

## **THE ISO 22000 FOOD SAFETY MANAGEMENT SYSTEM IN THE FOOD AND BEVERAGE INDUSTRY**

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Nowadays, most of the companies which understand the seriousness of ISO 22000 Food Safety Management System (FSMS) plan to take ISO 22000 FSMS certificate. The aim of this study is to analyze the applicability of ISO 22000 FSMS standards for food and beverage companies, which have ISO 22000 FSMS Certificate in İzmir/Turkey. For the research part of the study, 8 quality and hygiene managers of food and beverage companies which have ISO 22000 certificate in İzmir were asked selected questions. Thus, face-to-face interviews (semi-structured interview) were conducted to see manager's opinions. The obtained data were analyzed through content analysis method. The results of the study showed that each company confronted with some, small problems about the applicability of ISO 22000. However, the managers of food and beverage companies primarily believed the usage of ISO 22000. Then, they could easily apply this system as a result of constructing the infrastructure (stores, kitchen area, etc.) and superstructure (training, personnel, etc.) structures by using required resources.

**Key Words:** Food and Beverage Management, Safe Food, ISO 22000 FSMS

### **INTRODUCTION**

Especially the kitchens where food products are processed play an important role in the production of safe food products. Companies can purchase safe food that is in line with required standards. However, the food products would still be risky, if they are not stored, prepared, cooked, preserved, and presented according to the standards. The risk gets even higher, if companies do not pay attention to room temperature standards in each of these stages.

There are some standards enforced in Turkey and other developed countries in order to ensure the implementation of safe food practices. In Turkey, the standards concerning

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.

One of the most important reasons why the ISO 22000 FSMS was published was to bring together all the previous standards (ISO 9001, HACCP) under a single rubric. Moreover, the ISO 22000 FSMS standards also aim to ensure that food safety hazards and risks in all food and beverage companies are kept at a level that will not pose a risk for human health, and that consumers can consume safer food products.

The ISO 22000 FSMS is an international quality system that enables and ensures a safe production for food items. The ISO 22000 FSMS is all the more necessary for solving problems faced by food and beverage companies such as personnel's low level of education (such as the cooks and scullions), the company's inability to provide a sustained training for such personnel, insufficient supply for raw food products that comply with the standards, unfair conditions of competition concerning the marketing of food products, price and quality balance, insufficient internal control, and inability to ensure sustained improvement in production processes.

## **1. THE ISO 22000 FOOD SAFETY MANAGEMENT SYSTEM IN THE FOOD AND BEVERAGE INDUSTRY**

The hazards that cause food-related illnesses and how these hazards can be prevented in the food and beverage companies are both globally known. Today, food safety management system and practices stand out as the most prominent method of safe food production. Companies that implement systems such as the HACCP or ISO 22000 FSMS attain success in safe food production (Kocak, 2010).

The presence of communication all along the food chain is necessary to be able to identify all hazards related to food safety and to ensure sufficient control in every stage. The hazards and control measures defined in communication with consumers and suppliers will help generate requirements for the benefit of both consumers and suppliers (such the requirement for an expiration date and a label on the final product). It is also

necessary for a company to know its role and position in the food chain to be able to deliver safe food products to the final consumers and to establish an effective communication with them (Gok, 2010). Consumer demand for safer food production is increasing. This demand led to the formation and development of various standards. It is important to have an international harmony in order to avoid confusion about such standards. This is exactly the need that the ISO 2000 FSMS aims to meet (Bucak, 2011).

The ISO 22000, which was prepared by the ISO and published in September 2005, is the first international standard published as a "Food Safety Management System".

One of the most important reasons why the ISO 22000 standard was published was to

bring together the multiple standards of food safety (such as the HACCP or IFS) under a single rubric (Seng, 2007).

## **2. THE IMPLEMENTABILITY OF THE ISO 22000 FOOD SAFETY MANAGEMENT SYSTEM IN THE FOOD AND BEVERAGE INDUSTRY: THE CASE OF IZMIR**

This study examines the implementability of the ISO 22000 FSMS in companies based in Izmir that have the ISO 22000 FSMS certification. The study has the following two research questions:

- How well is the ISO 22000 FSMS standard implemented in food and beverage companies?
- Can the implementation of the ISO 22000 FSMS in food and beverage companies be made more efficient?

### **2.1. Aim, Scope, and Significance**

This study aims to analyze and evaluate the implementability of the ISO 22000 FSMS, which is the latest link introduced into the chain of international standards of safe food production, in food and beverage companies. This study will also bring forth some recommendations concerning the elimination of the difficulties and problems faced in the implementation of the ISO 22000 FSMS standards by food and beverage companies. Since the study is based on companies that have the ISO 22000 FSMS certification and produce food and beverage according to ISO 22000 FSM, it can also be said that the results of this study might have some beneficial implications for the food and beverage industry in general. The study concentrates on the opinions of the personnel in charge of quality and hygiene in food and beverage companies located in Izmir that have the ISO 22000 FSMS certification.

### **2.2. Method**

This study employs the qualitative research method. In this method, “a case study” is conducted in a natural environment such as class, neighborhood, or system (organization) with the aim of providing a holistic interpretation of the environment or the events in question (Yildirim & Simsek, 2008). In other words, a “case study” is a qualitative research method that evaluates a current phenomenon in its real-life settings (Yin, 2004).

This research aims to holistically examine the implementability of the ISO 22000 FSMS, which is currently adopted in many food and beverage companies. The data were collected through face-to-face interviews with the help of an interview form, sound recordings of the interview as well as notes taken by the researchers. Researchers also asked questions not included in the interview form, if they considered those questions to be necessary for providing a more insightful and rich interpretation.

### **2.3. Sample and Limitations**

The sample of this study consists of 11 companies in Izmir that had ISO 22000

FSMS certification. The reasons why these companies were included in the sample was because they were for-profit establishments, they have been implementing the ISO 22000 FSMS standards, they had implemented at least one of the other international quality systems concerning safe food production before, they adopted as a principle producing safe food products, and they have formed a reliable brand image through their products. Three kinds of limitations were faced within this framework. The first limitation was that while the companies had the ISO 22000 FSMS certification, their operations concerning quality systems were run by main branches that were located outside Izmir. Another limitation was that the management in one of the companies did not permit the research to be conducted in their company. Last limitation was that the companies included in this study were strictly for-profit organizations. Therefore, the food and beverage units of not-for-profit organizations (such as hospitals, military, or prisons) were not included in this study.

#### **2.4. Data Collection Method and Process**

The data were collected using the “semi-structured interview” technique. Each interview took between 35 to 55 minutes. The questions asked in the interview were prepared in light of an examination of the relevant literature as well as of the “Lead Auditor” and “Internal Auditor” question lists in the ISO 22000 FSMS. Although the questions were prepared in advance, the questions were restructured on the basis of the answers of the interviewee.

The questions to be used in the interviews were examined by an expert in the field (a quality systems trainer), and the efficiency of the questions was analyzed in a pilot interview. In the analysis, special attention was given to the intelligibility of the questions and whether the participant could understand them properly. The final draft of the questions was prepared after having revised the questions that were not properly understood in the pilot interview. During the data collection process, all interviews were conducted by the researchers themselves. In the analysis of the data, the researchers used the contribution of an expert on the field (a quality systems trainer) to the analysis of the data, extraction of the codes, and the creation of the themes.

#### **2.5. Data Analysis**

The data collected through interviews were subjected to content analysis. A separate table was prepared for each question in order to quantify the qualitative responses. The company personnel were distributed in these tables according to the responses they provided. In the last stage, the opinions of the participants were interpreted in an orderly way and presented as a report.

#### **2.6. Validity and Reliability**

Expert evaluation and detailed descriptions were used to ensure validity. Expert evaluation is defined as the examination of the research by an expert who is knowledgeable about the topic under inquiry as well as the qualitative research methods in various respects (Yildirim and Simsek, 2008: 268). The expert (a quality systems trainer) examined various aspects and stages of the research such as methods, data, statistical analysis, conclusions, and writing and gave detailed feedback to the researchers on each of

these topics. Detailed description means presenting the concepts and themes that come forth in the evaluation of the collected raw data without any additional input or commentary by the researchers (Yildirim & Simsek, 2008). Some of the data collected in this study were written in its raw form without any additional interpretation.

## **2.7. Results and Evaluation**

This research was conducted with the participation of 8 food and beverage companies in Izmir that had ISO 22000 FSMS certification. Some characteristics of these companies are presented in Table 1.

### **Table 1:** Characteristics of Participating Companies

According to Table 1, the number of years in the industry varied between 8 and 35 years among the participating companies, while their production capacities varied between 450 and 25.000 people.

The information about the interviewed personnel in charge of quality and hygiene in the companies are presented in Table 2. The table includes information about their demographical characteristic in five main categories.

### **Table 2:** Demographical Characteristics of the Participants

As can be seen from Table 2, quality and hygiene managers in all companies are food engineers. The number of years these managers worked in the industry varies between 4 to 12 years. The number of years these managers worked in their current companies varies between 2 to 7 years. The duration of the implementation of the ISO 22000 FSMS in these companies varies between 1 to 4 years.

The following data were obtained through interviews with the participants.

### **Table 3:** General Opinions of the Participants about the ISO 22000 FSMS

All of the participating companies used at least one quality system related with food safety before starting to use the ISO 22000 FSMS. These systems were the TS 13001 (HACCP) and the ISO 9001.

Some participating companies had more difficulties in transitioning to the ISO 22000 FSMS than others. Especially for the companies which had been using HACCP or ISO 9001 before, it was easier than they expected. The companies that had difficulties in the transition had two main reasons: insufficient infrastructure and overwhelming documentation requirements.

The companies received their ISO 22000 FSMS certifications from different kinds of institutions. Three of the companies received their certifications from an international certification institution, one from a national private institution, and the other one from the TSE, the national public institution for standardization.

All the stages of production and service for the food and beverage products that are produced according to the ISO 22000 FSMS standards have to be audited by private or public certification companies. The companies who were subject to external audit were audited by private companies. However, one of the participants shared the following opinion with the researcher: *“I think it would be healthier if the auditing was undertaken by a public organization rather than a private company. I don’t find private companies very reliable in this regard.”* As for the supplier auditing, some companies audited them themselves, while the others had them audited by consulting firms. However, auditing of the supplier by the company itself stands out as a healthier method.

Just like other quality systems, the primary responsibility for implementing the ISO 22000 FSMS also falls on the management. The management should first of all be the team leader for this system. The management should also perform all of its responsibilities properly and assume an active role in the implementation and auditing stages as well.

The ISO 22000 FMS has to be updated regularly. The necessary information for these updates are obtained from internal and external audits.

The documentation has to be made by the company personnel themselves. This system cannot be implemented properly with remote management. In this respect, all the records should be kept by the personnel in charge. One fundamental problem was expressed by the personnel in this regard. They stated that the documentation was an extra workload for them, and they could not fill in all the necessary documents as a result.

Internal and external communication as mentioned in the ISO 22000 FSMS differed from one organization to another. However, it was found that phone; bulletin boards, meetings, warning signs, and stickers were used more frequently as an internal communication instrument. E-mails and memos could also be used depending on the area of activity and the capacity of the company. External communication mainly consists of communication with suppliers and consumers. The instruments used for external communicating were generally phone, e-mails, visits, and questionnaires.

All personnel play an active role in the implementation of the ISO 22000 FSMS. The personnel should participate training programs about the system in practice or the system to be put in practice should renew their knowledge all the time as well as perform their responsibilities required by the system with minimal mistake. Therefore, it is necessary that the personnel should attend all the on-the-job training programs offered within the company as well as other necessary training programs.

In the process of the installation and implementation of this system, there are some preconditions that should be met by the company. Technical equipment, personnel training, raw material, auxiliary material, water, cleaning and disinfection are given special emphasis. It is impossible to properly install or implement the ISO 22000 FSMS without meeting these requirements first.

The measurements required by the ISO 22000 FSMS have to be performed in order for the combinations to be validated. These measurements are regularly performed at critical control points determined in advance. The most important resource for monitoring

measurements is the “Measurement Records and Documents”.

Verification procedures ensure that the hazards are completely and accurately identified and can be effectively controlled in the proposed plan. The controls are performed in two forms: internal and external audits. The auditing results are analyzed and evaluated by the personnel in charge. In case of a negative situation, corrective preventive actions are undertaken in order to make the system work properly.

The implementation of the ISO 22000 FSMS at every point in the system is as important as getting the certification. If the companies fail to improve themselves continuously along the implementation of these standards, the system will also fail to respond to the ever-changing needs and expectations of the company.

There are some difficulties and problems faced by the companies in implementing the ISO 22000 FSMS. These difficulties can be divided into three main domains: personnel, infrastructure, and documentation.

The ISO 22000 FSMS certainly contributes to the companies materially (higher lower revenues and expenses) and immaterially (higher reliability and better image). As for the material benefits, the level of loss and waste is minimized in the system as the operations have to be run in harmony with certain standards. Moreover, the catering companies with an ISO 22000 FSMS certification stand out in their bids against companies without one and are more likely to win the bids. The presence of the ISO 22000 FSMS certification also cultivates trust in the eyes of customers. This certification also helps companies gain prestige and have a positive image in the market.

The items in the ISO 22000 FSMS sufficiently cover all the stages of installation and implementation. However, some people think that the items are insufficient, while some others think that some items are redundant. As mentioned before, some people think that the public institutions should assume a more active role in the auditing of the implementation of these items. One of the participants made the following statement:

“The satisfaction of customers should be emphasized more by incorporating the ISO 10002 Customer Satisfaction Standards into the ISO 22000 FSMS. I think having one single set of standards make more sense than having two of them.” Some companies also have difficulties concerning documentations either because there are many items that require documentation or because there are no personnel who can perform this task. The common opinion of such companies is that there are more items in the ISO 22000 FSMS involving documentation than needed. Another related problem is that the written language used in the quality system cannot be properly understood by everyone in the company. Understanding and implementing these items are more difficult for the lower-level personnel who have a relatively lower level of education (such as scullions and helpers).

There are some requirements that the companies should meet before implementing the ISO 22000 FSMS. The first requires that the personnel should be given all the necessary training and understand the significance of the system. It is much easier to install and implement this system with informed personnel. In the opposite case, the process is more time-consuming and difficult.

If the infrastructure necessary for the system is not installed, the standards cannot be implemented properly. Therefore, the infrastructure must be installed completely. It is also necessary for the management to allocate sufficient resources and to use these resources in the right way for these standards to be met.

There are some tasks that have to be performed following a company's transition to the ISO 22000 FSMS. First of all, the system should be made continuously implementable. This requires that special attention be given to internal and external audits, the number of audits be increased if necessary, the system contents be updated to fit with the company, and the quality of the personnel be improved.

### **3. MODEL, AND RECOMMENDATIONS**

Food safety systems are implemented in the hotel industry as well as the food and beverage industry. While this study analyzes the implementation of the safe food quality system in the food and beverage industry, Fletcher et al. examined the implementation of the HACCP standards in several hotels in a very popular destination in Jamaica. In their study, they found out that the HACCP system was implemented more efficiently in bigger hotel companies. Their study also revealed that there were many shortcomings in the implementation of the HACCP system. They asserted that it was necessary to implement industry-specific policies for a better implementation of the HACCP (Fletcher et al., 2009).

All the records for documentation should be kept by the personnel in charge. The controlling of these records should also be made on the spot by the personnel authorized by the management. This poses certain problems to the authorized personnel. These personnel stated that the documentation was an extra workload for them, and that therefore they could not fill in all the documents properly. A study conducted by Nguyen et al. supports this finding. Their study suggested that there were two main problems faced by companies implementing a food safety system: the resistance to change and documentation (Nguyen et al., 2004). It is especially not possible to properly install or implement the ISO 22000 FSMS without meeting requirements concerning technical equipment, personnel training, raw materials, auxiliary materials, water, and cleaning and disinfection.

The findings of the study conducted by Yazici (2008) support the findings of our study. Yazici asserted that it was necessary for companies to renew themselves by reviewing their implementation of the ISO 22000 FSMS as the companies have a dynamic structure that goes through various changes throughout their operations like a living organism (Yazici, 2008).

In order for the ISO 22000 FSMS system to be fully implemented and to yield desired results, it is necessary that the companies establish the necessary infrastructure for it. However, a study conducted by Onbas (2009) put forward the idea that the implementation of the ISO 22000 FSMS will get easier once the ISO 22000 FSMS starts to be implemented inasmuch as requirements concerning necessary equipment, personnel and physical conditions will have to be met along the way (Onbas, 2009). The fact that the



training about the system should also be made part of this process should nevertheless not be overlooked. It is very difficult to implement this system without informed and trained personnel. A study conducted by Simsek (2006) also supports this finding. Simsek argues that whenever the food safety system cannot be properly implemented, it is necessary for the company to train its personnel on safe food preparation, hygiene, and sanitation and to repeat these training programs on a regular basis to ensure that the knowledge of the system and the practices it requires becomes established among the personnel (Simsek, 2006).

Companies implementing the ISO 22000 FSMS will benefit from it in various ways. In concluding his study, Yilmaz (2007) emphasized that implementing the ISO 22000 FSMS, which is intended to ensure safe food production all along the food chain, would necessarily provide companies with various benefits (Yilmaz, 2007). While the companies in Turkey pay more attention these benefits, Bai et al. found that the companies in China implement food safety management systems for different reasons. Having evaluated the implementation of the HACCP standard in Chinese food companies in their studies, they found out that the Chinese food companies considered the HACCP system to be more of a strategy for gaining an edge against their competitors. Other reasons why the Chinese companies implemented the system was found to be because they wanted to enter new markets, improve the quality of their food products, and increase their market share (Bai et al., 2007).

There are some requirements that a company should meet before implementing the ISO 22000. The first requirement is that the personnel should be provided all the necessary training about the system, and they should be cognizant of the significance of the system. It is much easier to establish and implement this system with informed personnel. One of the most important factors that help with implementing the ISO 22000 FSMS effectively is the training to be provided to the personnel. Turksoy and Altinigne also stated (2008) that what is most essential for the accommodation establishments in Cesme was that they should contact training institutions in order to get trained on food safety and start implementing the HACCP standard (Turksoy & Altinigne, 2008).

There are also some tasks to be performed after transitioning to the ISO 22000 FSMS. First of all, the system should be made continuously implementable. For this purpose, internal and external audits should be given special attention, the number of audits should be increased if necessary, the system contents should be updated to with the company and the quality of the personnel should be improved. A different perspective on measuring the quality system and auditing the success level of implementation of the standards was provided by Spiegel (2004). In his study, Spiegel aimed to develop an instrument to measure the effectiveness of food quality systems and to establish its validity. Measuring the effectiveness of the implementation of food quality systems, this instrument not only helped companies with choosing the right food quality system for them but also with measuring how effective they were in implementing the system (Spiegel, 2004).

Figure 1 presents a model that was constructed in light of the ISO 22000 FSMS, review of relevant literature, and the results of this study in order for the ISO 22000 FSMS to be implemented more efficiently.

**Figure 1: A Model Proposal for the ISO 22000 FSMS Implementation Process**

The model presented in Figure 1 consists of three main sections: safe product planning, safe product realization, and safe food preparation. The reason why such a model is being proposed in this study is because how the implementation of the ISO 22000 FSMS is administered plays an extremely important role in the ultimate success of implementation. In addition to the model presented above, the following recommendations can be made for the companies which would like to implement the ISO 22000 FSMS efficiently.

a) Food and beverage companies should first of all establish a corporate structure and adopt a professional management approach in running their operations.

b) As a first step, the higher management should believe that the implementation of the ISO 22000 FSMS will provide added value for the company.

c) Although the installment and implementation of the system is costly in the short run, the system will be profitable in the long run.

d) Companies should make sure to systematize their production and presentation of food and beverage, and this system should especially be certified with one of the quality system documents given by the International Organization for Standardization.

e) The infrastructure necessary for the system to be implemented most efficiently (building and facility structure, kitchen, storage room, other work spaces, transportation vehicles, equipment, waste and sewer system) must be properly installed in advance.

f) Just like other quality management systems, it is very important to work with informed personnel in the process of the installment and implementation of the 22000 FSMS and to provide sustained training for the personnel authorized in the implementation process.

g) Quality standards can be implemented more efficiently when the personnel have a certain level of knowledge about quality management.

h) The personnel should especially play an active role in the installation and implementation stages of this system.

i) The due attention should be paid to food safety practices at all stages of food production including supply, purchasing, delivery, storage, taking raw materials from storage, preparation, cooking, transfer, and service in harmony with the ISO 2000 FSMS.

j) Food and beverage companies should certainly seek support from consulting firms whenever they need about problems that they face but cannot overcome in the implementation of the quality system.

k) The number of internal and external audits should be at least twice a year so that whether the company can effectively implement the ISO 22000 FSMS system requirements after transitioning to it, can be monitored.

Moreover, the Ministry of Food, Agriculture, and Livestock should assume a more active role in auditing the implementability and sustainability of the ISO 22000 FSMS. The auditing should not be left to private institutions, but be carried out by the government, too.

Special attention should be given to the above-mentioned recommendations in order for the ISO 22000 FSMS to be applied properly in food and beverage companies. When the necessary conditions are met, the ISO 22000 FSMS can be implemented despite minor mistakes. This study can be repeated with a bigger sample and in a broader context in order to further corroborate its findings. The researchers who would like to take that path can be recommended to undertake:

- more comprehensive studies that would compare and contrast not-for-profit institutions such as hospitals, military posts, and prisons with the ISO 22000 FSMS certification,

- studies that would compare and contrast not-for-profit food and beverage companies with ISO 22000 FSMS certification,

- studies that would compare public and private food and beverage companies with the ISO 22000 FSMS certification,

- and studies that would compare foreign and local food and beverage companies with the 22000 FSMS certification.

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**Table 1:** Characteristics of Participating Companies

Company Name	Area of Activity	Number of Years in the Industry	Food Production capacity (in person)	Number of Food Engineers Employed	Total Number of Personnel
<b>Bortar Catering</b>	Catering	17 years	25.000	7	250
<b>Firuz Catering</b>	Catering	26 years	4.000	2	60
<b>Seçkin Catering</b>	Catering	8 years	7.000	3	120
<b>Sever Catering</b>	Catering	8 years	4.000	2	70
<b>Sofra Catering</b>	Catering	15 years	25.000	9	300
<b>Esbaş Food Company</b>	Catering	14 years	20.000	11	150
<b>Biz Tur Food and Beverage Company</b>	Restaurant-Cafe-Bar	15 years	5.000	2	115
<b>Tavac Recep Usta Restaurant</b>	Restaurant	35 years	450	----	90

**Table 2:** Demographical Characteristics of the Participants

Participants	Department/ University Graduated	Number of Years in the Industry	Number of Years in the Company	Job	Duration of ISO 22000 GGYS Implementation
<b>Participant 1</b>	Food Eng./Ege Uni.	4 years	2 years	Quality and Hygiene Manager	2 years
<b>Participant 2</b>	Food Eng. / Hacettepe Uni.	8 years	4 years	Quality and Hygiene Manager	1 year
<b>Participant 3</b>	Food Eng./Ege Uni.	6 years	2 years	Quality and Hygiene Manager	3 years

<b>Participant 4</b>	Food Eng../Ege Uni.	6 years	3 years	Quality and Hygiene Manager	2 years
<b>Participant 5</b>	Food Eng../Ege Uni.	5 years	3 years	Quality and Hygiene Manager	3 years
<b>Participant 6</b>	Food Eng../Ege Uni.	12 years	7 years	Quality and Hygiene Manager	4 years
<b>Participant 7</b>	Food Eng../Ege Uni.	9 years	4 years	Quality and Hygiene Manager	1 year
<b>Participant 8</b>	Business Administration/ Dokuz Eylül Uni.	7 years	5 years	Quality and Hygiene Manager	2 years

**Table 3:** General Opinions of the Participants about the ISO 22000 FSMS

TOPICS	CODES	1	2	3	4	5	6	7	8
Evaluation of the Standard Used Before ISO 22000	TS 13001 (HACCP)	X		X	X	X			
	ISO 9001	X	X	X		X			
Evaluation of the Transition Process to ISO 22000	Easy	X		X		X			
	Difficult		X		X				
	Receiving an ISO Certification First Time		X						
Institutions from which the Company Received Its ISO 22000 FSMS Certification	International Private		X	X					
	National Private				X				
	Public (TSE)	X				X			
Scope of ISO 22000 FSMS	Covers all Units	X	X	X	X			X	X
	Does not cover all units					X	X		
	We do the monitoring of Suppliers Ourselves	X	X	X		X	X	X	

	A Consulting Firm Does the Monitoring of Suppliers for Us				X				X
Role of Management in the Implementation of ISO 22000 FSMS	Trust of the Management	X	X	X	X	X	X	X	X
	Developing Policies	X	X	X	X	X	X	X	X
	Allocating Resources	X	X	X		X	X	X	X
	Authority and Responsibility	X	X	X	X	X	X	X	X
	Team Leadership	X	X	X	X	X	X	X	X
Evaluation and Updating of Internal Audit	Updates	X	X	X	X	X	X	X	X
	Internal Auditor	X	X	X	X	X	X	X	X
	Twice a year	X		X		X	X	X	
	Once a year		X		X				X
	Sufficient	X	X	X	X	X	X	X	X
Evaluation and Updating of External Audit	Updates	X	X	X	X	X	X	X	X
	External Auditor		X		X		X	X	
	Once a year	X	X	X		X	X	X	
	Sufficient	X	X	X	X	X	X	X	X
Documentation in ISO 22000 FSMS	Available	X	X	X	X	X	X	X	
	Unavailable								X
	Records Kept Properly	X	X	X	X	X	X	X	X
	Doing Monitoring Themselves	X	X	X	X		X	X	
Use of Internal Communication Instruments	Bulletin Board	X	X	X	X	X	X	X	
	E-mail	X	X	X	X	X	X	X	
	Meeting	X	X			X			X
	Phone	X	X	X	X	X	X	X	X
	Warning Signs and Stickers	X				X	X	X	
Use of External Communication Instruments	Visits	X	X	X	X	X	X	X	
	E-mail	X	X	X	X	X	X	X	
	Meeting	X	X			X			X
	Phone	X	X	X	X	X	X	X	X
	Questionnaire	X				X	X	X	
Role of Personnel in the Implementation of ISO	Active	X	X	X	X	X	X	X	X
	On-the-job Training	X		X		X	X	X	X

22000 FSMS	Reflected in Practice	X		X		X	X	X	
	Personal Hygiene	X		X		X	X	X	X
Requirements of ISO 22000 FSMS	Technical Equipment	X	X	X	X		X		X
	Training	X	X	X	X	X	X	X	
	Raw Material, Auxiliary Product		X			X	X	X	X
	Water	X	X	X	X	X		X	
	Cleaning and Disinfection	X	X	X	X	X	X	X	X
Safe Product Planning and Realization	Precondition Program	X		X		X	X	X	X
	Characteristics of Product	X	X	X	X	X	X	X	
	Flow Chart		X		X		X	X	X
	Hazard and Risk Analysis	X	X	X	X	X	X	X	X
	Corrective and Preventive Actions	X		X	X	X	X		
	Withdrawal of Product	X	X		X	X	X		X
Validation in ISO 22000 FSMS	Measurements	X	X	X	X	X	X	X	X
	Monitoring	X	X	X	X	X		X	
	Measurement Control	X	X	X	X	X	X	X	
Verification in ISO 22000 FSMS	Internal Audit	X	X	X	X	X	X	X	X
	External Audit		X		X		X	X	
	Evaluation	X	X	X	X	X	X	X	
	Analysis	X	X	X	X	X	X	X	
Improvement in ISO 22000	Sustained Improvement	X		X	X	X	X		
	Updating	X	X	X	X	X	X	X	
Evaluation of the Implementation of ISO 22000 FSMS	Personnel	X	X	X	X	X	X	X	X
	Company's Physical Sufficiency (Infrastructure)		X			X		X	
	Documentation		X		X			X	X
Contribution of ISO 22000 to Company	Revenues and Expenses	X	X	X	X	X			
	Reliability and Image	X	X	X	X	X	X	X	X
Evaluation of the Redundancy/Insufficiency Status of the Items in ISO	Insufficient-Inadequate	X			X				
	Redundant		X					X	X
	Enough			X		X	X		



22000 FSMS									
Recommendations to the company before transitioning to ISO 22000 FSMS	Training	X	X	X	X	X	X	X	X
	Company's Physical Sufficiency (Infrastructure)		X					X	
	Personnel	X		X		X	X		
	Management				X				X
Recommendations to the company after transitioning to ISO 22000 FSMS	Continuity	X	X	X		X	X		
	Control				X			X	X

**Figure 1: A Model Proposal for the ISO 22000 FSMS Implementation Process**

