

CHOICES AND COMBINATIONS OF QUALITY, HACCP AND SAFETY STANDARDS IN THE FOOD MANUFACTURING SECTOR

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Abstract

The International Standards Organisation (ISO) 9001 standard facilitates the implementation of a quality management system which in its early infancy was the only standard available to food manufacturers for standardisation purposes. With the introduction of Hazard Analysis Critical Control Point (HACCP) systems and more recently the promotion of ISO 22000 which are more appropriate for food manufacturers has created some anxiety as to what standards to implement. Some ISO 9001 food manufacturing organisations are considering implementing ISO 22000 food standard as a replacement for ISO 9001, some are just adding SANS 10330, a HACCP standard, whilst some want to implement ISO 22000 as an additional standard. This paper reports on an investigation of the choice of standards that management prefers. The study consists of comparative analyses of the standards, an empirical determination of management's preferred choices of standards or combinations of standards and the study of the implementation of ISO 22000 at the Mhlume Sugar Factory in Swaziland (Royal Swazi Sugar Corporation). The findings shows that an ISO 9001 certified organisation can add SANS 10330 and be equivalent to ISO 22000 depending on customer and market requirements. It is also shown that management have the least preference for ISO 9001 only, and prefer both ISO 9001 and ISO 22000 certificates. The greatest preference was for an integrated ISO 9001 and ISO 22000 system. The implementation at Mhlume shows that the ISO 9001 system and be combined with the ISO 22000 system. The benefit of this contribution is to inform management of the similarities and differences between quality, HACCP and food safety systems and the possibility of combining them.

Keywords: ISO 9001, food safety, ISO 22000, food quality, HACCP, SANS 10330

Introduction

In today's industrial world the essence of adequate delivery to customers is based on predetermined standards. How can an organisation satisfy the needs and expectations of their customers consistently and with confidence?

Funk (2008) defined a standard as:

- A set of parameters used to determine what is acceptable.
- A level of expectations designed to bring out the best.
- A set of realistic and consistent guidelines set to achieve goals.
- A tool to measure performance for benchmarking and performance improvements.

Some important benefits of standardisation are:

- Improving the suitability of products, processes and services for their intended purposes and markets, and meeting customer requirements.
- Promotion of global trade through the implementation of recognised and prescribed international standards.
- Preventing unsafe products from reaching consumers through the use of regulatory standards which ensure that certain safety measures are compulsory.

Standardisation and consistency no longer relate only to quality in the food sector, but have been extended to the arena of food safety. Ramnauth *et al.* (2008) report that a predominant challenge of this age is the production of safe food because of the increasing opportunities for food contamination. Nguyen *et al.* (2004) also report that the recorded incidents of infection from food-borne pathogens are increasing and the need for food safety programs are growing stronger.

Since 1987, food manufacturing organisations have implemented the quality based international standard ISO 9001 rather vigorously, and have used this standard as a tool to gain consumer confidence and to ensure that organisations are capable of consistently meeting quality and service objectives (Surak, 1999).

With the formation of the World Trade Organisation (WTO), which superseded the General Agreement on Tariff and Trade (GATT) in 1995, is an umbrella body for international trade. They established two relevant agreements linking to food safety; Sanitary and Phytosanitary Measures (SPS) and the agreement on Technical Barriers to Trade (TBT). These two agreements include the requirements for the protection of human and animal life from additives, contaminants, toxins, or disease-causing organisms in their food and their transfer between countries. Member governments agreed through these agreements to use relevant international standards, such as Codex Alimentaris (created in 1963), to develop a system for meeting current and future food safety needs of the worlds food supply, hence reducing the food-borne health risks. This system was termed HACCP (hazard analyses control and critical point system).

This led to a plethora of different types of national and localised food safety standards, which then led to confusion regarding requirements, to increased costs and complications for suppliers that have to conform to multiple programs and systems. With a driving need to harmonise standards internationally, the ISO 22000 food safety standard was formalised in 2005.

Many food manufacturing organisations are now subjected to complying with the requirements of ISO 9001 quality standards, HACCP standards and ISO 22000 food safety standards. Some of these organisations are questioning the need to comply with multiple standards, and some companies are even considering abandoning ISO 9001 altogether in favour of ISO 22000.

The intention of this paper is to provide some information regarding multiple standards in the South African food manufacturing industry, and to suggest some views on how to manage them. Conclusions are based on empirical research after the implementation of ISO 22000:2005 at the Mhlume sugar factory in Swaziland.

Background to ISO standards

ISO 9000 quality family

ISO 9000 is a family of standards for quality management systems. This standard is used worldwide by businesses and organisations large and small, in public and private sectors, by manufacturers and service providers, and in all economic sectors of activity. An ISO survey of certifications published by the ISO central secretariat (www.iso.org AC Nielsen) shows that up to the end of December 2007, at least 951 486 ISO 9001:2000 certificates had been issued in 175 countries and economies. Of this total, South African organisations received 3283 certificates. This shows the growth and popularity of this standard since its inception in 1987. The series of standards within the ISO 9000 family is given below.

ISO 9000:2000: Quality management systems – Fundamentals and vocabulary covers the basics of quality management systems and defines the core vocabulary of the ISO 9000 series of standards.

ISO 9001:2008: Quality management systems – Requirements provides a number of requirements which an organisation needs to fulfill if it is to achieve customer satisfaction through consistent delivery of products and services which meet customer expectations. The major requirements are a current and up to date quality management System, demonstration of management responsibility towards the promotion and awareness of quality, provision of adequate and appropriate resources, methods and techniques of product and service realisation, the measurement analysis of both instrumentation and methods and the improvement of the various processes.

ISO 9004:2000: Quality management systems – Guidelines for performance improvements provides guidelines on how to determine the maturity of an ISO system and identifies the various areas for improvement towards best practices and world class performance.

Different versions

The ISO 9001 standard has also been changing from 1987, with improvements being incorporated into new versions. An outline of the versions are as follows:

1987 version

ISO 9000:1987: had the same structure as the UK Standard BS 5750, with three ‘models’ for quality management systems, the selection of which was based on the scope of activities of the organisation:

ISO 9001:1987: Model for quality assurance in design, development, production, installation, and servicing was intended for companies and organisations whose activities included the creation of new products.

ISO 9002:1987: Model for quality assurance in production, installation, and servicing had basically the same material as ISO 9001, but did not cover the creation of new products.

ISO 9003:1987: Model for quality assurance in final inspection and test - covered only the final inspection of finished product, with no concern for how the product was produced.

1994 version

ISO 9000:1994 emphasised quality assurance via preventive actions, instead of just checking final product, and continued to require evidence of compliance with documented procedures. As with the first edition, the down-side was that companies tended to implement its

requirements by creating shelf-loads of procedure manuals, and became burdened with an ISO bureaucracy. In some companies, adapting and improving processes could actually be impeded by the quality system.

2000 version

ISO 9001:2000 combined the three standards of 9001, 9002 and 9003 into one, called 9001. Design and development procedures are required only if a company does in fact engage in the creation of new products. The 2000 version sought to make a radical change in thinking by actually placing the concept of process management front and center. Process management was the monitoring and optimising of a company's tasks and activities, instead of just inspecting the final product. The 2000 version also demands involvement by upper executives, in order to integrate quality into the business system and avoid delegation of quality functions to junior administrators. Another goal is to improve effectiveness via process performance metrics, i.e. numerical measurement of the effectiveness of tasks and activities. Expectations of continual process improvement and tracking customer satisfaction were made explicit.

2008 version

ISO 9001:2008 only introduces clarifications to the existing requirements of ISO 9001:2000 and some changes intended to improve consistency with ISO 14001:2004. There are no new requirements. A quality management system being upgraded simply needs to be checked to see if it is following the clarifications introduced in the amended version. According to a report by the Praxiom Research Group (www.praxiom.com) the differences between the 2008 and 2000 standards are:

- Outsourced processes need to be identified and specified in terms of the type, the nature and extent of control and that the original owner of the process is still responsible for ensuring customer, regulatory and statutory requirements.
- Documents and records necessary for planning, operating and controlling quality management processes need to be maintained, in addition to those required by the standard.
- Need to identify and control the distribution of only those external documents required (previously not defined) to plan and operate the quality management system.
- The management representative must be a member of the organisation's own management. Previously external parties were considered acceptable as management representatives.
- All quality management system personnel (those that directly or indirectly influence product and service quality) must be competent.
- Information systems are added as part of the infrastructure.
- The work environment is now defined as 'working conditions' and include issues such as noise, temperature, humidity, lighting and weather.
- Customer post-delivery requirements include warranty provisions, contractual obligations (maintenance) and supplementary services (recycling and disposal).
- Design and development outputs include information on how the product is preserved during product and service provision.
- Monitoring and measuring devices are replaced with monitoring and measuring equipment (including software).
- Post-delivery data can be used to evaluate customer satisfaction.
- All records of internal audits and activities need to be maintained.

- The impact of each process on the quality management system when deciding on the monitoring and measurement method needs to be evaluated and documented.
- Records must specifically indicate who released the product(s) for delivery to the customer.

The ISO 9000 quality system is guided by eight principles which are: (i) customer focus, (ii) leadership, (iii) process approach, (iv) system approach, (v) factual approach, (vi) involvement of people, (vii) mutually beneficial supplier relationships and (viii) continual improvement.

HACCP – SANS 10330:2007

HACCP is a systematic, preventive and scientific approach for assuring food safety (Nguyen *et al.*, 2004) which addresses physical, chemical and biological hazards as a means of prevention rather than finished product inspection. HACCP is used in the food industry to identify potential food safety hazards, so that key actions, known as Critical Control Points (CCPs) can be taken to reduce or eliminate the risk of the hazards being realised, thereby protecting public health. The system is used at all stages of food production, and 'preparation' included packaging and distribution. Basically, HACCP is implemented to protect food from contaminants, and to minimise the effects of contamination where this does occur. It is a combination of three elements – principles of food microbiology, quality control and risk assessment (Amjadi and Hussain, 2005).

HACCP was conceived in the 1960s when the US National Aeronautics and Space Administration (NASA) asked Pillsbury to design and manufacture the first foods for space flights. Since then, HACCP has been recognised internationally as a logical tool for adapting traditional inspection methods to a modern, science-based, food safety system.

A standard for the implementation of HACCP (SANS 10330:2007) was developed by the South African Bureau of Standards (SABS), based on ISO 9001:2000.

HACCP consists of seven principles: (i) conduct a hazard analysis, (ii) determine critical control points, (iii) establish critical control point monitoring requirements, (iv) establish corrective actions, (v) establish record keeping procedures and (vi) establish procedures for ensuring the HACCP system is working as intended.

The HACCP principles enhance food safety management systems and product quality. It instantly demonstrates a commitment to producing or trading in safe food, which can be particularly beneficial when the supplier is subject to inspection by regulatory authorities or stakeholders. Demonstrating a real commitment to food safety can transform brand and corporate images and act as an effective entry-to-market tool, opening up new business opportunities around the world.

HACCP requires prerequisite programs (PRPs). A PRP is defined in SANS 10330:2007 as a specified procedure of instruction that enhances or maintains operational conditions to enable more effective control of food safety hazards or control the likelihood of introducing food safety hazards and their contamination into the product or the processing environment. SANS 10330:2007 contains the list of PRPs.

ISO 22000

The idea of harmonising all the relevant national food and food safety standards on an international level was initiated by the Danish Standards Association, which eventually led to the release of an international food standard ISO 22000 in 2005 (Joppen, 2005). Surak (2007) indicates the following characteristics of this standard:

- Can be used by all organisations in the food chain.
- Enhances all principles and implementation of HACCP.
- Provides an auditable standard.
- Ensures that processes to control food safety are validated, verified, implemented, monitored and managed.

ISO 22000:2005 is thus an international certification standard that defines the requirements for effective food safety management systems. It can be used by organisations throughout the supply chain – from farmers and ingredient suppliers, to food services, processors, transportation and storage companies, retailers and packaging companies. The standard requires the definition of management's responsibility and commitment, the various documents, relevant communication procedures, emergency procedures, management reviews, resource planning, identification of prerequisite programs, effective HACCP systems, tractability procedures, procedures for the identification, handling and disposal of non-conforming products, withdrawal of unsafe products, monitoring and measurement of methods and equipment, and a verification methodology.

The ISO 22000 system is intended to address food safety concerns and can also be used to respond to other food-specific concerns, such as ethical issues and consumer awareness. The standard aims at harmonising the requirements for food safety management within the food chain on a global level.

ISO 22000 combines generally recognised key elements to ensure food safety all along the food chain; from raw materials to the point of consumption. These elements include:

Interactive communication. All relevant food safety hazards along the food chain need to be identified and adequately controlled at each step. To ensure that this happens, communication between organisations both upstream and downstream in the food chain is essential. Communication with customers and suppliers about identified hazards and control measures will assist in clarifying customer and supplier requirements and how these impact on safety of the end product. It is important that an organisation recognises its role and position within the food chain in order to ensure effective interactive communication and safe delivery of goods to the consumer.

System management. For a food safety initiative to be effective, it needs to be established, operated and updated within the framework of a structured management system that is incorporated into the overall management activities of the organisation. The ISO 22000 standard has been aligned with ISO 9001 in order to enhance the compatibility of the two standards. It can, however, be implemented independently of other management system standards.

Prerequisite programmes. PRPs in the context of food safety are those conditions and activities that are necessary to maintain a hygienic environment throughout the food chain.

They also include those activities which facilitate an environment which is suitable for the production, handling and provision of safe end products and food for human consumption. Such programmes, depending on the location of the organisation in the food chain, include Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), Good Veterinarian Practices (GVP), Good Hygienic Practices (GHP), Good Production Practices (GPP), Good Distribution Practices (GDP) and Good Trading Practices (GTP). In the development of a food safety management system, the prerequisite programmes can be likened to the requirement for a student to achieve a minimum qualification standard before gaining entry to a tertiary education programme, in that, without the prerequisite programmes being in place, the system cannot be implemented. GMPs include but are not limited to washing of hands prior to entering food production areas, covering of hair when entering food production areas, pest control and cleaning and sanitation programmes.

HACCP principles. Hazard analysis is an important step for an effective food safety management system in that it assists in organising the knowledge required to establish an effective combination of control measures. ISO 22000 requires that all hazards that may be reasonably expected to occur in the food chain, be identified and assessed; including those that may be associated with the type of process and facilities used. In this way, the standard integrates the principles of HACCP and its application steps as developed by the Codex Alimentarius Commission.

These requirements are auditable as they combine the HACCP plan with prerequisite programmes. In conducting the hazard analysis, the organisation is able to select the appropriate strategy for ensuring that hazards are controlled, by combining prerequisite programmes, operational prerequisite programmes and the HACCP plan. Operational prerequisite programmes are activities identified as essential for controlling the likelihood of introducing food safety hazards to and/or the contamination or proliferation of food safety hazards in the food product or processing environment.

Comparisons of standards

Table 1 provides an analysis of the SANS 10330: 2007, ISO 9001:2008 and ISO 22000:2005 standards. The purpose of this analysis was to identify the deficiencies within ISO 9001: 2008.

Table 1. Comparative analyses of SANS 10330:2007, ISO 9001:2008 and ISO 22000:2005.

Topic	HACCP SANS 10330:2007	ISO 9001:2008	ISO 22000:2005
	Hazard identification and control, PRPs	Quality management system	Food management system, PRPs
Scope	HACCP management system	Quality management system	Food safety management system
Application	Organisations that wish to prevent biological, chemical and physical hazards in food	All organisations including food organisations	Organisations in the food chain
Exclusions	N/A	Limited to clause 7	No exclusions
Risk analyses	Required	Not required	Required
Policy	N/A	5.3. Quality policy	5.2. Food safety policy
Senior management commitment and	5. Management responsibility	5.1 Management commitment	5.1 Management commitment

Topic	HACCP SANS 10330:2007	ISO 9001:2008	ISO 22000:2005
continual improvement		5.4 Planning 5.5 Responsibility, authority and communication 5.6 Management review 8.5 Improvement	5.8 Management review
Food Safety planning	8. HACCP study requirements		7.4 Hazard analysis 7.5 Establishing the operational prerequisite programs 7.6 Establishing the HACCP plan
Food safety and quality policy	5.1 General	4.2.1 General 5.1 Management commitment 5.3 Quality policy	5.2 Food safety policy
Manual	4.1 The HACCP manual	4.2.2. Quality manual	
Organisational structure, responsibility and management authority	5. Management responsibility	5.5 Responsibility, authority and communication	5.4 Responsibility and authority
Representative	5.2 Management representative	5.5.2 Management representative	5.5 Food safety team leader
Contract review and customer focus		5.2 Customer focus 7.2 Customer-related processes 8.2.1 Customer satisfaction	5.6 Communication
Internal audit	8.12.2.2 Internal audits	8.2.2 Internal audit	8.4.1 Internal audits
Purchasing-supplier approval and performance monitoring	6.2(l) PRP for control of suppliers	7.4 Purchasing	7.2 PRPs 7.3.3 Product characteristics
General documentation requirements	8.13.1 Document control	4.2.3 Control documents 4.2.4 Control of records	4.2.2 Control of documents 4.2.2 Control of records 7.7 Updating of PRPs
Corrective and preventive action	7. Corrective action 6.2(k) PRP for traceability and product recall	8.5.2 Corrective action 8.5.3 Preventive action	8.5.1 Continual Improvement 7.10.2 Corrective actions 5.7 Emergency preparedness and response 7.2 PRPs
Traceability	6.2(k) PRP for traceability and product recall	7.5.3 Identification and traceability 7.5.4 Customer property	7.9 Traceability system
Production and service provision	8. HACCP study using the 12 stage principles:	7.5.1 Production and service provision 7.5.2 Validation of production and service provision 7.5.5 Preservation of product	7.2 PRPs 7.6.1 HACCP plan 8.2 Validation of control measure combinations
Operations Environment	6. PRPs	6.3 Infrastructure 6.4 Work environment	7.2 PRPs
Staff facilities, hygiene, housekeeping, waste removal, pest control	6. PRPs	6.3 Infrastructure 6.4 Work environment	7.2 PRPs

Topic	HACCP SANS 10330:2007	ISO 9001:2008	ISO 22000:2005
hemical and physical product contamination control	6. PRPs	7.5 Production and service provision	7.2 PRPs
Foreign body detection		7.5 Production and service provision	7.2 PRPs
Product packaging and ingredients		7.5 Production and service provision	7.3.3.1 Raw materials, ingredients and product-contact materials
Storage and transportation	6. PRPs	7.1 Planning of product realisation 7.5.4 Customer property	7.2 PRPs
Planning of product realisation	6. PRPs	7.2.1 Determination of requirements related to the product 7.2.2. Review of requirements related to the product 7.2.3. Customer communication	7.3.4 Intended use 7.3.5 Flow diagrams, process steps and control measures 5.6.1 External communication
Product design development	8.12.3 HACCP plan review	7.3 Design and development	7. Product realisation
Product inspection and laboratory testing	8.12.2.1The HACCP team shall establish a system for the verification of all HACCP procedures and records. Verification and auditing methods, procedures and tests, including random sampling and analysis, shall be used, as appropriate, to determine the effectiveness of the HACCP.	7.5 Production and service provision	7.2 PRPs 8.2 Validation of control measure combinations
Control of non-conforming product		8.3 Control of non-conforming product	7.10 Control of non-conformity
Product release	8.11 Establish corrective action plans (only for unsafe product)	8.2.4 Monitoring and measurement of product 8.3 Control of non conforming product	7.6.5 Actions when monitoring results exceed critical limits 7.10 Control of non-conformity
Complaint handling	5.4.3 Management review (Review of complaints and recall incidents)	7.2.3 Customer communication	5.6 Internal and external communication
Control of operations	8.10 Establish a monitoring system for each CCP	7.1 Planning of product realisation 7.5 Production an service provision	7. Planning and realisation of safe products
Calibration and control of measuring equipment	6. PRPs	7.6 Control of monitoring and measurement equipment	8.3 Control of monitoring and measuring equipment
Training	6. PRPs	6.2 Human resources	6.1 Provision of resources 6.2 Human resources
Medical screening	6.2 PRPs		7.2 PRPs
Protective clothing for employees and visitors to production areas	6 PRPs		7.2 PRPs

The deficiencies within the ISO 9001:2008 standard are indicated by the shaded areas. These deficiencies can be accommodated by the implementation of the ISO 10330: 2007 standard. In other words, organisations that are ISO 9001: 2008 compliant can implement ISO 10330: 2007 in parallel and be equivalent to an ISO 22000: 2005 organisation. This is mathematically shown as:

$$\text{ISO 9001 + HACCP (SANS10330:2007) = ISO 22000}$$

This may seem mathematically correct. However, two methods were used to verify this. One method involved empirical research to determine the extent to which management believed in this equation and the other method was to study the implementation of ISO 22000:2007 in an organisation that was already certified to ISO 9001 standards.

Empirical research

Methodology

A preliminary research study was conducted to evaluate the thinking of South African food manufacturing organisations on the subject of the ISO 9001, SANS 10330 and ISO 22000 standards. The research was conducted by developing a questionnaire which was subsequently e-mailed to 150 managers in the food manufacturing sector nationally. The response rate was 67% (100 replies were received). The main sections of the questionnaire included the following:

- Determination of the organisational position of the manager. The choices given were executive management, senior management, and middle management.
- Determination of the manager's knowledge of the ISO 9001, SANS 10330 and ISO 22000 standards. The respondent had the following choices against each standard: 1 = No knowledge, 2 = some knowledge, 3 = general knowledge, 4 = good knowledge, or 5 = excellent knowledge.
- Determination of the level of agreement of six statements (dimensions) on a seven-point likert scale. (1=low agreement and 7 = high agreement). The respondents were requested to indicate the level of agreement on the following combinations of the standards in a food manufacturing environment: 1 = ISO 9001 only, 2 = ISO 22000 only, 3 = SANS 10330 only, 4 = ISO 9001 + ISO 22000, 5 = ISO 9001 + SANS 10330, 6 = ISO 9001 + 22000 (integrated).

Results

The responses from managers who indicated that they had no knowledge or only limited knowledge of any of the standards, were rejected. Rejects amounted to 27, hence there were only 73 acceptable responses. The statistical analyses of the data conducted with SPSS V15 for Windows software after the responses were coded onto an EXCEL spreadsheet. The results are shown in Tables 2 to 4 and Figure 1.

Table 2 shows that 8,2% of the respondents were in executive management, 19,2% in senior management and 53% in middle management. It is assumed that this is the levels of management that are responsible for decisions for the implementation of management systems.

Table 2. Organisational position of respondent.

Managerial level	Frequency	Percentage
Executive	6	8.2
Senior	14	19.2
Middle	53	72.6
Total	73	100.0

Since the data collected indicating the manager's level of knowledge was ordinal it was decided to use median as the central indicator of the data. Table 3 shows the results of this data. It can be seen that all managers have more than simply general knowledge of all standards (>3).

Table 3. Level of knowledge of standards.

Standard	Managerial level		
	Executive	Senior	Middle
ISO 9001	4.3	4.5	4.0
ISO 22000	3.8	3.7	4.1
SANS 10330	4.3	4.3	4.3
Mean	4.0	4.2	4.1

Table 4 and Figure 1 show the calculated means of the responses per type of manager and the mean of all managers per dimension. Since there is not must variation between the levels of management per dimension the discussion will focus on the overall means of each dimension.

Table 4. Level of agreement of respondents on choice of standards on a scale of 1 to 7.

Standard	Executive	Senior	Middle	Mean	Rank
ISO 9001 only	1.5	1.5	1.9	1.7	6
ISO 22000 only	4.0	4.3	4.6	4.3	4
SANS 10330 (HACCP) only	3.2	2.9	3.5	3.2	5
ISO 9001 + ISO 22000	5.3	4.3	4.3	4.4	3
ISO 9001 + SANS 10330	4.7	3.9	4.8	4.5	2
ISO 9001 + ISO 22000 integrated	5.5	5.9	5.0	5.3	1

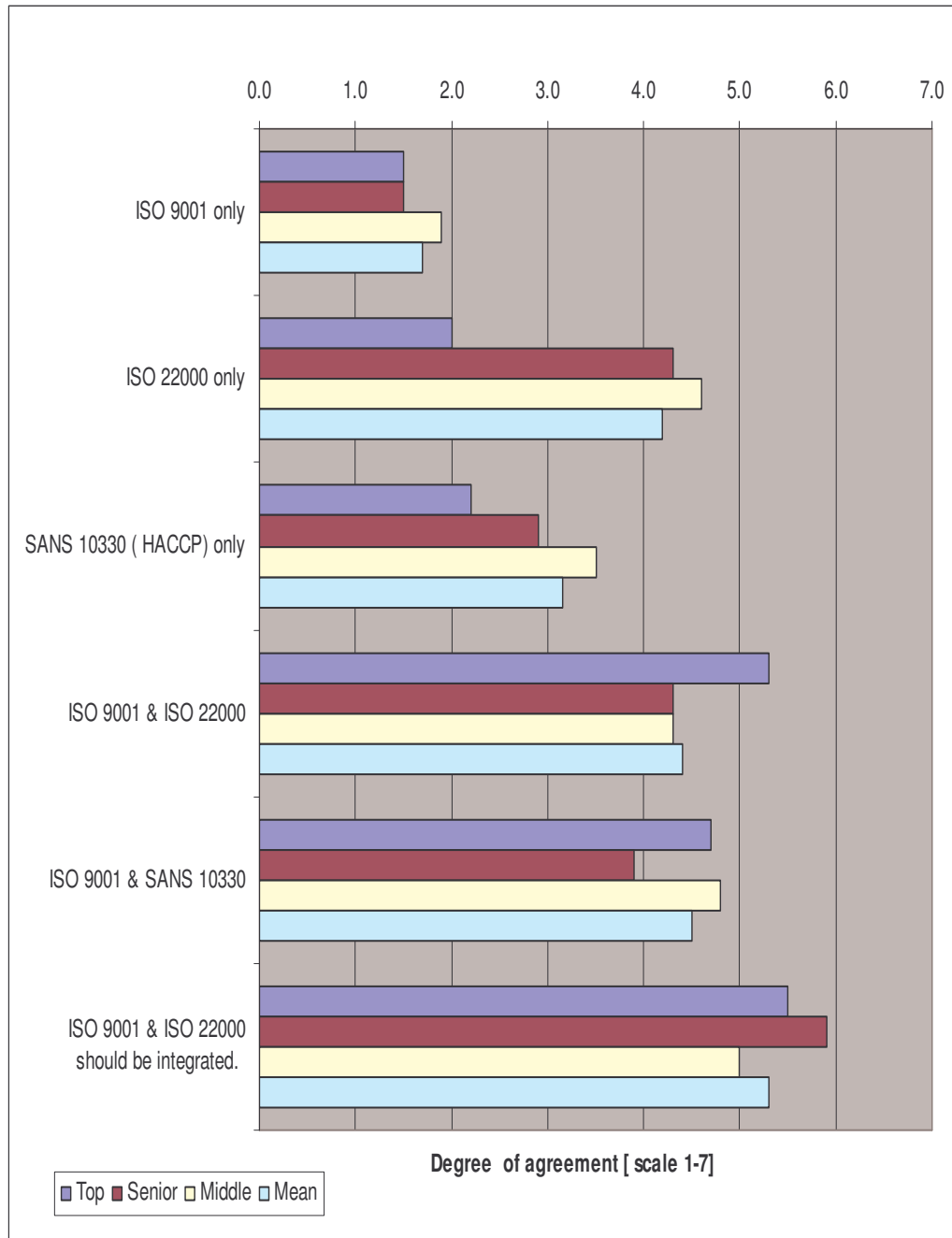


Figure 1. Level of agreement of managers on the choice of standards.

ISO 9001 only

The preference for ISO 9001 only for a food manufacturer was the lowest.

SANS 10330

The preference for the implementation of SANS 10330 only was 3.2 on the likert scale and ranked at number 5, showing that management had a higher preference for HACCP only than for ISO 9001 only.

ISO 22000 only

This had a mean of 4.3 and ranked fourth in order of preference.

Combined systems

The preference for ISO 9001 combined with ISO 22000 had a mean of 4.4, and the mean for the preference for ISO 9001 combined with SANS 10330 was 4,5. The mean for the integration of ISO 9001 and ISO 22000 was 5.3 and ranked at number one.

Conclusion from the research

Since the mean preference is for ISO 22000 only almost the same as the mean preference for ISO 9001 and SANS 10330, it can be concluded that in terms of preference:

ISO 9001 + HACCP (SANS10330:2007) = ISO 22000.

CASE STUDY

Implementation of ISO 22000 at Royal Swazi Sugar Corporation

Introduction

The Royal Swazi Sugar Corporation (RSSC) is the largest employer in Swaziland, being both a grower and miller of sugarcane. RSSC is listed on the Swaziland Stock Exchange and consists of two sugar mills, Mhlume and Simunye, as well as a distillery based at Simunye. The two production sites manufacture brown (very high pol – VHP) sugar, white sugar is produced in Mhlume. The distillery produces a potable alcohol spirit, and recently rolled out a project for bio-ethanol. The bulk of the products manufactured by RSSC are for export to Europe, East Africa and the Southern African Customs Union (SACU) regions.

Why RSSC refinery implemented ISO 22000

Changes in the marketing climate of sugar, such as the reform of the European Union (EU) Sugar Regime in the past two to three years have posed a threat to African, Caribbean and Pacific (ACP) developing countries exporting sugar into the EU. Many of these developing countries lost guaranteed markets for the export for their raw sugar as provided for in the former EU Sugar Regime. However, a new market emerged, which was that for direct consumption (DC) sugar. The EU DC sugar market demands extremely high standards of product quality and hygiene, as well as stringent environmental standards for product manufacture. It was important for RSSC to seriously consider the means of meeting these requirements if it was to continue to be a viable player in the sugar market. RSSC therefore took on the challenge of implementing a food safety management system (ISO 22000: 2005) which was focused, coherent and could be integrated into an existing system management framework. A key enabler of this was RSSC's certification to ISO 9001, ISO 14000 and OHSAS 18000.

Further to the threatening market climate, there was an increasing demand from customers for the provision of objective evidence of an effective food safety management system. External third party and direct customer audits required criteria such as glass registers, hazard analysis and HACCP plans; all of which are components of a food safety management system. For RSSC to retain and grow its customer base, it became increasingly evident that there was a need to implement a system that would address the needs of customers and markets.

Challenges of implementing ISO 22000 and interventions taken

With RSSC having had in place other ISO systems for some time, the expectation was that the ISO 22000 standard would simply be an 'add-on'; this however, turned out not to be the case at all. Some of the challenges faced and overcome in the implementation of the ISO 22000 standard at RSSC are outlined below.

Mindset change: As an organisation, RSSC needed to focus on product safety as an objective outcome. This was very different from the previous mindset that had existed during the implementation of ISO 9000 where the focus was on 'writing what you will do and doing what you have written'; in which case, the organisation defined its own outcomes. The outcome of a food safety management system was a product safe for consumption. The standard also had rigorous predefined requirements as opposed to self-defined outcomes. In this regard, the food safety management system developed by RSSC had to demonstrate that key elements of the standard were addressed, such as communication, a documented system that was effective and actively implemented, prerequisite programmes and a HACCP plan as outlined by the Codex Alimentarius Commission.

Intervention on the challenge: Several interventions were taken to deal with the challenge of changing mindsets in order to implement the food safety management system:

The concepts of 'clean' and 'dirty' factory production areas were used to differentiate between high risk production areas and areas of less risk. This concept was implemented in tangible ways that would communicate to employees, contractors and visitors that behavioural changes were required when entering 'clean' factory areas. A change of protective clothing from blue to white was implemented, the use of hair and beard nets was introduced, hand washing facilities were provided at entrances and thus all who entered 'clean' factory areas were required to scrub before entry could be allowed. Furthermore, engineering staff working in these 'clean' factory production areas were required to use tools dedicated to these areas in order to prevent cross contamination.

Training across all levels of the factory was yet another intervention taken to raise the level of awareness about the system being introduced. The training focused on the new requirements for personal hygiene, protective clothing requirements and prerequisite programmes and their importance for the implementation of the standard.

Lack of awareness of system requirements: When the decision to implement a food safety management system was taken, there was no appreciation of the intense requirements of the system. It was anticipated that a HACCP plan could be incorporated into the existing quality manual and that that would be sufficient to achieve certification. It soon became evident that there was a lack of awareness of the system's requirements.

Intervention on the challenge: It was important that the organisation embark on extensive training, which was conducted as dictated by the need. Initial training was conducted by using an external facilitator who employed a generic training programme. It was evident following a few weeks of training and some internal audits that the generic training had had minimal impact. Consequently, an in-house training programme was developed. This was targeted at all groups throughout the organisation and was developed around five basic questions:

1. What is food hygiene?
2. Why are we at RSSC concerned about it?
3. How do we achieve it?
4. What is the ISO 22000 system?

5. How does it relate to my job?

Knowing the low impact achieved by the initial training, it was realised that the effectiveness of training had to be verified. This was done through pre and post training tests. The results were useful as they indicated areas that had not been well understood, and where additional focused training could be undertaken. It was also found that some activities conducted by operators had to be re-contextualised in light of the requirements of the ISO 22000 system.

Rigorous management of illness at work

The implementation of a food safety management standard required that a rigorous approach be taken towards illness at work. The challenge found by RSC was that the approach to illness had previously not been rigorous at all. It was necessary to review the management of illness at work, particularly in areas where, according to the hazard analysis, illness of employees could pose a threat to product safety. Illnesses such as diarrhoea, coughing, throat, ear and nose infections, food poisoning and TB could no longer be ignored.

Intervention on the challenge: Since illness is of a sensitive nature, it was important that the training clarified the importance of producing safe food and how food-borne illness could affect the safety of food products. The training sessions therefore discussed disclosure of illness very extensively, as well as the illnesses that needed to be disclosed. Employees having any food borne illness or infectious illness such as TB are therefore released from duties where they pose high risk to food products. Further to this, all visitors entering production areas were requested to sign in and declare whether they had been exposed to illnesses that may result in contamination of food products. Where necessary, visitors were not allowed into these facilities.

Need to enhance operational standards: The operational standards already in place needed to be enhanced to meet the predefined requirements of the ISO 22000 standard.

Intervention on the challenge: To improve on the system, the organisation sought expert advice from consultants. A gap audit was conducted which highlighted shortcomings in the current system, and visits to other food plants were conducted. Through the use of these interventions, significant strides were made within short time periods that would otherwise have taken longer to achieve.

Costs associated with the implementation of the standard: The implementation of ISO 22000 brought with it significant costs. These costs largely came about through the need for infrastructure modifications and additions. Among other things, there was a need for metal screening, the provision of washbasins at entrances to production areas, new signage to raise awareness on issues of food safety, repositioning of entrances where there was potential contamination due to uncontrolled access into production areas, and changing of light fixtures to protect the product from glass contamination. A major challenge was that there was no budget for the work.

Intervention on the challenge: Because the demand as dictated by the market for implementing the system was so significant, the work had to be done. A 'zero budget' cost centre was therefore established for the purpose of tracking all costs associated with implementing the system. Having implemented the system, these costs were then capitalised and over time have been recovered as part of the sugar refining allowance.

How ISO 22000 was implemented at RSSC

The implementation of a food safety management system at RSSC had been decided on around the time of the EU reforms, which clearly indicated that there was a need to meet stringent requirements for direct consumption sugar. With the experience of having previously implemented a suite of ISO systems, the expectation by RSSC was that this process would take place within a very short time span. The initial plan was to draw up a HACCP that could be incorporated into the existing ISO 9000 manual. The time line shown below indicates how the system was implemented, and clearly shows how a process expected to be very short, ultimately took a long time due to lack of awareness of the requirements of a food safety management system.

2005-2007

Minimal progress due to a limited appreciation of effort required to succeed. Some work was done in putting together a hazard analysis. This was, however, not sufficient for implementation of the system.

April 2007

A Stage 1 audit was conducted, as the ISO 22000 standard requires that an organisation undergoes two stages before certification is achieved. This audit was turned into a gap audit due to the large gap that existed between the requirements of the system and what had been implemented at the time.

August 2007

It was realised that a focused team approach was required, and a Food Safety Team was convened. This team initiated the implementation of ISO 22000 as a project and held weekly food safety meetings. These meetings were honoured at all levels of the organisation and well attended by senior management. This was important for ensuring that the importance of the project was recognised by all, and clearly demonstrated management commitment to the implementation of the standard.

A 'zero budget' cost centre was established to keep track of all project costs. This was important for capitalisation of the project and ultimately accounting for the funds that were used for its implementation.

To ensure that the system was being implemented appropriately, regular consultations with food safety experts were sought and extensively used.

Challenging goals and deadlines were established, the most challenging of which was to undergo a first stage audit within three months of setting up the project team.

November 2007

A Stage 1 audit was conducted and this audit was successful.

April 2008

Due to the system requirements for a Stage 2 audit to be conducted within six months of the Stage 1 audit, it was important that the audit be conducted by April. The challenge with this was that the plant had not been in operation since the end of November, as crushing operations had stopped. At the time of the audit, the plant had only been running for two weeks; consequently, the system was immature and there was need to further audit the system after a month.

May 2008

A follow-up audit was conducted in which non-conformities raised in the April audit were to be checked for closure. This audit was also successful and the organisation received recommendation for certification.

Benefits of ISO 22000 implementation

The implementation of ISO 22000 for RSSC has yielded many benefits. Firstly, the systems at RSSC have provided customers in the EU with the assurance that RSSC products are safe for consumption, are of a high standard of hygiene and are produced in an environmentally sensitive manner, with due consideration for the safety of its employees. Accordingly, this has removed 'non-tariff' barriers to export of RSSC sugar to Europe. These barriers pose a threat to many companies in developing countries and are difficult to overcome. Other benefits include:

- RSSC has become the first preferred supplier for Coca Cola in Southern Africa and an authorised supplier of refined sugar to Pfeifer and Langen in Germany.
- RSSC has received positive feedback from other European customers who have stated that, as a result of the certification, they no longer had further requirements for physical annual audits due to their confidence in the system implemented.
- RSSC was highly praised by Cadbury following poor performance ratings during this customer's audits on previous occasions.
- Finally, there has been a 42% increase in refining capacity within the past 18 months to meet the ever increasing demand from EU markets – with further expansion indicated.

RSSC, by taking on the opportunity to produce DC refined sugar which meets all the stringent quality and hygiene requirements of the European market, has positioned itself to not only survive, but to thrive and compete effectively in the newly competitive EU sugar market landscape and globalised food industry. RSSC implemented ISO 9000 and ISO 22000 independently, and ISO 22000 was integrated into the ISO 9000 manual. The systems are, however, audited independently, as the scope of the ISO 22000 covers refined product, from production through to storage and packaging. Implementing a food safety system that is aligned with an existing quality management system has had the benefit of an integrated management system, even though auditing of the standards remains independent.

Questions raised by this study:

- ISO 22000 cannot be considered as an add-on. Will this apply also to SANS 10330?
- The focus of culture changed from quality to food safety. Will implementing SANS 10330 bring an equivalent culture as that required by ISO 22000?
- Can employee illnesses as required by ISO 22000, be managed by SANS 10330?

These are questions that remain unanswered, and there is some doubt that

$$\text{ISO 9001} + \text{SANS 10330} = \text{ISO 22000}.$$

Conclusions

It has been shown that food manufacturing organisations prefer to add SANS 10330 and believe that this is equivalent to ISO 22000. This may not be the case. It has been shown that ISO 22000 can be combined with ISO 9001, with some costly requirements which may be worthwhile rather than simply implementing SANS 10330 as an add-on. However, market requirements and economics, i.e. the costs of SANS 10330 implementation versus costs of

ISO 22000 implementation, may move organisations to implement ISO 22000 as well as maintain ISO 9001.

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