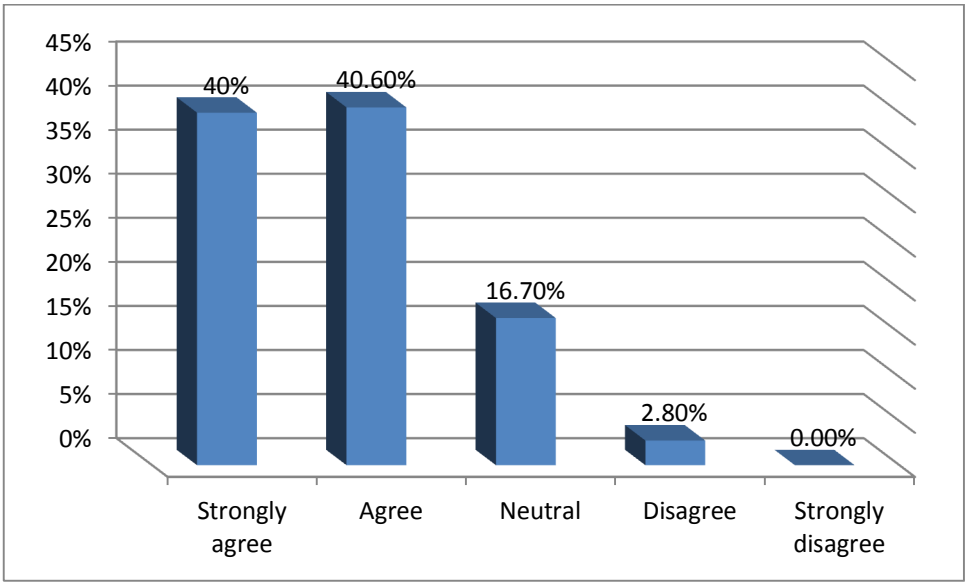

Figure3.22 Frequency test for the third hypothesis

Table 3.24 Frequency test for the third hypothesis

Answer	Frequency	Percentage
Strongly agree	72	40%
Agree	73	40.6%
Neutral	30	16.7%
Disagree	5	2.8%
Strongly disagree	0	0.0%
Total	180	100%

From table 3.24 and figure 3.22 we notice that answer of most of the individuals study are (Agree) by (73) and with (40.6%), followed by whom answer is (Strongly agree) by (72) with (40%), while whom the answer is (Neutral) by (30) with (16.7%).

Table 3.25: Chi square test for the third hypothesis

Phrases	Chi-square value	P-value	Median	Trend
The implementation of ISO 22000 create loyalty in the market	2.800	0.423	-	-
The implementation of ISO 22000 improve customer satisfaction by present safe product	3.700	0.157	-	-
The implementation of ISO 22000 improves employee morale	1.600	0.449	-	-
The implementation of ISO 22000 enhance image between companies	2.800	0.247	-	-
The implementation of ISO 22000 lead to Continual improvement.	0.800	0.371	-	-
The implementation of ISO 22000 Better communication between departments.	2.400	0.494	-	-
The implementation of ISO 22000 develops gaining competitive advantage.	1.300	0.522	-	-
The implementation of ISO 22000 develops Improvement in performance.	0.200	0.655	-	-
The implementation of ISO 22000 develops mentioned CCP in the food safety	0.200	0.655	-	-
Hypothesis	**74.178**	**0.000**	**4**	**agree**

From the table3.25 above:

- The value of chi-square for the first phrase is (2.80) with (p-value=0.423 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
- The value of chi-square for the second phrase is (3.700) with (p-value=0.157 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study.

- The value of chi-square for the third phrase is (1.600) with (p-value=0.449 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
- The value of chi-square for the fourth phrase is (2.800) with (p-value=0.247 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
- The value of chi-square for the fifth phrase is (0.800) with (p-value=0.371 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
- The value of chi-square for the sixth phrase is (2.400) with (p-value=0.494 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
- The value of chi-square for the seventh phrase is (1.300) with (p-value=0.522 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study.
- The value of chi-square for the eighth phrase is (0.200) with (p-value=0.655 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.
- The value of chi-square for the ninth phrase is (0.200) with (p-value=0.655 > 0.05), this indicates that there is no significant differences at the level (5%) between answers of study individuals.

  The value of chi-square for the third hypothesis is (74.178) with (p-value=0.000 < 0.05), this indicates that there is significant differences at the level (5%) between answers of study individuals and in favor of agree.

CHAPTER FOUR

CONCLUSION &

RECOMMENDATIONS

4.1 Discussion

From the data analysis of questionnaires the researcher notice that there was some miss leading answers. From the analysis and according to chi-square tests in the last chapter the **(sig.vaule <0.05)** for the three hypotheses that reject the null hypotheses and accept the research hypotheses that means all research hypotheses is true. The researcher study the impact of implementing ISO22000 in Sudanese food industry by taken the Coca cola Company as case study, the research find out that the coca cola have good working environment and their staff are competent, have technical knowledge, good skills and continual improvement and develops improvement in performance these is main issue in quality management system.ISO 2000 have these issue and more ,so if the Sudanese food industries implement this standard and adopt quality management system this will achieve quality working environment positive trend in performance and results .

4.2 Conclusion

The researcher conclude that Sudanese food industry need adopting food safety management system and other linking standards to gain positive trends in working environments, technical knowledge ,skills and performance.

4.3 Recommendations

The researcher would recommend that Coca Cola Company continue adopting the practicing and implementing of the quality standards certifications and linking with other certifications so as to achieve the sustainable results for people.

The researcher also recommend for other Sudanese industries to adopt and apply quality management system, food management system and other quality system to gain positive trend in performance.

The further research needs to study the impact of implementing ISO22000 with wide scope on the industries performance to have positive indicator.

References:

- آيه القران الكريم
- Business Dictionary (2011).
- Blanc, D. I. (2006). ISO 22000- from intent to implementation. *ISO Management Systems*, Retrieved from http://www.iso.org.ims.
- Corlett, D.A. 1998. *HACCP user's manual.* An Aspen Publication: New York.
- CERCO (2007).
- Cross (1994).
- Dewanti-Hariyadi, R. 2009. *Implementation of Food Safety Management at Industry level in Developing countries: Is GMP/HACCP confusing?* Paper presented at SEAFAST-ICMSF-Borlaug International Seminar and Workshop, Department of Food Science and Technology Bogor Agricultural University, Indonesia, 2-4 December 2009, Bogor.
- Department of Trade and Industry (2000).
- FDA (1999).
- ISO 9000 -2000.
- ISO 9001-2008.
- Lusk *et al* (2011).
- Mcdonald *et al* (2005).

- FAO/WHO, (1999). *Codex alimentarius- food hygiene basic texts*

- Food and Drug Administration, (2009). Hazard analysis and critical control points principles and application guidelines Retrieved from http://www.fda.gov/Food/FoodSafety/HazardAnalysisCriticalControlPointsHACCP/HACCPPrinciplesApplicationGuidelines/default.htm#defs, (para 8-27)

- Fotopolous, C. Gotzamani, K. & Kafetzopoulos, D. 2011. *Critical Factors for effective implementation of the HACCP system: A Pareto analysis*. British Food Journal, 113(5):578-597.

- GFSI. (2007). what is ISO 22000? *The Food Business Forum*

- Henson, S., & Humphrey, J. 2009. *The Impacts of Private Food Safety Standards on the Food Chain and on Public Standard-Setting Processes.* FAO Headquarters: Rome. Hair, F.
- ISO 22000:2005 Standard.

- ISO 22000:2005....What Transition Can it Make in your Food Production Facility?

- ISO. (2011). *The iso story*. Retrieved from http://www.iso.org/iso/about/the_iso_story/iso_story_foreword.htm

- Keener, L. A. (1999). Is haccp enough for ensuring food safety? *Food Testing and Analysis*, (October/November),

- Latimer, J. A. (1997). *Friendship among equals*.

- Mayes, T., & Mortimore, S. (2001). *Making the most of haccp*. Cambridge: Woodhead Publishing Limited

- Menash *et al* (2011).

- Morikawa&Morrison,2004.

- Nowicki, P. A., & Sikora, T. A. (2007). Food safety assurance according to codex alimentarius and iso 22000 standard. *Polish Journal of Food and Nutritional Sciences*, *57*(4), 489-493.

- Prati, R. and A, M. D. 2004. The new ISO 22000 norm on food safety management. Ingredienti Alimentari (Chiriotti Fditori) 3: 19-21.

- Ropkins, K., A, Beck. 2000. Evaluation of worldwide approaches to the use of HACCP to control food safety. *Trends in Food Science and Technology,* 11(2000):10-21.

- South African National Standard. (SANS 2007). *Requirements for a Hazard Analysis and Critical control Point (HACCP) system.* (ISO 10330).

- South African Wine Information. 2011. Statistics. [Online]. Available from: http://www.wine.co.za [Accessed 25/12/2014].

- Surak (2003).

- Surak, J. O. (2006). Strengthening the food safety management system. *Quality Progress*, (October/November),

- Surak, J. O. (2007). A recipe for safe food: Iso 22000 and haccp. *Quality Progress*, (October), Surdick, Matthew, J (2012) .Improving the HACCP system through the application of ISO22000.

- United Nations Industrial Development Organization (UNIDO), (2000). *Hazard analysis and critical control points (haccp)*. Retrieved from http://www.unido.org/doc/31861

- Unneveh, L. and Jensen, H. 1998. *The economic implications of using*

HACCP as a Food Safety Regulatory Standard, (Unpublished research material) Centre for Agricultural and Rural Development, Iowa State University.

- Van der Spiegel, M. 2004. *Measuring the effectiveness of food quality management.* A thesis submitted in fulfilment of the requirements for the degree of Doctorate at the Wageningen University.

- World Health Organization, (1999a). *Clostridium botulinum*. Retrieved from http://www.who.int/csr/delibepidemics/clostridiumbotulism.pdf
- World Health Organization. 2011. *Definition of GMP.* Available from http://www.who.int Accessed [22/12/2014].
- www.dalgroup.com (Accessed 1 /11/2014)
- Yapp, C. & Fairman, R. 2006. *Factors affecting food safety compliance within small and medium-sized enterprises: implications for regulatory and enforcement strategies*. Food Control, 17 (2006):42-51.

Appendix:

Appendix A

The purpose of this survey is to obtain information about employees' views and opinions on the impact of implementing ISO 22000 in food industry in Sudan.
The survey results should serve to promote working conditions and the work environment in general.
Please read carefully every question before answering. You should express your opinions only, without discussing them with fellow co-workers. This is very important because the purpose of the survey is to obtain a true image of your views and opinions on certain issues. It is also recommended that all questions be answered.

No	Statement	1	2	3	4	5
1	Implementing ISO22000 enhance using of software in controlling and analysis					
2	Implementing ISO22000 orgnise knowledge by linking ISO22000 with other implemented standard in company					
3	The implementing of ISO 22000 enhance hazard analysis					
4	Implementing ISO22000 can enhance the competence of staff in food safety					
5	Implementing of ISO 22000 lead to better communication between departments internal and external					

Survey questionnaire was developed using 5point of likert scale

(1=strongly disagree; 2=disagree; 3=neutral: 4=agree; 5=strongly agree)

GENERAL INFORMATION ABOUT YOURSELF

Department: ----------
How long have you worked at coca cola?

☐Less than 2 years ☐More than 2 years
Please cross (X) on the number that best matches to your opinion.

No	Statement	1	2	3	4	5
1	The implementation of ISO 22000 develops considering to lay out and of building associated utilities					
2	The implementation of ISO 22000 enhanced layout of premises including workspace and employee facilities					
3	The implementation of ISO 22000 develops visual inspection in transportation and storage.					
4	The implementation of ISO 22000 enhances Controlling personnel hygiene and cleaning.					
5	The implementation of ISO 22000 helps in managing waste effectively.					

Thank you for your cooperation

No	Statement	1	2	3	4	5
1	The implementation of ISO 22000 create loyalty in the market					
2	The implementation of ISO 22000 improve customer satisfaction by present safe product					
3	The implementation of ISO 22000 improve loyee morale					
4	The implementation of ISO 22000 enhance ...ge between companies					
5	The implementation of ISO 22000 lead to Continual improvement.					
6	The implementation of ISO 22000 Better communication between departments.					
7	The implementation of ISO 22000 develops gaining competitive advantage.					
8	The implementation of ISO 22000 develops Improvement in performance.					
9	The implementation of ISO 22000 develops mentioned CCP in the food safety					