The Implementation of Food Safety Management System (ISO 22000) in Egyptian Flight Catering Companies

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Abstract
The Food Safety Management System (ISO22000) is a strategic decision for a flight catering company that can help improve overall performance and food safety. There are several potential benefits of the implementation of ISO22000, such as the ability to provide consistently secure foods, products, and services that meet applicable legal and regulatory customer requirements and address the risks associated with the objectives. This research aims to measure the effectiveness of the food safety management systemISO22000 implementation in Egyptian Flight catering companies by identifying existing gaps in the application process. Data were collected by a modified checklist depending on a pre-tested checklist that was approved by the Egyptian Civil Aviation Authority with a reference of "RBG/QA/CL/116, issue 01". This has been used as a major research tool by which an audit has been performed in the surveyed catering unit. The research depends on the qualitative approach in describing the phenomenon of the research and analyzing its dimensions. Data were analyzed using a heptatonic scale to measure the degree to which the data matches the actual implementation of the requirements. The field study concluded that there are several gaps in the application of the system, despite the existence of a specific and pre-prepared mechanism for implementation. The research indicated in the findings that the general degree of compliance with the Food Safety Management System ISO 22000 standards is (77%) with a gap size of (23%). The research presented a set of recommendations for air-flight companies to ensure the effective application of the system assays.

Keywords: Flight catering, ISO22000, food safety, flight catering, aviation, Egypt.

Introduction
In-flight catering companies are operated to produce and supply safe food products of agreed quality to consistently meet customer needs and expectations and enhance customer satisfaction so that there is complete assurance that makes customers receive the optimum nourishment, and is illegally to become ill or injured by foreign objects present in food (Smith, 2016). They could achieve that through Supplying safe and hygienic food products to the consumer, prevention rather than detection/rectification, complying with requirements & continually improving the effectiveness of the Food Safety Management System, and creating an environment of teamwork as well as participation and system awareness to all employees. Therefore, inflight catering companies tend to apply ISO 22000 which specifies the requirements for a food safety management system where an organization in the food chain needs to demonstrate its ability to control food safety hazards to ensure that food is safe at the point of consumption (McLeod, 2019). ISO 22000 can be used by any organization that is independent of its role in the food chain or the size of the organization, as it only specifies what the organization must do to demonstrate that it controls food safety risks to ensure safe food (ISO, 2009). The new version is expected to be published in June 2018 and the main changes include a new high-level structure, which will be the

same as for all other ISO management system standards, modifications to the risk approach, and clarification of the PDCA-cycle (plan-do-check-act) (Paunescu et al., 2018).
This research attempts to provide empirical evidence on the implementation of the ISO 22000 food safety management system by using the checklist to identify gaps in the application of this system. Studies investigating problems associated with the implementation of ISO22000 in Flight catering companies are still rare. The research provides quantitative empirical evidence about analyzing the main gaps that may prevent the adoption of the standard in the flight catering industry. Research is an attempt to raise awareness about food safety, which can result in catering companies in a greater acquisition of market share and better food safety performance.

Research Objectives

1. Evaluate the implementation process of the Food Safety Management System (ISO22000) in-flight catering companies.
2. Identify the existing gaps in the process of food Safety Management System (ISO22000) in-flight catering companies

Research Question

The research is addressing the following question:

What is the general degree of compliance with the Food Safety Management System ISO 22000 standards in Egyptian Flight Catering Companies?

Review of Literature

International transportation and air travel are found to play an important role in moving people or products from one place to another either domestically or internationally (Abu-Al-Rub & Shibhab, 2020). The airline industry is at the heart of the travel and tourism industry. The positive development of the travel and tourism industry has created great competition among large and small airline companies for passengers (Boulton & Maunsell, 2004). In-flight catering or airline catering is a service provided by companies to passengers traveling by air. In-flight catering is a very important part of the airline business, especially for airlines that provide long-haul service. Meal design and meal planning are important processes of in-flight catering service, according to International Air Transportation Association (IATA) (Becker, 2012). Flight catering food service is defined as a part of the food service industry that is concerned with the provision of meals and beverages served to passengers on board aircraft (WHO, 2021). This food service is usually provided by companies specializing in the in-flight catering business. According to (Dewet, 2007), airline catering was defined as the business of providing food prepared and packaged for service by an airplane crew during a flight. Bellavia (2017) stated that catering is a multifaceted segment of the food services industry. There is a niche for all types of catering businesses within the broader segment of catering. Catering management can be defined as the task of planning, organizing, and controlling each activity and beverage at a competitive and profitable price (Amin et al., 2018).

The Importance of In-Flight Catering to Airline Operators

The provision is generally determined by airline companies to account for five to ten percent of the total fare on any flight. Food as a product differentiator in the opinion of some passengers has long been recognized, whereas the 'in-flight experience', especially the meal, is the only way to differentiate airlines. "Many passengers are no longer just booking a seat, but paying for an experience (Garza-Reyes, 2018). The fact that airlines consider food important is illustrated by the

fact that many reputable chefs such as Raymond Blanc create their menus. Food is a particularly competitive factor in First Class, where passengers' expectations are very high. On the contrary, food is also important in economy class travel, as passengers expect it as part of the 'value for money aspect of the fare. As early as 1970, the importance of food was recognized by operators with one anonymous executive vice president of a national airline in the USA commenting: airline managements are pumping more dollars into food and services than they would like as a way to entice passengers to Board their planes, that is the only thing we have to sell that is different" (Sokovic et al, 2010). This remark was particularly poignant at the time, as US airlines were heavily regulated until 1978 (as was the case in Europe until recently) and the only source of product differentiation was the 'inflight experience', an important component of which was and remains, the food served (Teixeira & Sampaio, 2012).

Food Safety Management System (ISO 22000)

Air transportation is now the first choice among international travelers and business travelers. Linked to this growing change, onboard food service has become one of the key factors in providing quality and usefulness within the catering industry. The main goal is not only taste satisfaction but also the guarantee of food safety. The recurring need for improvement and the application of new models to improve health and quality is present in the specific quality control systems in the aero system (Sundarakani et al., 2018). A base, or even a network of airline catering industries, production services, and distribution of meals on board, must be effective and appropriate with the main purpose being quality inspection of the food, ensuring consumers both satisfaction and health. In the specialized industry of the creation of meals, tools are inserted to ensure safety in the production chain and the pursuit of continuous improvement of processes (Sysmac Management Consultant FZE, 2020). Consumer interest in food safety is increasing with an increasing awareness of food-borne illness (Stringer, 2005), and a series of food scandals and incidents that are continuously happening without any sign of decrease (Sunadi et al., 2020). Sunadi et al (2020) have pointed out that the percentage of the population suffering from the food-borne disease each year is up to 30 percent in developed countries. Increased demand for processed and packed food increases the risk of food safety issues. Increased demand for processed and packaged foods increases the risk of food safety problems (Taylor & Kane, 2005). As a result, customers look for quality and safety guarantees when visiting outlets for food purchases, and in turn, there is a proliferation of food safety management system (FSMS) standards in the food industry (Taylo, 2011). Food producers should implement and maintain different FSMS standards as per customer and market requirements to ensure the safety of the product to the level of expectation of customers (Afoakwa et al., 2013). The safety of passengers and crew is a top priority for the airline industry. This includes serving in-flight food that is not harmful to the health and safety of passengers and crew. Today, examples of the harmful effects of improperly prepared or "unsafe" food are on the rise, and regulators and courts worldwide are responding. Now, more than ever, the organization needs to demonstrate diligence. The industry needs to be confident that airline caterers are making conscientious efforts to prepare food using methods designed to protect the health and safety of their passengers and crew (Allata et al., 2017). Airlines are responsible for the food served on board, whether it is prepared in an airline-owned "flight kitchen" or sourced from an independently owned catering company. The steps involved including food preparation, transporting to the aircraft, storing, and finally, serving on the aircraft need to be well coordinated to avoid contamination (Zorpas, 2008). In its broadest sense, food safety must be achieved through safe production, storage, and handling to avoid food-borne illnesses such as food intoxication,

infectious diseases, or other detrimental effects. In principle, such diseases can be caused by agents of biological, chemical, or physical nature (Teixeira & Sampaio, 2012). Food safety is important. Consumers have a right to expect that those who supply the food that they buy have taken every precaution to manufacture products that do not cause harm. Those with a responsibility for the regulation of the global food industry recognize this principle and legislate accordingly. This imposes a legal and moral duty, in addition to an economic incentive, on all food companies to ensure that the food they provide is as free of hazards as possible. The food business that tries to avoid its responsibilities in this regard will not remain in business for very long (Amin et al., 2018).

Methodology

The research depends on an observation checklist to determine the gap in the food safety management system (ISO 22000) and analyze these gaps to diagnose the percentage of conformity and determine the size of the gap. The checklist targeted 18 items and is designed using the Seven Point Likert Scale. It includes 7 grades to elicit the opinions of the respondents. Graded according to the degree of application. The Seven Point Likert scale is used to measure the extent that matches the actual implementation of the requirements. (Al-Khatib, 2008).

Table 1: The degree of conformity and determine the size of the gap

Phrase Scale	Phrase Weight
Fully applied /Fully Documented	6
Fully Applied /Partially Documented	5
Fully applied /Not Documented	4
Partially applied /Fully Documented	3
Partially applied /Partially Documented	2
Partially applied /Not Documented	1
Not documented /Not Applied	0

Source: (Al-Khatib, 2008)

After determining the grades for each axis through answers to the checklist, it is approved the following equations to extract percentages of the extent of conformity as follows (Wheelen & Hunger, 2000):

1. Calculating the approximate average of (extent of conformity with the requirements) to extract the (Average Arithmetic Weight). This was done by calculating the repetition values for each of the exam lists according to the following equation:
   U - Weighted Arithmetic Mean = (Sum of Weights x Repetitions) / Sum of Repetitions
2. Calculating the percentage of compliance with the application using the following equation:
   U = Weighted Arithmetic Mean / 6 (Highest Score on the Scale)
3. Calculating the size of the gap by subtracting percentages of (Extent of Conformity) from number (1): Gap size = 1 - (Extent of Conformity)

Results and Discussion

The qualitative approach to analyze the study data has also been used. To reach the gap size in different departments of the catering unit, a checklist has been used for analysis. The checklist was used to analyze the gap using the equations provided.

Document Check Gap Analysis

Table 2: Document Check Gap Analysis

Documents Check	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	9		1				
The result	54		4				
Arithmetic mean	5.8						
The percentage of compliance	0.97						
Gap size	0.03						

The checklist in Table 2 shows the level of actual implementation of document Check. The company achieved a compliance percentage (0.97), which indicates a gap of (0.03).

Receiving Area Gap Analysis

Table 3: Receiving Area Gap Analysis

Receiving Area	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	8			1	1		
The result	48			3	2		
Arithmetic mean	5.3						
The percentage of compliance	0.88						
Gap size	0.12						

The checklist in Table 3 shows the level of actual implementation of receiving area. The Company achieved a percentage of compliance is (0.88), which indicates a gap of (0.12).

Cold Storage Facilities (Fridges and Freezers) Gap Analysis

Table 4: Cold Storage Facilities (Fridges and Freezers) Gap Analysis

Cold Storage Facilities (Fridges) freezer	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied Not Documented	Not Documented Not Applied
weights	6	5	4	3	2	1	0
duplicates	7				1		
The result	42				2		0
Arithmetic mean	5.25						
The percentage of compliance	0.88						
Gap size	0.12						

The checklist in Table 4 shows the level of actual implementation of cold storage facilities (Fridges) freezers. The company achieved a compliance percentage of (0.88), which indicates a gap of (0.12).

Deforesting Gap Analysis

Table 5: Deforesting Gap Analysis

Deforesting	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
weights	6	5	4	3	2	1	0
Duplicates	2						1
The result	12						
Arithmetic mean	4						
The percentage of compliance	0.66						
Gap size	0.34						

The checklist in Table 5 shows the level of actual implementation of deforesting. The company has achieved a compliance percentage of (0.66), which indicates a gap of (0.34).

Food Preparation Area Gap Analysis

Table 6: Food Preparation Area Gap Analysis

Food Preparation Area	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	6			1			1
The result	36			3			0
Arithmetic mean	4.5						
The percentage of compliance	0.81						
Gap size	0.19						

The checklist in Table 6 shows the level of the actual implementation of the food preparation area. The company achieved a compliance percentage of (0.81), which indicates a gap of (0.19).

Cooking and Reheating Gap Analysis

Table 7: Cooking and Reheating Gap Analysis

Cooking and Reheating	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	3						1
The result	18						0
Arithmetic mean	4.5						
The percentage of compliance	0.75						
Gap size	0.25						

Table 7 shows the level of actual implementation of ISO 22000 for cooking and reheating. The company achieved a compliance percentage of (0.75), which indicates a gap of (0.25)

Personnel Hygiene Gap Analysis

Table 8: Personnel Hygiene Gap Analysis

Personnel Hygiene	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	4			1		0	
The result	24			3		0	
Arithmetic mean	4.8						
The percentage of compliance	0.8						
Gap size	0.2						

The checklist in Table 8 shows the level of actual implementation of personnel hygiene. The company achieved a compliance percentage of (0.8), which indicates a gap of (0.2).

Equipment Gap Analysis

Table 9: Equipment Gap Analysis

Equipment	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	4					1	
The result	24					1	
Arithmetic mean	4.8						
The percentage of compliance	0.83						
Gap size	0.17						

The checklist in Table 9 shows the level of actual implementation of equipment. The company achieved a compliance percentage of (0.83), which indicates a gap of (0.17).

Cleaning and Sanitation Gap Analysis

Table 10: Cleaning and Sanitation Gap Analysis

Cleaning and Sanitation	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	5	0	0	0	0	0	0
The result	30						
Arithmetic mean	1						
The percentage of compliance	1						
Gap size	0						

The checklist in Table 10 shows the level of actual implementation of cleaning and sanitation. The company achieved a compliance percentage of (1), which indicates a gap of (0).

Refuse Facilities Internal and External Control

Table 11: Refuse Facilities Internal and External Control Gap Analysis

Refuse Facilities Internal and External Control	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	7						2
The result	42						0
Arithmetic mean	4.6						
The percentage of compliance	0.77						
Gap size	0.23						

The checklist in Table 11 shows the level of actual implementation of refuse facilities' internal and external Control. The company achieved a compliance percentage of (0.77), which indicates a gap of (0.23).

Pest Control Gap Analysis

Table 12: Pest control Gap Analysis

Pest control	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	4				1		
The result	24				2		
Arithmetic mean	4.8						
The percentage of compliance	0.87						
Gap size	0.13						

The checklist in Table 12 shows the level of actual implementation of Pest control. The company achieved a compliance percentage of (0.88), which indicates a gap of (0.22).

Food Premises Construction Gap Analysis

Table 13: Food Premises Construction Gap Analysis

Food Premises Construction	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	7						1
The result	42						0
Arithmetic mean	5.25						
The percentage of compliance	0.88						
Gap size	0.22						

The checklist in Table 13 shows the level of actual implementation of food premises construction. The company achieved a compliance percentage of (0.88), which indicates a gap of (0.22).

First Aid Kit Gap Analysis

Table 14: First Aid Kit

First Aid Kit	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	0	0	0	0	0	0	0
The result	0						
Arithmetic mean	0						
The percentage of compliance	0						
Gap size	1						

The checklist in Table 14 shows the level of the actual implementation of the first aid kit. The company achieved a compliance percentage of (0), which indicates a gap of (1).

Potable Water Control Program Gap Analysis

Table 15: Potable Water Control Program Gap Analysis

Potable Water Control Program	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	3	0	0	0	0	0	0
The result	18						0
Arithmetic mean	6						
The percentage of compliance	1						
Gap size	0						

The checklist in Table 15 shows the level of the actual implementation of the potable water control program. The company achieved a compliance percentage of (1), which indicates a gap of (0).

Laboratory Analysis Gap Analysis

Table 16: Laboratory Analysis Gap Analysis

Laboratory Analysis	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	3						
The result	18				2		
Arithmetic mean	6						
The percentage of compliance	1						
Gap size	0						

The checklist in Table 16 shows the level of actual implementation of laboratory analysis. The company achieved a compliance percentage of (1), which indicates a gap of (0).

Meal Examination Gap Analysis

Table 17: Meal Examination Gap Analysis

Meal Examination	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	6			3			2
The result	36			9			0
Arithmetic mean	4.09						
The percentage of compliance	0.68						
Gap size	0.32						

The checklist in Table 17 shows the level of actual implementation of meal examination. The company achieved a compliance percentage of (0.68), which indicates a gap of (0.32).

Training Gap Analysis

Table 18: Training gap analysis

Training gap	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	4						1
The result	24						0
Arithmetic mean	4.8						
The percentage of compliance	0.8						
Gap size	0.2						

The checklist in Table 18 shows the level of actual implementation of training. The company achieved a compliance percentage of (0.8), which indicates a gap of (0.2).

Security Measures Gap Analysis

Table 19: Security Measures Gap Analysis

Security Measures	Fully Applied Fully Documented	Fully Applied Partially Documented	Fully Applied Not Documented	Partially Applied Fully Documented	Partially Applied Partially Documented	Partially Applied, Not Documented	Not Documented Not Applied
Weights	6	5	4	3	2	1	0
Duplicates	3						1
The result	18						0
Arithmetic mean	4.5						
The percentage of compliance	0.75						
Gap size	0.25						

The checklist in Table 19 shows the level of actual implementation of security measures. The company achieved a compliance percentage of (0.75), which indicates a gap of (0.25).

To conclude; Table 20 shows the total degree of compliance and the total gap size for the implementation of the food safety management system (ISO 22000) in the flight catering company under study.

Table 20: Total Gap Size

Department	Degree of compliance	Gap size	Ranks
Documents check	0.97	0.03	2
Receiving area gap analysis	0.88	0.12	4
cold Storage Facilities (Fridges)freezer	0.88	0.12	4
Food preparation	0.81	0.19	6
Defrosting	0.66	0.34	10
Food Preparation Area	0.81	0.19	6
Cooking and Reheating gap analysis	0.75	0.25	8
Personnel Hygiene gap analysis	0.8	0.2	3
Cleaning and Sanitation	1	0	1
Refuse Facilities Internal and External Control	0.77	0.23	7
Pest control	0.87	0.13	5
Training	0.8	0.2	3
Food Premises Construction	0.88	0.22	4
First Aid Kit	0	1	11
Potable Water Control Program	1	0	1
Laboratory Analysis	1	0	1
Meal Examination	0.68	0.42	9
Security Measures	0.75	0.25	8
Total gaps	0.77	0.23	

As illustrated in Table 20, a ranking was given for each item according to its degree of compliance and Gap size. It is found that the general degree of compliance with the FSMS ISO 22000 standards was (77%) with a gap size of (23%). The highest degree of compliance with the FSMS ISO 22000 standards was in the cleaning and Cleaning and Sanitation and also the Potable Water Control Program (with 1 degree of compliance and 0 Gap size). The lowest degree of compliance with the Food Safety Management System ISO 22000 standards was in the First Aid Kit (with 0 degrees of compliance and 1 Gap size). The ranking of ISO22000 sections according to their degree of compliance is as follows:

1. Laboratory Analysis, Potable Water Control Program, and Cleaning and Sanitation, with nil gap size.
2. Documents check, with 0.03 gap size.
3. Receiving area gap analysis and Cold Storage Facilities and Food Premises Construction, with 0.12 gap size.
4. Pest control, with 0.13 gap size.
5. Food Preparation Area, with 0.19 gap size.
6. Personnel Hygiene Analysis and Training, with 0.2 gap size.
7. Refuse Facilities Internal and external Control, with 0.23 gap size.
8. Cooking and Reheating gap analysis and Security Measures, with 0.25 gap size.

9. Meal Examination, with 0.32 gap size.
10. Defrosting, with 0.44 gap size.
11. First Aid Kit, with gap size, reached 1.

The total gap size (0.23) is not low, especially when it is with a sensitive field like flight food safety.

According to what has been reached, the most important results are as follows:

- The implementation of Laboratory Analysis, Potable Water Control Program, and Cleaning and Sanitation came first in achieving effective application with zero gap size and compliance percentage of one.
- The Implementation of Documents check came second in achieving effective application with a gap size of 0.03 and compliance percentage of 0.97.
- The implementation of receiving area, cold Storage Facilities (Fridges)freezer, Personnel Hygiene gap analysis, and Food Premises Construction came third in achieving effective application with a gap size of 0.12 and compliance percentage of 0.88.
- The Implementation of Training came Fourth in achieving effective application with a gap size of 0.2 and compliance percentage of 0.8.
- In the implementation of the Food Preparation and Food Preparation Area, Pest control came fifth in achieving effective application with a gap size of 0.19 and compliance percentage of 0.81.
- The implementation of internal and external Control came sixth in achieving effective application with a gap size of 0.23 and compliance percentage of 0.77.
- The Implementation of Cooking and Reheating gap analysis and Security Measures came Seventh in achieving effective application with a gap size of 0.25 and compliance percentage of 0.75.
- The Implementation of the Meal Examination came to Eights in achieving effective application with a gap size of 0.42 and compliance percentage of 0.68.
- The implementation of defrosting came Ninth in achieving effective application with a gap size of 0.34 and compliance percentage of 0.66.
- The Implementation of the First Aid Kit came Tenth in achieving effective application with a gap size of Zero and compliance percentage of One.

Recommendations

1. Spread the food safety culture among the staff of the company, as many gaps were discovered in the application of the ISO22000 food safety management system, despite the existence of fixed and announced requirements and measurements.
2. Enhancing managerial commitment for better implementation of ISO22000 food safety management system.
3. The research suggests that not only managers but also, the flight catering company is suggested to set direct responsibilities related to the safety of all the employees with seniority level and even lower within the company. As it leads to a safe food operation environment.

4. Contracting with certified professional trainers or internationally accredited organizations to upgrade the food safety culture within the flight catering company, as the research reached a lack of effective training at the flight catering companies.
5. Regular follow-up from the safety department, as a follow-up, is one of the ways to continuous improvement, and at the same time, lack of follow-up is a direct reason for the existence of gaps.
6. Encourage staff to periodic reporting of any deficiencies and suggestions for any area of the food safety system as it leads to an effective application.

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تطبيق نظام إدارة سلامة الغذاء أيزو 22000 في شركات التموين الجوى المصرية

الملخص العربي

يعد اعتماد نظام إدارة سلامة الأغذية الايزو 22000 قرارًا استراتيجيًا للمنظمة يمكن أن يساعد في تحسين الأداء العام ونظم سلامة الأغذية. هناك العديد من الفوائد المحتملة لشركات التموين الجوي عند تطبيق نظام ادارة سلامة الاغذية ايزو 22000 مثل القدرة على توفير أغذية ومنتجات وخدمات آمنة باستمرار تلبي متطلبات العملاء القانونية والتنظيمية المعمول بها ومعالجة المخاطر المرتبطة بالأهداف، بالإضافة إلى القدرة على إثبات الامتثال لمتطلبات نظام سلامة الاغذية المحددة. يعتمد البحث على المنهج النوعي في وصف ظاهرة البحث وتحليل أبعادها. .تم جمع البيانات من خلال قائمة مراجعة معدلة اعتمادًا على قائمة مراجعة تم اختبارها مسبقًا والتي وافقت عليها هيئة الطيران المدني المصرية مع الإشارة إلى RBG / QA / CL / 116" ، الإصدار 01". تم استخدامها كأداة للدراسة تم من خلالها إجراء تدقيق على وحدة التموين التي خضعت للمسح. اعتمد البحث على المنهج النوعي في وصف ظاهرة البحث وتحليل أبعادها. تم تحليل البيانات باستخدام مقياس سباعي لقياس مدى مطابقة التنفيذ الفعلي للمتطلبات وخلصت الدراسة الميدانية إلى وجود عدد من الثغرات في تطبيق النظام على الرغم من وجود آلية محددة ومعدة مسبقًا للتنفيذ. قدم البحث مجموعة من التوصيات لشركات التموين الجوي لتفادى أسباب حدوث فجوات تطبيق نظام ادارة سلامة الاغذية ايزو 22000 فى شركات التموين الجوي.

الكلمات المفتاحية: تموين الطائرات - ISO22000 -إدارة سلامة الغذاء - الطيران