

Preparation of prerequisites programs for successful implementation of HACCP in local food products company

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ABSTRACT

The HACCP system is designed to identify the risks that may affect consumer's health, whether these risks are physical, chemical, or biological. The application of the HACCP system in Iraqi food companies is recent, since it started a few years ago, there are only a few number of food companies implement it. Due to mentioned reason the present research is trying to put a highlight on this very important topic related with consumer's health, especially at the present time after the outbreak of the Covid19 in most countries worldwide, including Iraq. The research is overcoming the difficulties in front of specialists in food safety and employees in local food production companies, and trying to understand how to implement HACCP system in effective way, and given excessive details to the preparation of prerequisites programs which must be carried out before implementing the HACCP system. Four questionnaires was established for this purpose, and directed to each of: managers of food companies, employees in food handling working in national food products companies, food inspectors, and to the consumers. Questionnaires results demonstrated that, only 20% of local food companies managers having knowledge about HACCP pre-requisites programs, and only 31.2% of employees working in the national food company sector have been participated in training about HACCP and pre-requisites programs, 75% of food inspectors working in the national authority of food control have been receiving training about HACCP and pre-requisites programs, and finally only 27% of consumers are seeking food products bearing quality and safety certificate while purchasing food. The research conduct that HACCP system and their pre-requisites programs require more attention from Iraqi food control authority, and it recommended to be obligated application by all local food products companies.

Keywords: *Pre-requisites programs, HACCP, food products, local company.*

INTRODUCTION

There is no doubt that food safety is a great importance in protecting consumer's health, so it is very necessary for food companies to provide safe food meets all requirements given in the national food legislations and related specifications, and follow all procedures that must be taken during all stages of production, processing,

storage, and distribution, to ensure its safety or suitability for human consumption [1]. Safe food is food free from contaminants and risks which does not cause any harm, or disease to humans in the short or long term [2].

The interest of the Iraqi society in the issue of food safety has been started recently in a few last years ago [3], and this interest taken more importance after the outbreak of a number of diseases and epidemics, most recent Covid19, as well as the cases of food poisoning happened among Iraqi population due to the failure to follow health requirements in food handling, or the failure to follow national food standard in manufacturing, and due to illegally entrance of spoiled food from abroad to the Iraqi market to sell it to the Iraqi consumer in different ways [4]. Many questions about these risks and how to avoid them has been appeared among Iraqi people, which made them more interested in the food safety issues. In addition, that the food safety issue is receiving a great attention from specialists of food safety in Iraq [5]. In order to reach the utmost safety in food serving, some local food companies, such dairy companies, beverages plants, and restaurants, have been started to contract with food safety specialists to manage their work. The HACCP system is considered as one of the most important and successful food safety systems worldwide [6], which has recently started to be applied in some local food companies. Therefore, it was necessary to conduct a research in this issue, and show how this system will be developed in our local food companies and which are the prerequisites programs required.

The concept of food safety differs from the opinion of each: the consumer, the producer, and the control authorities [7]. The consumer wants natural, healthy, fresh, non-heat treated food, low in fat, sugar, and salt, and without additives such as preservatives. He is looking for food free risk or zero risks., while the food manufacturer is looking for acceptable risk, because he produces food in large quantities with the using of additives necessary for easy manufacturing and achieving attractive appearance and desired taste and permissible preservatives to prolong the validity period, according to the applicable standards, taking into account economic aspects [8]. It is natural for the consumer to look for free risks food, while the manufacturer looking for acceptable risks, and this is the difficult equation. From the point of view of the food control authority, food safety means protecting the consumer through monitoring the quality and safety of the product, starting from inspection the food establishment, monitoring production units, examining the final product, and its circulation and marketing system, that is, it is concerned with product specifications, analysis, and validity [9]. In practical, food safety consists of identifying, assessing, and analyzing food risks, and setting appropriate standards and solutions to avoid them entrance to the food chain throughout scientific and technological basis [10].

The success and effective implementation of HACCP system in any local food company in Iraq, require HACCP team knowledge to determine the risks in the stages of production related with the infrastructure, tools and equipment, and personals. An

effective HACCP system will depend on the competency of the people who both developed and operate it, in addition to implement the prerequisites programs (PRP_s) [11].

To prevent, reduce or eliminate food contamination during storage and fabrication, all elements should be controlled by using PRP_s and HACCP plan [12]. The prerequisites programs considers as the basis for successful HACCP implementation, and should be started before HACCP implementation [13]. Once this has been achieved, the HACCP plan can be implemented. In general the prerequisites programs used to control risks related with food and fabrication's environment (buildings and structures, services, personnel, tools and equipment), while HACCP system should be used to control risks related directly with food processes (fabrication and storage) [14]. Therefore, prerequisites programs are essential element to implement simple and effective HACCP system. In many stages of food fabrication there are a lack of understanding of the prerequisites concept [15], therefor we done this research to give clearly image of what are prerequisites programs and how to do it effectively.

It is logical that any success to implement a food safety management system in any food company is based on the availability of the prerequisites programs for this system [16], because it will contribute to the success and activation of the food safety management system, as well as, it will consider the primary elements on which this system is built or linked with it in one way or another. Without these programs or one of them, or even not applying them effectively, the matter becomes very difficult and the application of the system, in this case, becomes useless and even costly [17]. The follow-up becomes more difficult and the problems and technical difficulties will be more difficult too, that ultimately lead to the failure the implementation of the system and achieving the desired results, even if records proven to have system basics [18].

Process Improvements also depend on the prerequisites programs that provide a safe and legal environment for production. The periodic verification of the application of PRP_s can identify opportunities to improve productivity and potential profitability, which means that these programs are linked to other components in addition to the food safety and quality [19].

The Prerequisite Programs PRP_s are defines as the basic conditions and activities necessary to maintain a healthy environment in the food chain which suitable for the production, handling, guarantee, or provision of a safe final food product for human consumption [20].

In food safety management systems, effective control measures are essential for reducing the risk of food contamination. Purchasing management procedures (such as raw materials, additives, chemicals, packaging materials) and equipment procedures (such as water, steam, ice), and product handling procedures (such as storage and distribution). All mentioned procedures aims to prevent cross-contamination. Then the prerequisites programs are required or necessary before the production. PRP_s establish the basis on which the food hygiene is built. PRP_s are built

in place to prevent the risks from unexpected contaminations, and they should be updated to include even insignificant risks [21].

As for the Operational Prerequisite Program (Op.PRP) is defined as the prerequisites program that has been identified when analyzing the sources of the risk, and considered essential in order to control the possibility of entrance a source of risk to the food safety system, or in its manufacturing environment. For example, the pest control program is a prerequisites operational program in which indicates all details of the pest control procedures [22].

MATERIALS AND METHODS

To develop and implement an effective HACCP system in local food products company, contacts, visits, workshops have been done with a sample of food companies managers and with the Iraqi Food Control Authority represented by the Department of Sanitary Monitoring. This done before starting this research in order to establish a questionnaire based on the information gathered. Also a review of national food legislation and regulation has done to support this research. The objective of the research required the knowledge of the food companies' manager toward food safety management system in general, and HACCP system in particular, therefore the tool used was the questionnaire. Four questionnaires has been established for this purpose, and distributed to four type groups as following:

1. Questionnaire type A: addressed to food companies managers.
2. Questionnaire type B: addressed to employees worked in local food companies.
3. Questionnaire type C: addressed to inspectors worked in the national food control authority.
4. Questionnaire type D: addressed to the consumers.

A total of 20 questionnaire of type A, 80 questionnaire of type B, 40 questionnaire of type C, and 100 questionnaire of type D, was distributed during the period April-June 2020. Respondents asked to answer the questions in the questionnaire by Yes or No.

RESULTS AND DISCUSSION

1. Food companies and prerequisites programs

The prerequisites programs that should be checked in food company before implementing HACCP system in local food products company can be divided in three groups:

1.1. Programs related with primary production: Since the raw food material is important to achieve food safety in any food company, so it is necessary to refer and describe to the most important programs that constitute food safety management systems at the primary production level, and should be taken in account of the all local food companies which to implement successful HACCP system (Table 1).

Table 1: Programs related to primary production.

Program	Description
1. Integrated Pest Management (IPM)	Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment. This information, in combination with available pest control methods, is used to manage pest damage by the most economical means, and with the least possible hazard to people, property, and the environment.
2. Good Agricultural Practices (GAP) and Good Handling Practices (GHP)	Good Agricultural Practices (GAP) and Good Handling Practices (GHP) are voluntary audits that verify that fruits and vegetables are produced, packed, handled, and stored as safely as possible to minimize risks of microbial food safety hazards.
3. Good Veterinary Practices (GVP)	Best practice includes good livestock practices and good veterinary practices (GVP). Examples are good management of poultry farms, specific knowledge of poultry diseases and diagnostics, knowledge of the working mechanism of veterinary medicinal products and extensive experience with the correct administration methods of veterinary medicinal products.

1.2. HACCP Prerequisites programs: Because of Hazard Analysis and Critical Control Point Program (HACCP) is the most widespread and applied program, and even the basis of most modern food safety management systems across the food chain (if not all of them with some organizational differences in the basis), it is necessary to address the most important programs firstly, although that there are many prerequisites programs that should be done before the implementation of HACCP and thus the implementation of the food safety management system, working to activate and maintain it, ensure its maintenance and good modernization, and ultimately lead to the desired results of it, which is in short, achieving food safety. These programs

can be illustrated in Table 2.

Table 2: Prerequisites program for HACCP system

Program	Description
1. Good Manufacturing Practices (GMP)	A system for ensuring that products are consistently produced and controlled according to quality standards.
2. Sanitation Standard Operation Procedures (SSOP)	Written procedure that explains exactly how a certain cleaning task is completed.
3. Calibration and Maintenance	Calibration procedures shall be appropriate for the intended use of the equipment and shall provide criteria for determining if calibration is satisfactory.
4. Pest Control	Equipment shall be maintained as specified in the technical procedure. A program contains all the relevant information about the pest control.
5. Training personal	Competence, knowledge in food hygiene and HACCP, education plan.
6. Personal hygiene	Included employee's health status, employee's clothes and hand wash.
7. Traceability and recall product	From whom and to whom? recall of incorrect product.
8. Safe handling, storage and transport.	Storage, cross contamination, separation of raw materials, packaging materials, process chemicals, finished products.
9. Raw materials and packaging materials.	Raw materials, ingredients, process chemicals, materials in contact with food, reception control, information from the food chain.

1.3. Programs included in HACCP system: three kind of programs used for identifying various risks and their potential sources that could be affected in the food safety. Risks identified may be physical, chemical, or biological, which may arise from pathogenic or toxin-producing microbes. For this purpose a set of control measures should be prepared to control, eliminate or reduce risks to the permissible limits stipulated in the legislations or specifications established for each type of these risks. These measures depend on controlling the basic elements that affect the safety and quality of food. Tables 3,4, and 5 illustrate the kinds of physical, chemical, and biological risks, their sources, and their control measures.

Table 3: Physical risks and their control measures

Risk	Source	Control measures
Glass	Lighting sources, watch faces and mirrors, thermometers, glassware.	Using of covers for lighting devices made of plastic or shatter-resistant glass, preventive maintenance.
Insulating materials	Water and steam pipes.	Preventive maintenance and use of appropriate materials conforming to the established standards.
Personal belongings	Staff.	Training for good personal practices.
Metal parts and shards, nails and nuts, metal filings or any other metal	Components, machinery, maintenance, manufacturing stages, final product.	Regular maintenance with the use of specialized detection and separation methods.
Non-living pests and insect parts	Floor, buildings and constructions, components –	Shelter removal, pest control and inspection systems, and appropriate storage.
Wood chunks, sawdust	warehouses.	
Twine and winding ties, wire, clips, plastic parts and more	Buildings, wooden tools and equipment, goods stored on wooden shelves.	Prevention of wood using, preventive maintenance and cleaning before using.
	Packing materials.	

Stones, dirt, sand, rocks and cigarette butts	Raw materials, improper personal practices.	Preventive maintenance and using of detection and separation methods. Detection and use of separation methods, good personal practices.
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Table 3: Chemical risks and their control measures

Risk	Source	Control measures
Residues of pesticides, hormones, antibiotics, hazardous chemicals, and toxins.	Reception.	Specifications and reception conditions, certificate of supply, good use practices, good agricultural practices.
Dyes, inks and materials that are prohibited from being included in the package components and filling materials (indirect additives).	Reception.	Specifications and reception conditions, certificate of supply, good use practices.
Food additives.	Using.	Specifications and reception conditions, certificate of supply.
Chemical water treatment materials	Reception. Using.	Good use practices.
Paints, coatings and lubricants (indirect)	Reception. Using.	Specifications and reception condition, certificate of supply. Good use practices.
Detergents and disinfectants	Warehouses	Specifications and reception condition, certificate of supply. Follow good handling

Recontamination	Transportation	procedures and adequate rinsing
Other types of pollutants from transportation, loading and shipping.	Chemical or natural chemical reactions between food ingredients and some of them, or between one of the food ingredients and the package material, or a natural component of the primary food item or one of the materials added to it.	Organize by type of material, restrict entry to toxic chemicals area, inventory of all chemicals. Checking and cleaning of transportation before loading, with chemicals being shipped separately from food.
Food that causes allergic reactions to humans	The food itself or manufacturing processes and storage under inappropriate storage conditions.	Specifications and Conditions of Receipt, Certificate of Supply, Good Agricultural Practice (GAPs).
Anti-absorption and metabolizing of nutrients, such as tea and iron		Specifications and conditions of receipt, certificate of supply, good manufacturing procedures.

Table 4: Biological risks and their control measures

Bacteria	Source	Food	Range Temp.	Range pH	Range WA	Air requirements	% Salt per mit livin g
<i>Clostridium botulinum</i>	Soil and intestinal	Food canisters	(3.3- 48)T oxins such	4.6- 9.0	0.94-0 .97	Non- aerobic	5- 10%

<i>Clostridium perfringens</i>	tract of fish and animals Dirt, dust, sediments (widespread), insects, human intestinal tract, animals and sewage	with low acid levels, especially: vegetables, meat, fish, pickled or smoked fish, and other seafood products Beef, turkey, poultry, cooked minced meat and other meat dishes such as: meat broth, soups and sauces	as spores are resistant to freezing but are damaged by heat (75-80) (6-50) C	5-9	0.93	Non-aerobic	5-8%
<i>Bacillus cereus</i>	Soil, dust, water, plants, kinds of grains, dry food and spices	Meat, vegetable dishes, milk, pastries stuffed with cream, soups, muhalabiyas, fried rice with water or fat, and	(4-55) C	4.9-9.3	0.91-0.96	Facultative anaerobes	10%
<i>Yersinia enterocolitica</i>			(0-45) C	4-10	0.945	Facultative anaerobe	5% 8%

<i>Esherishia coli</i>	Soil, water and the intestinal system of species of animals (birds, dogs and cats)	other starches (potatoes and pasta)	(7-46) C	4.4-9	0.95	Facultative anaerobe	0.5-1.5 %
<i>Campylobacter jejuni</i>	The human and animal intestinal system	Meat and meat products, vegetables, milk and dairy products	(30-45)	4.9-8	0.912	We need an environment that contains oxygen(5-2)% and(10-5) % carbon dioxide	higher than 10%
<i>Staphylococcus aureus</i>	Soil, sewage, water, poultry, animals, cats, dogs, rodents, and some birds of prey	Uncooked or raw meat and poultry, raw milk, dairy products, unprocessed cheese and salads Raw, uncooked milk, poultry and other meats and their products	(6.1-8, 47) ENTEROTOXINS ARE PRODUCED AT A DEGREE (10+46)	4-9.8	It grows upon 0.83 and produces toxins upon 0.86	Non-aerobic	0.5+10 %
<i>Vibrio</i>	Human,						

<i>parahaemol yticus</i>	hands, nose, throat, boils, wounds, festering, inflamed, animal, infectiou s mastitis	Turkey, chicken, beef roast, eggs, pastries and pastries stuffed with cream, luncheon meat, milk, dairy products and salads containing chicken egg, potatoes and pasta	(5+44)	4.8- 11	0.94-0 .98	Non- aerobic	4%
<i>Salmonella spp.</i>	Estuaries		(5.2-46.2)	3.8- 9.5	0.93	Non- aerobic	30%
<i>Listeria monocytoge nes</i>	Water, sewage, soil, birds, freshwat er turtles, rodents, eggs, and the intestinal organs of animals,	Uncooked, adequately decontami nated or re- contamina ted fish, crustacean s and shellfish	(0.4-45) C	4.39 -9.5	0.92	Aerobic grow in low oxygen or facultativ e anaerobic	0- 4.5 %
<i>Aeromonas Hydrophila</i>	especiall y poultry Soil, feed container	Beef, turkey, poultry, eggs, egg products, meat salad,	(0-45)	4.5- 9	0.95		less than 4%

<i>Brucella</i> <i>spp.</i> <i>1.Brucella</i> <i>abortus</i> <i>2.Brucella</i> <i>melitenisis</i>	s, water, some Environ me- ntal resources , birds and animals	shellfish, raw milk, dried coconut, baked goods and sauces	(6-42) C	4.5- 8.8	-	Optional pneumati c	0.1- 4 %
<i>Vibrio</i> <i>Cholerae</i>	Water environ ment and sanitatio n	Raw, uncooked milk, soft cheeses, ice cream, uncooked vegetables , uncooked meat, uncooked or cooked poultry products, and smoked or cooked fish	(10-43) C	5- 9.6	0.97- 0.98	Aerobic although there are strains grow better in 10-5% carbon dioxide	0.5- 5 %
<i>Vibrio</i> <i>Vulnificus</i>	Cows, sheep and goats Aquatic environ ments Aquatic	Sea food, shrimp fish, vegetables , raw meat and poultry and milk Eating milk (usually sheep and goat milk)	(8-42) C	5-10	-	Non- aerobic Non- aerobic	

	environ ments	and products made with unpasteuri zed milk (such as fresh goat cheese)					
		Seafood, vegetables , cooked rice and ice					
		Seafood, especially raw food					

2. Respondents opinion

2.1. Food companies manager's opinion

A total of 20 respondents from food companies' managers participated in the survey. The questionnaire addressed to them consisted of four questions. As it illustrated in Table 1, their answers were as following: 85% of respondents heard about HACCP system, and only 33,3 % of them implemented one of safety management system such HACCP. Only 20% of them have knowledge about HACCP pre-requisites programs, and 65% of them asked to implement one of food safety management system such HACCP (Figure 1).

Table 1: Questionnaire addressed to local food company's managers.

No.	Question	Yes	No
1	Is your company implemented any food safety management system?	5	15
2	Have you asked to implement any food safety management system in your company?	13	7
3	Do you heard before about HACCP system and the possibility of implement it in your company?	17	3
4	Have your company knowledge about HACCP prerequisites	4	16

	<p>programs and their importance in your business?</p>		
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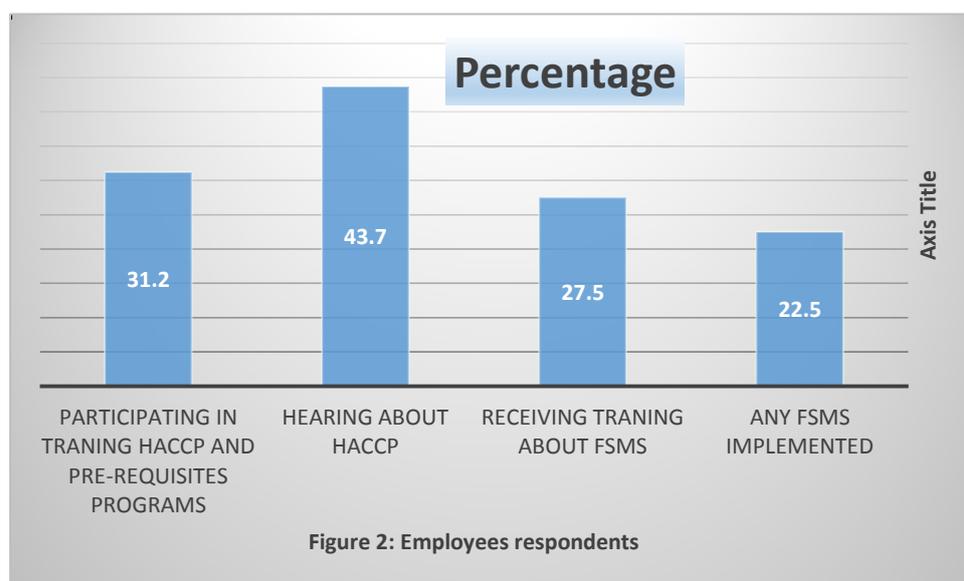


2.2. Employees opinion

In the case of the employees in food handling. A total of 80 respondents from employees in food handling in the national food sector have been participated in the survey. The questionnaire addressed to them consisted of four questions. As it illustrated in Table 2. Their answers were as following: 43.7% of respondents heard about HACCP system before, and only 25% of them implemented one of safety management system such HACCP. But a high percentage of them 85% heard about HACCP system and its importance for the food company, and 65% of them asked to implement one of food safety management system like HACCP (Figure 2).

Table 2: Questionnaire addressed to employees worked in local food companies.

No.	Question	Yes	No
1	Is your company implemented any food safety management system?	18	62
2	Have you trained in your company to any food safety management system such HACCP or other?	22	58
3	Do you heard before about HACCP system and the possibility of implement it in your company?	35	45
4	Do you have a knowledge about prerequisites programs and their importance in the implementation of HACCP in your company?	25	55

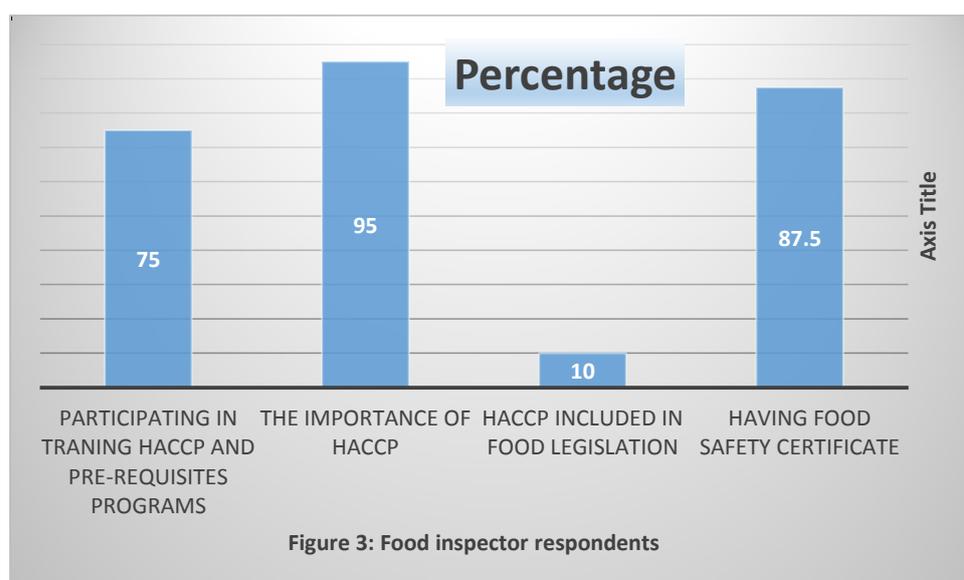


2.3. Food inspector's opinion

A total of 40 respondents from food inspectors working in the national authority of food control participated in the survey. The questionnaire addressed to them consisted of four questions. As it illustrated in Table 3. A high percent 95% of respondents have awareness of importance HACCP and the pre-requisites programs to application in the local food company, 87.5% of food inspectors have studied before food safety or they have a certificate in this subject. There are 75% of the respondents receiving training in HACCP and pre-requisites programs, and only 10% of the respondents said that HACCP is obligation to application in accordance with Iraqi Food legislations and regulations.

Table 3: Questionnaire directed to food inspectors in local food control authority.

No.	Question	Yes	No
1	Have you studied food safety in your education or have you any certificate in this subject?	35	5
2	Is HACCP system obligation to application in accordance with Iraqi Food legislation and regulation?	4	36
3	Do you heard before about HACCP system and their importance to implement in the local food company?	38	2
4	Do you trained in your work about HACCP system and have you knowledge about prerequisites programs and their importance in your job?	30	10

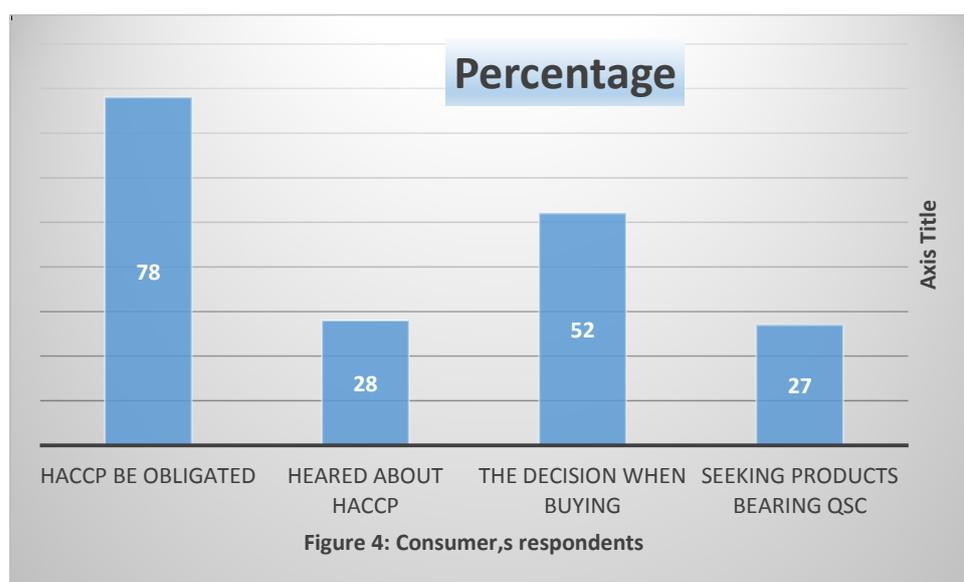


2.4. Consumer's opinion

A total of 100 respondents from Iraqi consumers have been participated in the survey. The questionnaire addressed to them consisted of four questions as it illustrated in Table 4. There are only 28% of respondents heard before about HACCP system, 27% of them seeking food products bearing food safety certificate such HACCP or ISO 22000, 52% of the respondents having a decision to choose food products from certified HACCP or ISO 22000 company, and 78% of the respondents were desired that HACCP system became obligation to application by local food companies.

Table 4: Questionnaire addressed to the consumers.

No.	Question	Yes	No
1	Do you prefer to buy food product bearing food safety certificate, e.g. ISO 22000, HACCP?	27	73
2	Do you heard before about food safety system, and is that effect in your decision when buying food product from a company implemented and certified one of these systems?	52	48
3	Do you heard before about HACCP system and their importance to implement in the local food company?	28	72
4	Do you desire that Iraqi Food Control Authority obligate food companies to implement HACCP other food safety system in their business?	78	22



CONCLUSION

It will be clear that food safety management systems in general and HACCP system in particular is not built alone or separately from the package of prerequisites programs, which must be done before starting HACCP to enable local food company to verify the efficiency and effectiveness of the system. As a conclusion, Iraqi food companies need to implement prerequisites programs before starting HACCP system, so that they can be ready for HACCP implementation. All operational procedures should be written and explained before to the employees in food handling in order to application in their companies upon implementation HACCP system. The essential

problems of implementing HACCP in Iraqi food companies have been determined as: implementation HACCP system isn't in the consideration and in the attention of the top management of Iraqi food companies, lack of employees training about HACCP and pre-requisites programs, lack of Iraqi food low related to HACCP obligation in Iraqi food companies, and lack of Iraqi consumer's culture in selecting food products from certified food safety company such HACCP certified company which will give motivation to the manager of Iraqi food companies to implementation and certification HACCP system for getting competence with other food companies and increasing consumer's confidence.

For a successful HACCP program to be properly implemented, the top management of Iraqi food companies must be committed to a HACCP approach. A commitment by management will indicate an awareness of the benefits and costs of HACCP and include education and training of employees. Benefits, in addition to enhanced assurance of food safety, are a better use of resources and timely response to problems.

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REFERENCES

1. Walker E., Pritchard C., Forsythe S. (2003). Hazard analysis critical control points and prerequisite program implementation in small and medium size food businesses. *Food Control* 3, 14:169-174.
2. Fred Fung, Huei-Shyong Wang, and Suresh Menon. (2018). Food safety in the 21st century. *Biomedical journal* 41: 88-95.
3. FAO and WHO (2004). *Enhancement of management of the official control system of food safety programme in Iraq*. Second FAO/WHO global forum of food safety regulators, Bangkok, Thailand.
4. Namma, Nagam. (2014). Dumping policy and ways to support and protect domestic production. *Al Ghari Journal of Economic and Administrative Sciences*, 30 (7): 1-23.
5. News Desk. (2019). *WHO helps Iraq improve food safety*. Food Safety News.
6. Djekic I., Kuzmanovic J., Andellkovic A., and others. Effects of HACCP on process hygiene in different types of Serbian food establishments. *Food Control*, 2016, 60: 131-137.
7. Abdulmalik A. Modern system for food safety HACCP. *Asiot J. for environmental studies.*, 2008, 32: 39-55.
8. Iraqi Center of Standardization and Quality Control. Food Standard.
9. Iraqi Ministry of Health and Environment (2012). Manual of Sanitary Monitoring.
10. International Standardization Organization (2005). Food Safety Management System – Requirements. ISO 22000.

11. Alkhafaji M. Possibility of implementing Hazard Analysis Critical Control Points in one of local dairy plants. *Iraqi Journal of Market Research & Consumer Protection*, 2015,
12. Marques N., Matias J., Teixeira R., Brojo F. Implementation of Hazard Analysis Critical Control Points (HACCP) in a SME: Case Study of a Bakery. *Pol. J. Food Nutr. Sci.* 2012;62(4):215–227.
13. Tzamails P., Panagiotakos D., Drosinos E. A ‘best practice score’ for the assessment of food quality and safety management systems in fresh-cut produce sector. *Food Control.*, 2016, 63: 179-186.
14. Livsmedelsverket. HACCP faroanalysis.
15. Macheka L., Manditesra F., Ngadze R., Mubaiwa J., Nyanga L. Barriers, benefits and motivation factors for the implementation of food safety management system in the food sector in Harare Province, Zimbabwe. *Food Control.*, 2013, 34: 126-131.
16. SE Mortimore, BR Warren (2014). Prerequisite programs: current perspectives in food manufacturing. *Perspectives in Public Health Vol. 134 (4): 191-193.*
17. Agnieszka Jackowska-Tracz, Michal Tracz, Krzysztof Anusz. (2017). Integrated approach across prerequisite programmes and procedures based on HACCP principles. *Med. Weter.* 2018, 74 (4), 219-223.
18. Júlia Toropilová, Pavel Bystrický. (2015). Why HACCP might sometimes become weak or even fail. *Procedia Food Science*, 5: 296 – 299.
19. Junchao Lu, Xiao-Hui Pua, Chi-Te Liu, Che-Lang Chang, Kuan-Chen Cheng. (2014). The implementation of HACCP management system in a chocolate ice cream plant. *Journal of food and drug analysis*, 22: 391-398.
20. Murat Bas, Azmi S afak Ersun, Go`khan Kıvanc. (2006). Implementation of HACCP and prerequisite programs in food businesses in Turkey. *Food Control* 17:118–126.
21. Anna Mc Elhatton, Richard J. Marshall. (2007). *Food Safety A Practical and Case Study Approach: Preventive Measures for Food Safety*. Springer Science and Business Media, LLC: 50-67.
22. John Holah and Edyta Margas. (2011). HACCP: The rise of the prerequisites. *New food magazine*, 6:1-10.