

# A realistic study of the possibility of implementing a food safety management system(ISO22000:2018) an case study for Baghdad soft drinks company for the period 2023-2024

دراسة واقعية لأمكانية تطبيق نظام ادارة سلامة الاغذية (ISO22000:2018) دراسة حالة لشركة بغداد للمشروبات الغازية للمدة 2024-2023

أ.م. د. قيس زهير عبد الكريم  
 Qabas zouhair Abdel karima  
 الجامعة التقنية الوسطى  
 Middle Technical University  
 الكلية التقنية الادارية / بغداد  
 Kabas\_zouhair@mtu.edu.iq

مريم قحطان عبد الامير حسين  
 Maryam qahtan abdulamir hussen  
 الجامعة التقنية الوسطى  
 Middle Technical University  
 الكلية التقنية الادارية / بغداد  
 ddc2021@mtu.edu.iq

## المستخلص

تهدف الدراسة الى قياس الفجوة في تطبيق وتوثيق نظام ادارة سلامة الاغذية وفق المواصفة ISO22000:2018 في شركة بغداد للمشروبات الغازية ، وانطلقت الدراسة من اعتماد شركة بغداد للمشروبات الغازية على تطبيق نظام PEPSICO ، وضعف المعرفة لدى الادارة العليا بمتطلبات المواصفة ISO22000:2018 رغم سعي الشركة مؤخراً لتطبيق متطلبات نظام ادارة سلامة الاغذية وفق المواصفة ISO22000:2018. اعتمدت الدراسة على منهج دراسة الحالة لتحقيق الاهداف . تم استخدام قوائم الفحص كوسيلة لجمع البيانات . وقع الاختيار على شركة بغداد للمشروبات الغازية كواقع ميداني عملي لاجراء الدراسة. كما اعتمدت الدراسة على مجموعة من الادوات الاحصائية لتحليل البيانات ( الوسط الحسابي المرجح، قياس مدى المطابقة ، تحديد نسبة الفجوة). توصلت الدراسة الى عدد من النتائج، حيث بلغت نسبة المطابقة 45% في حين كانت الفجوة بين الواقع الفعلي للتطبيق ومتطلبات المواصفة 55% مما يعني هناك فجوة كبيرة بين الواقع الفعلي للشركة ومتطلبات المواصفة . لذلك توصي الباحثة بالاعتماد على النتائج التي توصلت اليها الدراسة من تحليل بيانات قوائم الفحص لتحديد الجوانب الايجابية وتعزيزها والسعي لتقليل الجوانب السلبية التي نالت اقل نسبة مطابقة.

**الكلمات المفتاحية:** ادارة سلامة الاغذية ، المواصفة القياسية ISO22000:2018 ، سلامة الاغذية ، نظام ادارة سلامة الاغذية ، هاسب

## Abstract

The study aims to measure the gap in implementing and documenting the food safety management system in accordance with ISO22000:2018 in the Baghdad Soft Drinks Company .The study started from Baghdad Soft Drinks Company's reliance on the pepsico system, weak knowledge of senior management regarding the requirements of the standard ISO22000:2018 although the company has recently sought to implement the requirements of the food safety management system in accordance with the specification ISO22000:2018 .The study relied on the case study approach to achieve the objectives. Checklists were used as a data collection method .The Baghdad Soft Drinks Company was chosen as a practical field to conduct the study. The study also relied on a set of statistical tools to analyze the data(the weighted arithmetic mean, measure the extent of conformity, determine the gap ratio). The study reached a number of results, where the conformity rate reached 45%, while the gap between the actual reality of the application and requirements of the specification reached 55% which means there is a large gap between the actual reality of the company and the requirements of the specification . Therefore, the researcher recommends relying on the results of the study from analyzing the checklist data to identify and enhance the positive aspects and strive to reduce the negative aspects that received the lowest percentage of conformity

**Keywords:** Food safety, HACCP, Food safety management, Food safety management system, standard ISO22000:2018.

## 1. Introduction

ISO 22000 is an internationally recognized standard that combines the ISO9001 approach to food safety management and HACCP to ensure food safety at all levels. The standard explains how an establishment can demonstrate its ability to control safety risks to ensure that food is safe.

Food safety is a global concern and ISO 22000 can be used by any organization within the food supply chain. The standard integrates the principles of the Hazard Analysis and Critical Control

Point (HACCP) system developed by the Codex Alimentarius. With auditable requirements, it combines the HACCP plan with prerequisite software as well as other food safety system requirements.

ISO 22000 certification will benefit most companies looking for a coherent, internationally recognized food safety management system. ISO 22000 may be required by some feed customers, but it is also good business, providing a framework for management, accountability, continuous improvement and communications.

For this purpose, many researches and studies were conducted, including:

The research presented by (Al-Defa) and entitled (**Assessing the reality of food safety management systems in accordance with ISO22000:2018 and their role in improving supply chain operations/an applied study in Nour Al-Kafeel Company**) in the year (2023)

The research aims to measure the gaps and application in the researched company, diagnose the operations of the applied supply chains, and identify the extent of the relationship and influence between the food safety management system according to the ISO22000:2018 standard and the supply chain operations, as the problem of the research is summarized in the lack of knowledge and awareness of the food safety management system on the part of workers and its negative impact. In supply chain operations.

The study population is Noor Al-Kafeel Food Products Company, and the research sample was a dairy production line. The study also relied on a case study approach, relying on examination lists, a number of statistical methods, and a questionnaire form.

The results of the research lie in the presence of a gap between the requirements of the system and the actual reality of the application. The percentage of the gap for food safety amounted to 58.25%, and the gap for the supply chain amounted to 28.23%. (Al-Dafadi,2023)

In the year (2023), a research was presented by (Abdelmotaleb, et al.,2023) entitled (**The Implementation of Food Safety Management System (ISO 22000) in Egyptian Flight Catering Companies**)

The research aims to measure the effectiveness of implementing the food safety management system in accordance with the ISO22000:2018 standard in Egyptian aircraft catering companies.

The problem of the research lies in the weakness in the application of food safety management systems in aircraft catering companies, which makes the companies exposed to legal issues, and the research community catering companies Egyptian Airlines

As for the research sample, places where food is manufactured and packaged in the company, the study relied on a qualitative approach/field study using checklists.

The results of the research are that there are a number of gaps in implementing the system despite the presence of high degrees of compliance with the food safety management system (Abdelmotaleb, et al.,2023)

The current research may differ from previous research in that it deals with a different sector and adopts the seven-point scale.

## 2. Research methodology

### 2.1 Problem of Research

Given the ongoing cases of food poisoning in the world, and the extent of the risks that contaminated food poses to customers in particular and to organizations and their reputation in general, food safety has become a primary concern for public health, which has led to a consistent approach to the food safety system for many organizations through the development of a system Comprehensive food safety, as the food safety management system in accordance with the ISO22000:2018 standard helps organizations protect their competitive market and reduce the high

costs that organizations bear as a result of the lack of awareness of the importance of the system, and protect their customers and society. Therefore, the research can be summarized in the Baghdad Soft Drinks Company's endeavor to implement a system Food safety management is in accordance with ISO22000:2018, due to its need to improve operations to avoid accidents and errors to which it is exposed. Accordingly, the research problem arises from the following set of questions:

- 1- What is the level of implementation of the requirements of the ISO22000:2018 standard by the Baghdad Soft Drinks Company?
- 2- How much is the gap between the actual reality of Baghdad Soft Drinks Company and the provisions of the ISO22000:2018 specification?

## 2.2 Research objective

The research objectives are summarized as follows:

- 1- Knowing the level of application of the requirements of the ISO22000:2018 standard by the Baghdad Soft Drinks Company.
- 2- Measuring the amount of the gap between the actual reality of Baghdad Soft Drinks Company and the provisions of the ISO22000:2018 specification.

## 2.3 The importance of study

1. Arousing the interest of Baghdad Soft Drinks Company to the positive aspects when implementing the food safety management system in accordance with the specification and providing foundations on which it can rely to achieve its goals.
2. Finding appropriate solutions to the gaps related to the implementation of the food safety management system and working to close them.

## 2.4 study population and sample

The Baghdad Soft Drinks Company, located in Al-Zafaraniyah, was chosen as a study population, and the company's soft drink production lines were chosen as a sample for the research.

## 2.5 Statistical tools used in data processing

The seven-point scale was relied upon to diagnose the level of application of the provisions of the ISO22000:2018 standard to obtain accurate results in the surveyed company by determining the relative weights. This data was analyzed quantitatively, obtaining the results and finding an appropriate interpretation for them. Through the following table, we can identify On items related to the seven-point scale and its weight (Fadel1 & Abdel Kareem, 2022:277) as in Table (1).

**Table (1) Seven-point Likert scale**

<b>Completely implemented</b> <b>Completely documented</b>	Fully documented, fully implemented	Partially documented, fully implemented	Undocumented Partially implemented	Fully documented, partially implemented	Partially documented Partially implemented	Not documented Not implemented
---	-------------------------------------	---	---------------------------------------	---	---	-----------------------------------

**Source:** Fadel1, Ali Abbas & Abdel Karim, Azzam Abdel Wahab, (2022), "Evaluation of the Possibility of Applying the Clauses of the Specification (ISO 45001:2018) in a Number of Formations of the Ministry of Construction and Housing: Comparative Research," Journal of Techniques, ISSN: 2708-8383, Vol. 4, No. 4, Pages 277.

In light of what is included in the checklists, degrees of conformity and degrees of non-conformity are determined. The percentage is extracted to determine the size of the gap based on the following equations (Muhammad et al., 2022:102) (Jumaa1 & Khaleel, 2022:90)

$$\text{❖ Weighted arithmetic mean} = \frac{\text{Total (weight * repetitions)}}{\text{Total repetitions}}$$

$$\text{❖ Percentage of conformity} = \frac{\text{Weighted arithmetic mean}}{6 \text{ (highest score on the scale)}}$$

❖ Gap size = 1 – percentage of matching range

### 3. The origins and concept of the standard (ISO22000:2018)

#### 3.1 Introduction

The International Standardization Organization (ISO) was established in the year 1946, when experts from 25 countries decided to establish an independent, non-governmental organization, and its official work began in 1947. The headquarters of that organization is in Switzerland, specifically in Geneva. The organization includes 163 members from The International Standards Authority, whose goal is to facilitate trade in products and services globally (Khaleel & Lokhande ,2022:1989) ,and global events indicate an increase in population numbers, an increase in demand for food, and an increase in levels of food waste. There is a need to create a specification related to the field of food. Food standards and regulations differ from each other. Some of them are mandatory and some are voluntary. Specifications for the safety of food and manufactured containers have been published. They are documents that help the organization in creating, implementing and maintaining the required programs for the PRP control system to control risks. This standard applies to all organizations regardless of their size or complexity and according to the following sequence. (Ninan&hassan,2023:60)

- ✚ ISO22000 Food Safety Management Systems.
- ✚ ISO22001 Guidelines on the application of ISO9001:2000 to the food and beverage industry
- ✚ ISO22002/TS Prerequisite programs for food safety include parts as follows(Njeudjang et al.,2022:51)
  - 2009: ISO/TS22002-1 Programs for food manufacturing requirements.
  - ISO/TS22002-2:2013 Programs basic requirements for food safety in how food is presented to the consumer.
  - ISO/TS22002-3:2011 includes programs on the basic requirements for agriculture and how to care for grown foodstuffs.
  - ISO/TS22002-4:2013 Programs for the basic requirements for packaging and packing produced foodstuffs.
  - ISO/TS22002-5:2019 contains special requirements for transportation and storage of foodstuffs.
- ✚ ISO/TS22003 Food safety management systems for bodies that provide audit and accreditation of food safety management systems
- ✚ ISO/TS22004 Food Safety Management Systems – Guidance on the Implementation of ISO22000:2005
- ✚ ISO22005 Traceability in the food chain - General principles and basic requirements for system design and implementation
- ✚ ISO22006 Quality Management Systems - Guidance on applying ISO9002:2000 to crop production.

Figure (1) embodies the ISO22000 family:

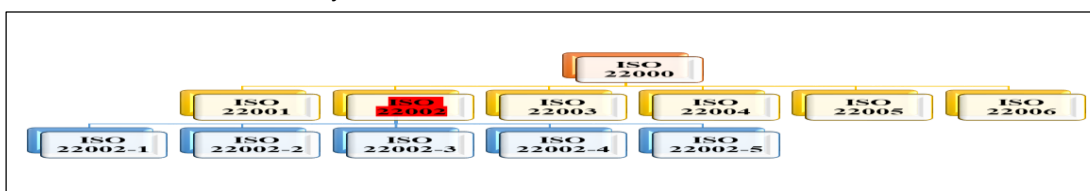


Figure (1) ISO22000 family of specifications

Source: Prepared by the researcher based on the aforementioned standard family

ISO22000 is known as an international system that helps meet the requirements of food safety, food security and sustainability in the food chain and provides a better understanding of the operational and strategic levels of risks and improvements in key processes in the food supply chain (Granja et al.,2021:25).A set of practices and procedures designed to prevent food-borne diseases by monitoring risks and finding ways to control them throughout the flow of food (Babeker et al.,2022:6831).

Through the different concepts of the researchers, the researcher sees that the food safety management system is an optional system that organizations resort to to protect their foods from risks, gain customer satisfaction, trust and comfort, and protect them from developing any symptoms that may harm their health or put their lives at risk. (El-rouby et al.,2020:951)

### **3.2 Benefits of implementing a food safety management system according to ISO22000:2018**

There are a group of benefits that are achieved when implementing a food safety management system in accordance with the ISO22000:2018 standard, including technological, economic and social benefits that reflect positively on the work of organizations and enhance their reputation, which encourages other organizations to adopt the idea of adopting this standard, and they are represented as follows(Radu et al.,2020:293)

- Implementing the ISO22000 system helps organizations align technical specifications for products and services.
- Making the industry more efficient, in addition to preventing obstacles to global trade.
- It guarantees consumers that the products they receive are safe, effective, and good for the environment.
- The standard is a strategic guide and a tool to help organizations overcome some of the challenges required in modern business.
- It increases the productivity of organizations and helps them reach new markets.

### **3.3 Steps to implement a food safety management system according to ISO22000:2018**

Methods and foundations for risk analysis, critical control points, and initial operational requirements programs should be determined in order to build a strong and effective system. These methods should be extracted from production flow maps, in addition to creating a documented system to continuously reduce risks with the aim of providing a safe product to the consumer. There are steps to the process of implementing the system according to The following sequence (Surareungchai et al.,2022:16)

**3.3.1 Establishing pre-control programs (PRPS):** - Before the system standards are applied, the work team determines conformity and non-conformity with the administration to provide the required resources, in addition to following up on all observations by the team regarding the infrastructure and the location of the equipment in terms of maintainability, operation, and cleaning, in addition to the appropriate space for carrying it out. Among materials to carry out inspection and pest control activities in the case of storage, observing waste locations, finding designated places for them, and closing them when not in use.

**3.3.2 Product description:** - The product and its purpose are identified in order to know the appropriate factors for preservation, packaging, and expiration date. Some materials need to be under certain environmental influences, such as temperature, humidity, or not being exposed to sunlight.



**3.3.3 Risk analysis:** Obtaining the final product is preceded by a number of processes, including entering raw materials and converting those materials into products, then taking samples to confirm cases of non-conformity, carrying out packaging, and arriving at storage. Risk analysis is done for all previous stages. To ensure that the system is implemented correctly( Purwanto et al.,2022:13)

**3.3.4 Controlling critical points and operating requirements programs:** The food safety team sets critical limits or control systems for each critical control point and operational requirements programs to prove that the control points are under control and are recorded and documented by the team.

**3.3.5 Develop a corrective action plan:** The organization creates and maintains documented information to determine appropriate procedures to detect and remove cases of non-conformity, identify their causes, prevent their recurrence, and control subsequent operations.

**3.3.6 Verification:** A verification plan is created by the food safety team to ensure that all processes of the food safety management system are effectively implemented and updated(Goncalves et al.,2020:400)

**3.3.7 Documented information:** - Create and update documented information for the food safety management system for all operations and maintain those records for at least one year after the expiration of the product.

**3.3.8 Tests:** Tests are conducted to ensure the safety of operations from the beginning of the entry of raw materials until the product is delivered to the consumer.

### **3.4Challenges of implementing a food safety management system according to ISO22000:2018**

Despite the benefits achieved by implementing the food safety management system, there are challenges facing organizations. Both (Abdelmoteleb et al.,2023:71) and (Radu et al.,2020:289) identified a set of challenges facing the application of the system, represented by:

**3.4.1 Senior management:** The weak participation of senior management, their lack of commitment to the responsibility they bear in implementing the FSMS, and their resistance to change lead to the weakness and failure of the organization to adopt the food safety management system.

**3.4.2 Employees:** One of the challenges facing the organization in adopting a food safety management system is through lack of awareness of the importance of applying the standard, lack of manpower, or lack of financial and moral motivation, which generates resistance to change and resistance to introducing new work procedures.

**3.4.3 Difficulty in application:** Most organizations face difficulty in applying the standard because they lack the tools and methodologies that help in its application, or the organization suffers from a lack of internal communications, which makes it an obstacle to implementing or adopting the idea of the standard.

**There are two other challenges, which are** (Zaki& Tager,2023)

**3.4.4 Time:** Organizations need sufficient time to implement the system and obtain the certificate. There are time restrictions imposed, which pose a clear challenge to organizations.

**3.4.5 Implementation costs:** Time alone does not constitute an obstacle or challenge to implementation. Even if organizations have sufficient time for implementation, they may be lacking in costs. Program costs are high and some organizations find it difficult to adopt the standard.

From the researcher's point of view, implementing an approved system is a process that takes a long time and provides many benefits to organizations and thus reflects positively on the reputation

and share of organizations in the markets, but implementing it is not an easy matter. Organizations need training cadres, skilled manpower, and support and support from senior management, in addition to the material costs that arise. For organizations, the high costs and time required for completion, in addition to the tools, equipment and technology that the organization needs, are all considered factors that help in adopting a food safety management system program, and otherwise they constitute a challenge and an obstacle to the implementation of the standard.

#### **4. Success factors for the food safety management system according to the standard ISO22000:2018**

Implementing a food safety management system is extremely important, and there are factors that help in its success: (Mongi-mora et al,2020:352-356), (Purwanto et al.,2019:180), (Elizabeth et al.,2021:51)

##### **4.1 Internal factors**

###### **4.1.1 leadership**

###### **4.1.2 Training**

###### **4.1.3 Performance evaluation**

###### **4.1.4 Planning**

###### **4.1.5 Finance resource**

##### **4.2 External factors**

###### **4.2.1 Organization context**

###### **4.2.2 Risk and opportunities**

###### **4.2.3 Interested parties**

###### **4.2.4 The support**

#### **5. company products (soft drinks field)**

The company produces soft drinks in various sizes and flavors. It contains thirteen production lines for soft drinks distributed among four laboratories with a 24-hour working day divided into three work patrols. The daily production capacity of soft drinks is approximately 45,000 packages of different types. The company's products for soft drinks are shown in the table. Below:

**Table (2): Company products, study sample**

1.	pepsi	✓	✓	✓
2.	7 up	✓	✓	✓
3.	Diet pepsi	750 ml	✓	
4.	Diet 7 up	750 ml	✓	
5.	Pepsi zero	750 ml		
6.	7 up zero	750 ml		
7.	Miranda orange	✓	✓	✓
8.	Miranda zero	750 ml		
9.	Mountain	✓	✓	✓
10.	Mountain zero	750 ml		
11.	Mirinda apple	✓	✓	✓
12.	Shani	✓	250ml	✓
13.	Rockstar		185 ml	
14.	Mirinda grape	✓	250ml	✓

Source: Prepared by the researcher based on data in the company's records

#### **6. Analysis of Results**

The reality of implementing the food safety management system in the Baghdad Soft Drinks Company in accordance with the requirements of the standard (ISO22000:2018), as the research data represented a checklist in accordance with the provisions of the standard (ISO 22001) to

achieve the goal of the study and answer the first question. The level of application of the management system will be known. Food safety according to ISO22000:2018 at Baghdad Soft Drinks Company, based on checklists for the main items and sub-items, which will be analyzed and discussed.

### 6.1 The fourth item is the organization's context

In Table ( 3) the checklists for the sub-items of the organization's context appear, namely (4.1) Understanding the organization and its context, 4.2 Understanding the needs and expectations of the parties involved, 4.3 Defining the scope of the food safety management system, 4.4 The food safety management system) and the extent of its application and documentation in the Baghdad Soft Drinks Company.

**Table (3) Checklist Item 4 Organization Context**

Table (3) Checklist Item 4 Organization Context								
No.	Paragraph	Completely applied			Partially applied			Not implemented and not documented
		Totally notarized	Partial notary	Undocumented	Totally notarized	Partial notary	Undocumented	
		6	5	4	3	2	1	
4.1 Understanding the organization and its context								
1	The company identifies internal and external issues relevant to its purpose and that affect its ability to achieve the desired results of the food safety management system.					✓		
2	The company works to identify, review and update information related to internal and external issues related to the food safety management system.					✓		
4.2 Understand the needs and expectations of concerned parties								
3	The company is working to determine the requirements of concerned parties related to the food safety management system					✓		
4	The company works to review and update information related to interested parties and their requirements related to the food safety management system.							✓
4.3 Determine the scope of the food safety management system								
5	The company determines the scope of the food safety management system, taking into account internal and external issues and the requirements of relevant stakeholders.							✓
4.4 Food safety management system								
6	The company establishes and implements a food safety management system and works to maintain it, update it, and constantly improve its work.							✓
	Repetition	0	0	0	0	3	0	3
	The result	0	0	0	0	6	0	0
	Weighted arithmetic mean							
	Percentage of conformity	16%						
	Gap size	84%						

It is clear from the table for the fourth item, the context of the organization, that the actual application and documentation of the sub-items was with an arithmetic mean of 1 out of 6, and the matching rate was 16%, while the size of the gap was 84%, and that the demographic information about the research sample was according to Table (3).

### 6.2 Clause Five: Leadership



The level of application and actual documentation for Baghdad Soft Drinks Company for the sub-items of the main item (Leadership) appears in the checklists in Table (4).

**Table(4) Checklists for Item 5 Leadership**

Table (7) Checklist for Item 5 Leadership								
No.	Paragraph	Completely applied			Partially applied			Not implemented and not documented
		Totally notarized	Partial notary	Undocumented	Totally notarized	Partial notary	Undocumented	
		6	5	4	3	2	1	
5.1 Leadership and commitment								
1	Senior management demonstrates leadership and commitment to provide the necessary resources regarding the food safety management system.	✓						
2	The company ensures that the policy and objectives of the food safety management system that have been established are consistent with its strategic direction.				✓			
3	Senior management emphasizes the importance of the food safety management system and compliance with its requirements, legal and regulatory requirements, and customer requirements.						✓	
4	The company evaluates and manages the food safety management system to achieve the desired results.							✓
5	Senior management directs and supports individuals to contribute to the effectiveness of the food safety management system.						✓	
5.2 Policy								
	<b>The company develops and implements a food safety policy that:</b>				✓			
6	Be appropriate to the company's purpose and context.				✓			
7	Provides a framework for setting and reviewing the objectives of the food safety management system.					✓		
8	Meets the necessary food safety requirements.				✓			
9	Includes internal and external communications.				✓			
10	Ensures commitment to continuous improvement in the food safety management system.				✓			
11	The food safety policy shall be available as documented information to relevant interested parties.				✓			
12	The food safety policy must be made public, understood and implemented at all levels in the company.				✓			
5.3 Organizational roles, responsibilities and authorities								
13	Senior management ensures that the food safety management system complies with the requirements of ISO 22000.							✓
14	The company determines the head and members of the food safety team	✓						

15	The Food Safety Team Leader is responsible for establishing, implementing, maintaining and updating the food safety management system.						✓	
16	The company works to provide the necessary training and attract the best talents to the food safety team.				✓			
17	All members of the food safety team are responsible for reporting any problems with the food safety management system to the relevant persons.						✓	
18	The company defines relationships, levels of delegation of authority, powers, roles and tasks accurately, clearly and understandably.	✓						
	Repetition	3	0	0	7	2	4	2
	The result	18	0	0	21	4	4	0
	Weighted arithmetic mean	2.6						
	Percentage of conformity	43%						
	Gap size	57%						

It is clear from the table for the fifth item, Leadership, that the actual application and documentation of the sub-items was with a mean of 2.6 out of 6, and the compliance rate was 43%, while the size of the gap was 57%.

### 6.3 Item Six: Planning

The following checklist describes the questions related to the sub-clauses of the planning clause and the extent of Baghdad Company's actual implementation and documentation of the requirements of this clause.

table(5) Checklists for planning item

Table 3/ Checklists for planning item								
No .	Paragraph	Completely applied			Partially applied			Not implemented and not documented
		Totally notarized	Partial notary	Undocumented	Totally notarized	Partial notary	Undocumented	
		6	5	4	3	2	1	
6.1 Measures to address risks and opportunities								
1	The company ensures that the food safety management system can achieve its desired results by identifying internal and external issues and requirements of the parties concerned and identifying risks and opportunities that need to be addressed.					✓		
2	The company is working on planning the necessary measures to address the risks and opportunities it has identified.						✓	
3	The company integrates and implements procedures to address risks and opportunities into its food safety management system operations and evaluates the effectiveness of these procedures.				✓			
4	The measures taken by the company to address risks and opportunities are proportionate to the requirements of the parties concerned in the food chain.				✓			
6.2 Objectives of the food safety management system and planning to achieve them								
5	The company works to define the objectives of the food safety management system at the relevant levels and constantly update it.					✓		
6	The objectives of the food safety management system are fully consistent with company policy, and are measurable.				✓			
7	The objectives of the food safety management system take into account food safety requirements.				✓			
8	The company is working to determine the required resources necessary to achieve its goals in the food safety management system.	✓						

9	The company is working to determine the necessary method to evaluate the results obtained from achieving the goals in the food safety management system.							✓
<b>6.3 Planning changes</b>								
13	The company determines the purpose and consequences of changes in the food safety management system.						✓	
14	The company determines the purpose and consequences of changes in the food safety management system.				✓			
15	The company is continuing the process of ensuring the validity of the food safety management system.	✓						
16	The company works to provide the necessary resources to implement the changes effectively.	✓						
<b>Repetition</b>		3	0	0	5	2	2	1
<b>The result</b>		18	0	0	15	4	2	0
<b>Weighted arithmetic mean</b>		3						
<b>Percentage of conformity</b>		50%						
<b>Gap size</b>		50%						

It is clear from the table for the sixth item, planning, that the actual application and documentation of the sub-items was 3 out of 6, and the compliance rate was 50%, while the size of the gap was 50%.

#### 6.4 Clause Seven: Support

Table (6) shows the sub-items of Clause Seven (Support) and the extent of application and documentation in the Baghdad Soft Drinks Company.

table(6) Checklists for support item

No.	Paragraph	Completely applied			Partially applied			Not implement ed and not documente d
		Totall y notar ized	Partial notary	Undocu mented	Totally notariz ed	Partial notary	Undo cume nted	
		6	5	4	3	2	1	
7.1 Resources								
1	The company identifies and provides the resources necessary to establish, implement, maintain, update, and improve the food safety management system.	✓						
2	The company identifies the individuals necessary to operate and maintain the food safety management system and provides them with a suitable work environment.		✓					
3	The company works to establish and maintain the infrastructure to operate the operations of the food safety management system and achieve product conformity.				✓			✓
4	The company develops and applies criteria to evaluate, select, monitor the performance and re-evaluate external suppliers of operations, products and/or services.							✓
5	The company relies on good communication methods with external suppliers.						✓	
6	The company ensures that processes and products provided externally do not negatively affect the company's ability to meet the requirements of the food safety management system.							✓
7.2 Efficiency								
7	The company determines the competencies, knowledge and experience of the food safety team necessary to implement and develop the system.							✓
8	The company works to attract competent individuals to be qualified on the basis of education, training and/or appropriate experience to apply and implement the food safety management system.							✓
7.3 Awareness								
	The company ensures that all concerned persons are aware of:							
9	Food safety policy.				✓			

14	Objectives of the Food Safety Management System relevant to its missions.						✓	
15	Their individual contribution to the effectiveness of the food safety management system.						✓	
16	Consequences of non-compliance with the requirements of the Food Safety Management System.						✓	
<b>7.4 Communication</b>								
17	The company determines internal and external communications related to the food safety management system.	✓						
18	The company ensures that requirements for effective communication are understood by individuals involved in the food safety management system Relationship with the food safety management system.			✓				
19	The company works to ensure that sufficient information is communicated externally and is fully available to interested parties in the food chain.	✓						
	Effective communications with consumers are created, implemented and followed up regarding:							
20	Information related to food safety.						✓	
21	Food safety risks.						✓	
22	Other organizations.	✓						
23	Customer complaints.			✓				
24	Legal and regulatory authorities.						✓	
25	The food safety team is informed in a timely manner of changes necessary to maintain the effectiveness of the food safety management system.		✓					
<b>7.5 Documented information</b>								
26	Documenting information that the standard, company, regulatory bodies, and/or customers determine is necessary for the effectiveness of the food safety management system and for evaluating and re-evaluating the system.					✓		
	When creating and updating documented information, the organization ensures the following:							
27	Definition and description (such as title, date, etc.).	✓						
28	Formatting and media (language, graphics, etc.).	✓						
29	Review and approve validity and appropriateness.						✓	
30	The company controls the information documented by it by processing activities related to the system such as distribution, storage, preservation, disposal, and others.		✓					
	<b>Repetition</b>	6	4	2	2	1	7	4
	<b>The result</b>	36	20	8	3	2	7	0
	<b>Weighted arithmetic mean</b>							
	<b>Percentage of conformity</b>	50%						
	<b>Gap size</b>	50%						

It is clear from the table for item seven that the actual application and documentation of the sub-items was with an arithmetic mean of 3.0 out of 6, and the compliance rate was 50%, while the size of the gap was 50%.

### 6.5 Operating Clause

Table (7) represents the checklists for the operating item and the extent of application and actual documentation of Baghdad Company regarding this item.

**table(7) Run item checklists**

No.	Paragraph	Completely applied			Partially applied			Not implemented and not documented
		Totally notarized	Partial notary	Undocumented	Totally notarized	Partial notary	Undocumented	
		6	5	4	3	2	1	
8.1 Operational planning and control								

1	The company plans, implements, maintains and updates the processes necessary to meet the requirements for achieving safe products.	✓						
2	The company sets standards for system operations, and carries out control over them in accordance with previously established standards.	✓						
3	Operations are carried out as previously planned and corrective action is taken in case of any unintended change.	✓						
4	The company controls external operations.							✓
<b>8.2 Prerequisite Programs PRPs</b>								
5	The company develops, implements, maintains and updates prerequisite programs to reduce contamination in products.	✓						
6	Prerequisite programs are appropriate in terms of the size and type of operation and the nature of the products being manufactured or handled in the company.	✓						
7	Prerequisite programs are approved by the Food Safety Team.	✓						
8	Customer legal and regulatory requirements are determined by mutual agreement.			✓				
<b>8.3 Tracking system</b>								
9	The company identifies materials received from suppliers according to its own tracking system.	✓						
14	The company maintains documented information as proof of the tracking system for the product.	✓						
15	The company constantly verifies and tests the effectiveness of the tracking system.	✓						
<b>8.4 Emergency Preparedness and Response (Emergency Preparedness and Response)</b>								
16	The company follows special procedures to respond to emergency situations affecting food safety and maintains documented information to manage these cases.					✓		
17	The necessary measures are taken to limit the consequences of the emergency, in proportion to the size of the emergency or accident.					✓		
18	Documented information is reviewed and updated after any accident, emergency or test occurs.						✓	
<b>8.3 Risk Control</b>								
19	The company ensures that all applicable legal, regulatory and customer food safety requirements are identified for all materials.				✓			
20	The Company maintains documented information relating to finished products to the extent necessary to conduct a risk analysis.	✓						
21	The company prepares flow charts that provide a graphical representation of the process and is updated by the food safety team.	✓						
22	The company's operations, its environment and risk analysis are described based on the primary information that must be controlled.	✓						
23	The company works to identify all food safety risks that are reasonably expected to occur.	✓						
24	The company determines the acceptable level of food safety risk in the final product.							✓
25	The company evaluates the risks facing the implementation of the system.	✓						
26	The company keeps the result of the risk assessment as documented information and chooses the appropriate procedure to reduce the risks facing food safety.	✓						
27	Critical limits are defined in the critical control points and work parameters of the operational preparation programme.		✓					



28	The company establishes control measures to detect any failure to remain within critical limits or within the standards of acceptance procedures.		✓					
29	The company establishes a monitoring system to measure and detect failure to meet an action or implementation standard.	✓						
30	The company implements a risk control and maintenance plan.			✓				
<b>8.4 Update information defining PRPs and risk control plan</b>								
31	The Company updates information that defines prerequisite programs and the risk control plan.				✓			
<b>8.5 Monitoring and measurement control</b>								
32	The company provides evidence that the monitoring and measurement methods used are sufficient for monitoring and measurement activities.	✓						
<b>8.6 Verification related to PRPs and risk control plan</b>								
33	The company establishes and implements the necessary activities to verify compliance with the risk control plan.			✓				
34	A specialized work team undertakes verification and oversight of risk control activities.			✓				
35	The food safety team analyzes the results of verification activities.		✓					
<b>8.7 Control of product and process mismatches</b>								
36	The company ensures that data derived from HACCP monitoring and the operational preparation program are evaluated by people who have the competence and authority to initiate corrections and corrective actions.		✓					
37	The company maintains and updates information on how to identify and correct affected products to ensure their proper handling.		✓					
38	The company takes measures to identify non-conforming products, deal with them as unsafe products, and prevent their entry into the food chain.	✓						
<b>When the procedures for the operational preparatory program are not met, the company will implement the following:</b>								
39	Determine the consequences of this failure with regard to food safety.							✓
40	Determine the reasons for this failure.	✓						
41	Identify the products affected by this failure.	✓						
42	The company maintains information necessary to describe corrections made to non-conforming products and processes.		✓					
43	The need for corrective action is determined when critical limits in the critical control points or work standards of the operational preparation program are not met.	✓						
44	The Company keeps products identified as unsafe under its control for evaluation and disposition.	✓						
45	Information received from relevant parties, and authorization to handle products that may be unsafe, is kept as documented information.						✓	
<b>The company disposes of non-conforming products by:</b>								
	Reprocessing or additional processing inside or outside the company to ensure that food safety risks are reduced to acceptable levels.							✓
	Redirect it to be used for something else.							✓
	Destroy it or dispose of it as waste.	✓						
	The Company designates a qualified individual with the authority to initiate and timely recall of unsafe finished products.	✓						

	The implementation and effectiveness of withdrawals is verified through the use of appropriate techniques.							✓
	<b>Repetition</b>	<b>24</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>6</b>
	<b>The result</b>	<b>144</b>	<b>30</b>	<b>8</b>	<b>6</b>	<b>2</b>	<b>2</b>	<b>0</b>
	<b>Weighted arithmetic mean</b>	<b>4.21</b>						
	<b>Percentage of conformity</b>	<b>71%</b>						
	<b>Gap size</b>	<b>29%</b>						

It is clear from the table for item eight, Operation, that the actual application and documentation of the sub-items was with a mean of 4.21 out of 6, and the compliance rate was 71%, while the size of the gap was 29%.

## 6.6 Performance evaluation

Table (8) shows the checklists for the evaluation item to determine the extent of application and actual documentation for Baghdad Company regarding this item.

**Table(8) Performance appraisal item checklists**

Table (8) Performance appraisal item checklists								
No.	Paragraph	Completely applied			Partially applied			Not implemented and not documented
		Totally notarized	Partial notary	Undocumented	Totally notarized	Partial notary	Undocumented	
		6	5	4	3	2	1	
9.1 Monitoring, measurement, analysis and evaluation								
1	The company determines the methods of monitoring, measurement, analysis and evaluation and what should be monitored and measured.	✓						
2	Who will analyze and evaluate the results from monitoring and measurement.			✓				
3	The company analyzes and evaluates appropriate data and information arising from monitoring and measuring the performance and effectiveness of the food safety management system.	✓						
4	The results of the analysis and activities are communicated to senior management and used as input into the management review and update of the food safety management system.					✓		
9.2 Internal audit								
5	The company precisely defines the required auditing standards and conducts internal audits at planned periods of time to provide information about the extent to which the food safety management system complies with the company's own requirements.				✓			
6	The company plans and implements the audit process and selects qualified auditors to conduct the audit process to ensure objectivity, impartiality, and prepare the necessary reports.				✓			
7	The company communicates the results of audits to the food safety team and management to take the necessary corrective action.	✓						
9.3 Management review								
8	The company reviews information about the performance and effectiveness of the food safety management system at specific time intervals.							✓
9	The company reviews changes in internal and external issues related to the food safety management system.					✓		
10	The company is reviewing the adequacy of resources.			✓				
11	Data are presented to senior management in a way that links the information to the objectives of the food safety management system.					✓		
12	The company is working to review decisions and procedures related to opportunities for continuous improvement.		✓					

13	Information provided by internal and external communications is reviewed to make decisions about updates and changes to the system.		✓					
	<b>Repetition</b>	3	0	2	1	3	2	1
	<b>The result</b>	18	0	8	3	6	2	0
	<b>Weighted arithmetic mean</b>	3.08						
	<b>Percentage of conformity</b>	52%						
	<b>Gap size</b>	48%						

It is clear from the table for the ninth item, performance evaluation, that the actual application and documentation of the sub-items was an arithmetic mean of 3.08 out of 6, and the compliance rate was 52%, while the size of the gap was 48%.

## 6.7 Improvement Clause

Table (9) shows the checklists for the improvement item to determine the extent of application and actual documentation of the sub-items in the Baghdad Soft Drinks Company.

table(9) Checklists for the improvement item

No.	Paragraph	Completely applied			Partially applied			Not implemented and not documented
		Totally notarized	Partial notary	Undocumented	Totally notarized	Partial notary	Undocumented	
		6	5	4	3	2	1	
10.1 Non-conformity and corrective actions								
1	The need for corrective action is assessed in order to eliminate the cause of the non-conformity.	✓						
2	The company reviews the effectiveness of the corrective measures taken.	✓						
3	The company makes changes to the food safety management system if necessary.							✓
4	The company maintains information about the nature of the non-conformity and any corrective actions.						✓	
10.2 Continuous improvement								
5	The company is constantly working to improve the suitability, adequacy and effectiveness of the food safety management system.							✓
10.3 Updating the food safety management system								
6	The Food Safety Team evaluates the Food Safety Management System at planned intervals and identifies necessary updates on an ongoing basis.							✓
7	The company considers the need to review the risk analysis, risk control plan, and specific interim plans.					✓		
8	The company keeps system update activities as documented information and reports them as input into a management review.					✓		
	Repetition	2	0	0	0	2	1	3
	The result	12	0	0	0	4	1	0
	Weighted arithmetic mean	2.12						
	Percentage of conformity	36%						
	Gap size	64%						

It is clear from the table for the tenth improvement item that the actual application and documentation of the sub-items was with an arithmetic mean of 2.12 out of 6, and the compliance rate was 36%, while the size of the gap was 64%.

## 6.8. Discussing the final results of measuring the gap between the reality of implementing the food safety management system in accordance with ISO22000:2018 in the Baghdad Soft Drinks Company

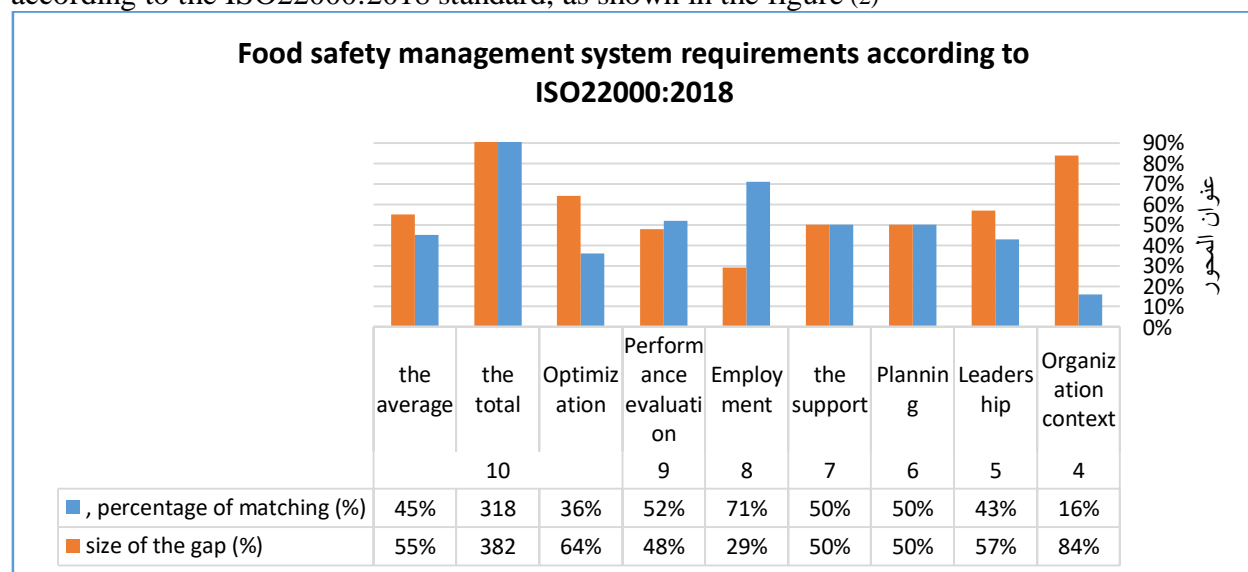
Table (10) shows the final results of implementing and documenting the food safety management system at Baghdad Soft Drinks Company in accordance with the terms of the ISO22000:2018 standard.

**Table (10) measuring the final gap of the food safety management system according to the requirements of ISO22000:2018**

No.	Item name	weighted arithmetic mean	, percentage of matching (%)	size of the gap (%)
4	Organization context	1.0	16%	84%
5	Leadership	2.6	43%	57%
6	Planning	3	50%	50%
7	the support	3.0	50%	50%
8	Employment	4.21	71%	29%
9	Performance evaluation	3.08	52%	48%
10	Optimization	2.12	36%	64%
	the total	19.01	318	382
	the average	2.71	45%	55%

The source was prepared by the researcher based on the results of the checklists for ISO22000:2018

The results in table (10) indicate that there is a gap in the Baghdad Soft Drinks Company of 55% in applying the provisions of the ISO22000:2018 standard, and the highest percentage of the gap was in the fourth clause, the context of the organization, considering that the company does not implement the standard despite seeking to obtain the certificate in addition to its focus on the degree The first is to provide defect-free products and deliver them safely to customers, ignoring some important internal and external issues in the specification. The highest percentage of conformity was in the eighth item, Operation. The reason is due to the organization's application of the systems affiliated with PEPSICO, which focuses on the sub-items of the operation item to a large extent. Therefore, there are periodic inspections of the samples included in the production chain, such as examining samples of the water used from the Tigris River before and after filtering. These samples are sent twice a year to the United States in special laboratories to ensure the safety of the water included in the production process. Although it is considered expensive, the company is always working. The results reached can be illustrated using a graphic chart to show the size of the gap and the percentage of compliance with the items of the food safety management system according to the ISO22000:2018 standard, as shown in the figure (2)



**Figure (2): Total conformity rates and size of gaps for the food safety management system according to ISO22000:2018 in Baghdad Soft Drinks Company**

## 7. Conclusions and Recommendations

After analyzing the results of the research questionnaire, a number of conclusions and recommendations emerged:

## Conclusions:

7.1 The company's weakness in identifying some internal and external issues such as the competitive environment and food fraud, which have a significant impact on the food safety management system.

7.2 The company does not rely on attracting talent, as it is satisfied with the qualifications of the individuals working in the company.

7.3 The company loses a lot of opportunities to seize

7.4 There are many problems with the company's infrastructure, as some factory lands are dilapidated and need to be maintained

7.5 Weak documentation processes in the company, which are an important part of the food safety management system

## Recommendations:

7.1 Develop a plan to identify internal and external issues through exploratory market studies and in accordance with the Food Safety Management System

7.2 Providing financial sums to contract with competencies in the field of food safety management system and benefiting from them to serve the safety of the products provided.

7.3 Develop advance plans to seize opportunities, use them for the benefit of the company, and address potential risks

7.4 Forming a maintenance team to maintain the infrastructure within a pre-determined timetable.

7.5 Establishing a secure documentation system to conduct documentation operations and protect them from damage and loss .

## Referenes

1. Abdelmotaleb, Doaa M., Mohamed, Mohamed Abdoutaleb, Ahmed, Yasser Abdel-Aty&Amer, Tamer Mohamed, 2023, "Barriers to the Application of the ISO22000 Food Safety Management System in Egyptian Flight Catering Companies", Journal of the Faculty of Tourism and Hotels-University of Sadat City, Vol. 7 Issue (1/1),pp:67-79
2. Abdelmotaleb, Doaa M., Mohamed, Mohamed aboutaleb, Ahmed, Yasser Abde-Aty& Amer, Tamer Mohamed, 2023 , "he Implementation of Food Safety Management System (ISO 22000) in Egyptian Flight Catering Companies, Journal of the Faculty of Tourism and Hotels-University of Sadat City, Vol. 7 Issue (1/1),pp:80-97
3. Al-Dafadi, Muhannad Jassim Hassan, 2023, "Assessing the reality of food safety management systems in accordance with ISO22000:2018 and their role in improving supply chain operations/ An applied study in Nour Al-Kafeel Company," Master's thesis, Administrative Technical College, Baghdad, Iraq
4. Babeker,AM, Ebrahiem,MA, Ahmed,AR& Mustafa,GA,2022, "Evaluation of the Existing Food Safety Management System (FSMS) Implemented in Sudanese Sugar industries", International journal of agricultural science and food technology,vol 8 ,no 1,pp: 021-027.
5. Elizabeth, Irma rosiana, Suyatma, Nugraha edhi, Yuliana, Nancy Dewy, Ranasasmita, Raafqi&Syaifullah, Syahnada Jaya, 2021, "Integration of ISO 22000 (2018) and HAS 23000 through Management System Audit: Case Study in Corned Beef Producer", Indonesian Journal of Halal Research,vol 3, no2,pp:43-55
6. El-rouby,M.Z., Bahlol,H.E, El-Desouky,A.I. , Sharoba,A.M.&Darweesg,A.H., 2020, "Application of Food Safety Management System (ISO 22000) In Processing of Wheat Flour Product",screened by ithenticate professional plagiarism prevention, ,vol.58, no (4), pp:949-962
7. FadelI, Ali Abbas & Abdel Karim, Azzam Abdel Wahab, (2022), "Evaluation of the Possibility of Applying the Clauses of the Specification (ISO 45001:2018) in a Number of Formations of the Ministry of Construction and Housing: Comparative Research," Journal of Techniques, ISSN: 2708-8383, Vol. 4, No. 4, pp: 277
8. Goncalves,J. , Rodrigues,B. , Teixeira,M. ,Domingues,P. &Cabecinhas,M. ,2020, "ISO22000 standarad implementation : benefits motivations and obstacles", proceeding of the 4<sup>th</sup> ICQEM conference,university of minho, Portugal,pp:392-403
9. Granja, N., Domingues, P., Cabecinhas, M., Zimon, D., & Sampaio, P., (2021), ISO 22000 certification: diffusion in Europe, Resources, Vol.10, No.10, PP.2-16



10. Jumaa1, Ruaa Khaled & Khaleel, Areej Saeed, (2022)," Evaluation of the Application of Quality Management Systems in Projects Quality Management Guidelines According to the Specification ISO 10006:2017:ACase Study in the Department of Engineering Construction", Journal of Techniques, ISSN: 2708-8383,Vol. 4, No. 3, pp: 87-98
11. Kawalkar,Rajat,Dubey,Harrsh kumar&Lokhande,Satish P., 2022, "A review for advancements in standardization for additive manufacturing", Materials today:proceedings, vol 50,pp:1983-1990
12. Monge-Mora, P. M., Oliveira, D. L. G., Shevchenko, K., Cabecinhas, M. & Domingues, P. , (2020) , "Critical success factors during the implementation of ISO 22000: 2018" , International Conference on Quality Engineering and Management, Proceedings of the 4th ICQEM Conference, University of Minho, Portugal, p353.
13. Muhammad1, Zainab Mahdi & Khalil, Areej Saeed, (2022)," Diagnosing the Actual Reality of the Requirements of Ecological Design According to ISO14006:2020: ACASE Study in EngineeringReconstruction Office-Iraq", Journal of Techniques, ISSN: 2708-8383,Vol. 4, No. 3, pp: 99-108
14. Ninan,Dr.George&Hassan,Dr.Femeena,2023, "ISO 22000/HACCP FOR FISH PROCESSING ESTABLISHMENTS ", ICAR-CENTRAL INSTITUTE OF FISHERIES TECHNOLOGY (ISO/IEC 17025:2005 NABL Accredited & ISO 9001:2015 certified) CIFT junction, Matsyapuri, P. O., Willingdon Island, Cochin-682029, Kerala, India, pp:1-180
15. Njeudjang, Kasi, Dongmo, Eric Donald, Ayiwouo, Mouhamed Ngounouno, Masso, Emilienne Adelaide ngo, Mbatchou, Franklin& Kuitse,Gabriel,2022, "Assessment of Compliance with Good Hygiene and Manufacturing Practice: Case of the Artisanal Chocolate Factory", Libyan Journal of Engineering ScienceandTechnology(LJEST),Vol.2,No.2,pp:48-55
16. Noryani, Ganar, Yulian Bayu, Sari, Widya Intan, Rosini, Lin, Munadjat, Baliyah , Sunarsi, Denok, Mas'adi& Gunartin, 2020, "Did ISO 45001, ISO 22000, ISO 14001 and ISO 9001 Influence Financial Performance? Evidence from Indonesian Industries", palArch's, journal of Archaeology of Egypt/ Egyptology, PJAE,vol 17, no (7), pp:6930-6950.
17. Purwanto, Agus, Asbari, Masduki, Santoso, Priyono budi, 2019 , "Influence of Transformational and Transactional Leadership Style toward Food Safety Management System ISO 22000:2018 Performance of Food" Industry in Pati Central Java, : Jurnal Inovasi Bisnis, vol 7,p: 180-185
18. Purwanto, Agus, Fahmi, Khaerul, Syahril,Irwansyah, Cahyono, Yoyok&Firmansyah, Arif, 2022, "The Correlation Analysis of ISO 22000:2018 Food Safety Management System on the Family Companies Performance", Unpri journal of science and technology,vol 1, no 1, pp:10-15.
19. Radu, maria-crina, Bucuroiu, rodica& Grosu, luminita,2020, "IMPROVEMENTS OF THE FOOD SAFETY MANAGEMENT SYSTEM BROUGHT BY THE ISO 22000:2018 WITH APPLICABILITY TO THE CANTEEN OF THE „VASILE ALECSANDRI” UNIVERSITY OF BACAU", Scientific Study & Research, "VASILE ALECSANDRI" University of Bacău. All rights reserved, vol (2), pp. 289 – 312
20. Surareungchai, Suwimol, Borompichaichartkul, Chaleeda, Rachtanapun, Chitsiri, Pongprasert, Nutthachai, Jitareerat, Pongphen,&SriLaong, Varit, 2022, "Comparison of Risk Assessment Schemes in GHPs and HACCP, FSMA Preventive Controls for Human Food, ISO 22000, and GFSI Recognized Standards with Risk Scoring Guidance in General Use with Fresh Produce" Horticulturae journal, vol 8,pp:1-23
21. Zaki, Michael Magdy& Tager, Ahmed Gamal, 2023, "ANALYZING THE FOOD SAFETY MANAGEMENT PROGRAMS (HACCP /ISO 22000) IMPLEMENTED IN HOTELS" , International Journal of Tourism and Hospitality Management Volume 6, Issue 1, pp:168-185