Assessment of Benefits and Challenges to Implementing HACCP in Small or Less Developed Businesses in Sharjah, United Arab Emirates

By

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For M.Sc. in Public and Environmental Health (April, 2012)
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I lovingly dedicate this thesis to those who supported me on each step of the way, my parents, my dearest wife, my lovely kids, my brothers and sisters.

Waleed
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"All the praises and thanks be to Allah, the (only) Originator [or the (only) Creator] of the heavens and the earth, Who made the angels messengers with wings, - two or three or four. He increases in creation what He wills. Verily, Allah is Able to do all things".

And I send the best of salutations upon prophet muhammad may Allah exalt his mention.

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ABSTRACT

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent foodborne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards. And Hazard Analysis and Critical Control Points (HACCP) is considered as a system to ensure the food safety from the farm to the fork. Implementation of Hazard analysis and critical control points is mandatory in Sharjah city for large businesses. In Small and Less-Developed Businesses (SLDBs) there are many barriers and challenges to implementing HACCP. This study was conducted to assess benefits and challenges to implementing HACCP in Small and Less-Developed Businesses in Sharjah city as a general objective. And to provide a clear classification of SLDBs according to HACCP requirements, to provide recommendations and solutions that will assist to implement HACCP in SLDBs, considering different practical options, and to assess benefits and outcomes to Public Health, government, and Food trading of implementation HACCP in SLDBs in Sharjah City as specific objectives. This study was applied the Observational cross-sectional study as study design by conducting a deep interviews with the managers in the restaurants as a tool to collect the data. The study population was 900 organizations, and the study sample was 90 restaurants (10%). The results of this study were various, (64%) of the managers did not aware the meaning of HACCP. (64%) of the managers did not attending and training in HACCP, (64%) of the managers did not have technical experiences in application of HACCP. About (64%) of managers did not know the benefits of implementing HACCP system. Lack of prerequisite programs (51%) was the key barrier identified for all food businesses. (99%) of managers said that they did not get any kind of external technical support. (62%) of managers did not have a written procedures for personal hygiene, cleaning and sanitizing, records and documentations. As a conclusion, a lack of knowledge about HACCP and other food safety programs were identified as the main barrier for food safety in food businesses.
Lack of prerequisite programs and inadequate physical condition of the facility were also identified as other barriers. Training programs, both basic food safety and HACCP to support implementation of prerequisite programs and HACCP in food businesses were suggested. The study has recommended that Sharjah Municipality should continue implementation of Sharjah Food Safety Program (SFSP) Good Hygiene Practices (GHP), should directly implement HACCP system in fast foods establishments in Sharjah, and should implement HACCP system in SLDBs through food inspectors with a little amount of money.
تقييم الفوائد والتحديات عند تطبيق نظام تحليل المخاطر و نقاط التحكم الحرة في المؤسسات الصغيرة العاملة في مجال تحضير و تقديم الأغذية في مدينة الشارقة، بدولة الإمارات العربية المتحدة

وليد عبد الغفار طه عبد المولى

ماجستير العلوم في الصحة العامة وصحة البيئة (أبريل، 2012 م)
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خلاصة البحث

سلامة الأغذية هي الإجراءات و النشاطات الضرورية التي يجب إتباعها في المؤسسات التي تعمل في مجال تصنيع الأغذية لضمان إنتاج غذاء خالٍ من المخاطر التي تضر بحياة المستهلكين. لقد أصبح تطبيق نظام تحلي المخاطر و نقاط التحكم الحرة ضرورة وإجبارياً على المصانع الغذائية و المؤسسات الغذائية الكبيرة في مدينة الشارقة. ولكن هناك ضرورة ملحة لتطبيق هذا النظام في المطاعم وأماكن تحضير الطعام للجمهور للحفاظ على الصحة العامة. ولكن هناك معوقات و عوامل تحذير من هذا التطبيق. الغرض من هذه الدراسة هو التعرف على التحديات، و تقييم الفوائد التي تعود على المؤسسات الصغيرة العاملة في مجال تقديم الأطعمة عند تطبيق نظام تحلي المخاطر و نقاط التحكم الحرة في الشارقة، الإمارات العربية المتحدة. ووجدت الدراسة أن عدم فهم نظام تحلي المخاطر و نقاط التحكم الحرة، هو أحد العقبات الرئيسية. و رصدت أن 64% قد أفادوا بأنهم لا يعرفون حقاً ما يعني ال HACCP بينما 64% منهم لم يحضروا أي دورة من نقاط التحكم الحرة. فقط 64% من مديرى أصحاب هذه المؤسسات ليس لديهم خبرة فنية في تطبيق نظام التحكم المخاطر. و رصدت أن 64% من الشركات ليس لديها القدرة المالية اللازمة لتنفيذ نظام تحليل المخاطر. وقالت آلية من المديرين (64%) أنهم لم يكون لديهم اتصالات مع مفتشي الرقابة على الأغذية في الشارقة فيما يتعلق بتنفيذ نظام تحليل المخاطر. 64% من المديرين لا يعرفون فوائد تنفيذ نظام تحليل المخاطر. وقال (98.9%) من المديرين أنهم لم يحصلوا على أي نوع من أنواع الدعم الفني الخارجي. 62% من المديرين لم يكن لديهم إجراءات مكتوبة للنظافة الشخصية.
والنظافة والتعقيم والسجلات والوثائق. وختاماً تم تحديد النقص في المعرفة حول نظام تحليل المخاطر، وغيرها من برامج سلامة الغذاء هو العائق الرئيسي لسلامة الأغذية في الشركات الغذائية. كما تم تحديد المقدرة المالية غير كافية للمنشأة وغيرها من الحواجز. وفي التوصيات تم طلب الدراسة من بلدية الشارقة بضرورة الاستمرار في تطبيق برنامج الشارقة لسلامة الأغذية في المؤسسات العاملة في تصنيع وتقديم الأغذية، وكذلك بضرورة تطبيق نظام تحليل المخاطر في هذه المؤسسات برسوم مخفضة.
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ACRONYMS

CDC: Centers for Disease Control and Prevention
FAO: Food and Agriculture Organization
FDA: Food and Drug Administration
GHP: Good Hygienic Practices
HACCP: Hazard Analysis and Critical Control Points
RTE: Ready-to-eat Food
SFSP: Sharjah Food Safety Program
SOP: Standard Operating Procedures
WHO: World Health Organization
CHAPTER ONE

INTRODUCTION

Food safety is an important issue to our life, because foodborne illness costs annually billions of money, and serves as constant challenges for consumers, researchers, government and industry. Worldwide, it is recognized that the application of the HACCP system to food production and preparation has clear benefits and the potential of enhancing food safety and preventing many cases of foodborne diseases. While the application of HACCP is making head way in large food industries, SLDBs have, for different reasons, experienced difficulties in implementing HACCP (FAO/WHO, 2004).

However, the importance of enhancing food safety in SLDBs in strategies for preventing foodborne illnesses cannot be over emphasized. The problems of implementing HACCP in small industries and in developing countries have been the subject of extensive discussions at meetings of the Codex Committee on Food Hygiene (CCFH) (CCFH, 2003).

It has been recognized that there is a need to develop a strategy for implementing the HACCP system or an equivalent risk-based system in industries where the food safety management system is not fully developed and resources are scarce (FAO/WHO, 2004).

Ensuring food safety to protect public health and promote economic development remains a significant challenge in both developing and developed countries. Considerable progress to strengthen food safety systems has been achieved in many countries, highlighting the
opportunities to reduce and prevent food-borne disease. However, unacceptable rates of food borne illness still remain and new hazards continue to enter the food supply. Food-borne risks to human health can arise from hazards that are biological, chemical or physical in nature. A key discipline for further reducing food-borne illness and strengthening food safety systems is risk analysis (Codex, 2003).

During the last several decades, risk assessment, risk management and risk communication have been formalized and incorporated into the specific discipline known as food safety risk analysis. This approach has now gained wide acceptance as the preferred way to assess possible links between hazards in the food chain and actual risks to human health, and takes into account a wide range of inputs to decision making on appropriate control measures. When used to establish food standards and other food control measures, risk analysis fosters comprehensive scientific evaluation, wide stakeholder participation, transparency of process, consistent treatment of different hazards and systematic decision-making by risk managers. Application of harmonized risk analysis principles and methodologies in different countries also facilitates trade in foods (Codex, 2003).

It was recognized that, regardless of the stage of development of a country, small businesses usually have greater difficulties in implementing HACCP. It was concluded that governments and professional trade bodies have a clear role to play in facilitating the implementation of HACCP in small businesses and other food businesses with less developed food safety management systems (referred to as less developed businesses), and that there is a need to develop specific guidelines for them. SLDBs have in the
past been discouraged from utilizing HACCP because of the guidance provided, which proved to be too complex for them (FAO/WHO, 2004).

However, the seven principles of HACCP can be applied to all businesses processing or preparing food, irrespective of size or nature of their work, provided that food business operators have been adequately trained and have access to necessary equipment, practical support materials and information. Where they are not able to develop and implement all the elements of the HACCP system by themselves, they will need external support. However, if SLDBs are to successfully implement HACCP, they will need to have management commitment to the process and be able to perform, at least, activities relating to the process description, monitoring, corrective actions and record keeping (FAO/WHO, 2004).

Even when an SLDB does not have the ability to perform, on its own, all the essential elements of HACCP, a responsible and adequate food safety management system should still be the goal of the business. So there is a need for governments to encourage regulators, industry, educational institutes and, where appropriate, independent experts to accept their role in assisting SLDBs in applying HACCP. It is the key role of all stakeholders, including governments, industry, consumers and the media, to overcome barriers to implement HACCP (WHO/FAO, 1999).

It is important for these stakeholders to consult and work together to determine priorities and time-scales for implementing HACCP. An important consideration in implementing HACCP in SLDBs is the recognition that there exists a critical interdependency between HACCP and prerequisite programmes (PRP). Prior to implementing HACCP, businesses must be engaged in good hygienic practices (GHP). By first implementing GHP, the difficulties associated with implementing HACCP
are minimized and businesses are encouraged to follow a graduated or stepwise approach to HACCP implementation (FAO/WHO, 2004).

Despite great advances in modern technology, producing safe food and keeping it safe remains a worldwide public health problem with illness caused by the consumption of contaminated food described as the most widespread health problem in the contemporary world. Available data indicate that:

- Most causes of such illness are of biological origin;
- The majority of these are caused by micro-organisms;
- That mishandling of food at some stage along the food chain is often responsible; and
- Food businesses within the hospitality industry are implicated in a disproportionate number of outbreaks (Taylor, E, 2008).

Regionally in the Gulf Countries Council (GCC) there is a great concern about food safety issue and how to control the food safety hazards throughout implementation of all food safety systems such as GHP, HACCP, ISO 22000. In addition to that annual conferences which running in different GCC areas such as Dubai International Food Safety Conference (DIFSC), and Oman International Food Safety Conference (OIFSC).

Inside United Arab of Emirates, every emirate try to do the best to control the food safety hazards by implementation of different types of food safety systems, for example Emirate of Abu Dhabi now running GHP training program conducting to Food handlers through numbers of food training and consultancies companies (ADFCA, 2008).

Dubai Emirate now running Person IN Charge (PIC) program in small businesses which conducted to Food Handlers in food services premises.
Ras Alkhaima Emirate now starting to implement HACCP system in all food establishments including, large and small businesses such as restaurants and cafeterias as a mandatory program (Sharjah Chamber and Commerce, 2010).

Here in Sharjah city-UAE, this issue is very cleared and understood to government authority, for that the application of HACCP is mandatory to large food businesses since (June, 2004). There are about 143 large food businesses in Sharjah city, 81 out of 143 already have implemented HACCP system, and the other number (62) are under processing the system. The number of food small businesses is about One Thousand (900) in Sharjah city, this large numbers of Small and/or Less Developed Businesses (SLDBs) increasing the challenges to Food Safety Control Section in Sharjah city, and double the importance of application of HACCP system in this sector, to achieve all the benefits that will outcome of that, and to decrease the healthy, financial and economic burdens.

For that and more others reasons there is an essential demand for studies and researches to be conducted in this emirate to prove the essential importance of application HACCP in SLDBs in Sharjah city. In addition, to that Sharjah municipality throughout Food Control Section has not conducted studies in SLDBs regarding implementation of HACCP.

This study discussed, assessed, and evaluated barriers, benefits, and challenges to implementation of HACCP in SLDBs in Sharjah city in United Arab of Emirates.

 Those challenges and barriers such as the size, lack of technical expertise, lack of knowledge, economic resources, or the nature of their work, and language skills encounter difficulties in implementing HACCP
in their food business. The term “less developed business” refers to the status of the food safety management system and not to the number of staff or volume of production.

1.1 Research Aims and objectives

1.1.1 General objective

The general purpose of this study is to identify the Challenges, and assess the benefits to implementing HACCP in Small and/or less developed Businesses (SLDBs) in Sharjah City-UAE.

1.1.2 Specific objectives

1. To assess benefits and outcomes to Public Health, government, and Food trading of implementation HACCP in SLDBs in Sharjah City.

2. To provide a clear classification of SLDBs according to HACCP requirements.

3. To provide recommendations and solutions that will assist to implement HACCP in SLDBs, considering different practical options.

4. To compare SFSP certified businesses in the sample study with HACCP requirements.
CHAPTER TWO

LITERATURE REVIEW

2.1 History of HACCP

The HACCP concept had its origin in the USA and stands for "Hazard Analysis Critical Control Point". The application of HACCP to food production was pioneered by the Pillsbury Company with the cooperation and participation of the National Aeronautic and Space Administration (NASA) in 1958. Natick Laboratories of the U.S. Army, and the U.S. Air Force Space Laboratory Project Group. 1959 Application of the system created food for the United State's space program that approached 100% assurance against contamination by bacterial and viral pathogens, toxins, and chemical or physical hazards that could cause illness or injury to astronauts. 1971 The HACCP system was published and documented in the USA. HACCP replaced end-product testing to provide food safety assurance and provided a preventive system for producing safe food that had universal application. In the succeeding years, the HACCP system has been recognized worldwide as an effective system of controls. The system has undergone considerable analysis, refinement, and testing and is widely accepted in the United States and internationally. 1985 The National Academy of Science (NAS) recommended the use of the system. (USFDA, 2008).

Worldwide the system became used and the FAO/WHO Codex Alimentarius (Food and Agriculture Organization/World Health Organization) cited the system in the Codex. In 1993, the European Regulation 93/43 (EEC) from 14.7.93 provided the use of system for the

1. Small and/or Less Developed Businesses, SLDBs is defined as:
   a) In most countries, SLDBs are classified by size, using economic measures such as financial turnover and number of employees. In 2001, the concept of defining small businesses on the basis of their qualities was introduced:
      1. They serve local customers.
      2. They have a limited share of the available market.
      3. They are owned by one person or by a small group of people.
      4. They are mostly owner-managed and independent of ownership by larger groups of companies (Taylor, E. 2007).
   2. “The term “small and/or less developed businesses” (SLDBs) shall mean businesses that because of their size, lack of technical expertise, economic resources, or the nature of their work, encounter difficulties in implementing HACCP in their food business. The term “less developed business” refers to the status of the food safety management system and not to the number of staff or volume of production” (WHO/FAO, 1999).
2.2.1 Good hygienic practices

“All practices regarding the conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain” (CAC/RCP 1 – 1969, Rev. 4 [2003]).

2.2.2 Codex HACCP system

“A system which identifies, evaluates and controls hazards which are significant for food safety, described in the Annex to the Codex General Principles of Food Hygiene “ (FAO/WHO, 2003).

2.2.3 HACCP-based system

“A system that is consistent with the seven principles of HACCP but does not conform to the layout or steps of the Guidelines for the Application of the Codex HACCP system” (FAO/WHO, 2003).

2.2.4 Food safety management system

A holistic system of controls that manage food safety in a food business. Includes GHPs, the HACCP system, management policies and traceability/recall systems. (FAO/WHO, 2003).

2.2.5 Food

Food was defined as every article manufactured, sold or represented for use as food or drink for human consumption or any item than enters into or is used in the composition, preparation or preservation of any food or drink (FAO/WHO, 2003).
2.2.6 Food hygiene

All conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain (FAO/WHO, 1999).

Food hygiene is much more than cleanliness, it involves all measures necessary to ensure the safety and wholesomeness of food during preparation, processing, manufacturing, packaging, storage, distribution, handling and offering for sale or supply to the consumer (Katrin, 2006).

2.2.7 Food safety

Food safety is an assurance that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use (FAO/WHO, 2003).

Food safety describes the practice of managing food in such a way that the food is highly unlikely cause any harmful effects, whether in the short term or long term to anyone who consumes products that have been processed, stored or sold by the business (FAO/WHO, 2003).

2.2.8 Good hygienic practices (GHP)

All practices regarding the condition and measures necessary to ensure the safety and suitability of food at all stages of the food chain (Codex, 2003a).
2.2.9 Micro-organisms

Include yeasts, moulds, bacteria, viruses and parasites. When used as an adjective, the term “microbial” is used (Codex, 2003a).

2.2.10 Food handling

Any operation in the preparation, processing, cooking, packaging, storage, transport, distribution and service of food (Codex, 2003a).

2.2.11 Food handler

Any person who directly handles packaged or unpackaged food, food equipment and utensils, or food contact surfaces and is therefore expected to comply with food hygiene requirements (Codex, 2003a).

A food handler may do many different things for a food business. Example include making, cooking, preparing, serving, packing, displaying and storing foods, Food handles can also be involved in manufacturing, producing, collecting, extracting, processing, transporting, delivering, thawing, or preserving food (Codex, 2003b).

2.2.12 Food born disease

Food born disease is defined as disease of an infectious or toxic nature caused by the consumption of contaminated food or water (Taylor, 2007).

2.2.13 Contamination

The introduction or occurrence of a contaminant in food or food environment (Codex, 2003a).

2.2.14 Cross contamination

Cross contamination is transfer of bacteria from one object to another. This contamination can be direct from food to food or indirect via hand and surfaces. Direct contamination requires the source of bacteria to be in direct contact with the food, for example, if raw poultry touches or drips on to high risk food. Indirect contamination relies on vehicle to transport the bacteria.
For example, if raw poultry is prepared on a chopping board with utensils that are then used for high risk food (Taylor, 2007).

2.2.15 Hazard

A biological, chemical or physical agent in food with condition of the potential to cause an adverse health effect (Codex, 2003a).

2.2.16 High risk foods

Food is allowed growth and reproduction of bacteria, which are eaten without cooking or any other transactions to exterminate the bacteria, such as milk and milk products, eggs, meat, fish and vegetables. Does not include acidic foods (with a pH less than 4.6) but also includes any food stored or prepared or handled at improper temperature (CCFH, 2003).

2.2.17 Ready-to-eat food

Any food (including beverages) which is normally consumed in its raw state or any food handled, processed, mixed, cooked, or otherwise prepared into a form in which it is normally consumed without further processing (CCFH, 2003).

2.2.18 Frozen food

Product maintained at a temperature equal to or below -18°C in any part of the product (Codex, 2003b).

2.2.19 Chilled food

Product intended to be maintained at temperatures not exceeding 4°C in any part of the product and stored for no longer than five days (Codex, 2003b).

2.2.20 Pests

Insects, birds, rodents and any other animal capable of directly or indirectly contaminating food (Codex, 2003b).
2.2.21 Food contact surface

A surface of equipment or a utensil with, which food normally comes in to contact (Codex, 2003a).

2.3 Establishment, design and facilities

This section covers the areas where the food is prepared, cooked, chilled, frozen and stored.

2.3.1 Location

Establishments should be located in areas which are free from objectionable odours, smoke, dust or other contaminants and are not subject to flooding.

2.3.2 Buildings and facilities

Buildings and facilities should be of sound construction and maintained in good repair. All construction materials should be such that they do not transmit any undesirable substances to the food.

2.3.2.1 Adequate

Adequate working space should be provided to allow for satisfactory performance of all operations.

Buildings and facilities should be designed to permit easy and adequate cleaning and to facilitate proper supervision of food hygiene. Building and facilities should be designed to prevent the entrance and harboring of pests and the entry of environmental contaminants such as smoke, dust, etc. Buildings and facilities should be designed to provide separation, by partition, location or other effective means, between those operations which may cause cross contamination. Buildings and facilities should be designed to facilitate hygienic operations by means of a controlled and regulated flow in the process from the arrival of the raw
material at the premises to the finished product, and should provide for appropriate temperature for the process and product.

2.3.3 **Food handling areas**

2.3.3.1 **Floors**

Floors; where appropriate, should be of waterproof, non-absorbent, washable, and non-slip materials without crevices, and should be easy to clean and disinfect. Where appropriate, floors should slope sufficiently for liquids to drain to trapped outlets (FAO/WHO, 1999).

2.3.3.2 **Walls**

Walls, where appropriate, should be of waterproof, non-absorbent and washable sealed materials and should be light colored. Up to a height appropriate for the operation they should be smooth and without crevices, and should be easy to clean and disinfect. Where appropriate, angles between walls, between walls and floors, and between walls and ceilings should be sealed and coved to facilitate cleaning (FAO/WHO, 1999).

2.3.3.3 **Ceilings**

Ceilings should be designed, constructed and finished to prevent accumulation of dirt and minimize condensation, mould development and flaking, and should be easy to clean (FAO/WHO, 1999).

2.3.3.4 **Windows**

Windows and other openings should be constructed to avoid accumulation of dirt and those which open should be fitted with insect-proof screens. Screens should be easily movable for cleaning and kept in good repair. Internal window sills, if present, should be sloped to prevent use as shelves.
2.3.3.5 Doors

Doors should have smooth, non-absorbent surfaces and, be self-closing and close fitting.

2.3.3.6 Stairs lift cages and auxiliary

Stairs lift cages and auxiliary structures such as platforms, ladders, chutes, should be situated and constructed to prevent contamination to food. Chutes should be constructed with inspection and cleaning hatches (FAO/WHO, 1999).

2.3.3.7 Food handling areas

In food handling areas all overhead structures and fittings should be installed in a manner to avoid contamination directly or indirectly of food and raw materials by condensation and drip, and should not hamper cleaning operations. They should be insulated where appropriate and be so designed and finished as to prevent the accumulation of dirt and to minimize condensation, mould development and flaking. They should be easy to clean.

2.3.3.8 Living quarters

Living quarters, toilets and areas where animals are kept should be completely separated from and should not open directly into food handling areas. Where appropriate, establishments should be designed so that access can be controlled. The use of material which cannot be adequately cleaned and disinfected, such as wood should be avoided unless its use would clearly not be a source of contamination.

2.3.4 Water supply

An ample supply of water, in compliance with the WHO "Guidelines for Drinking Water Quality", under adequate pressure and of suitable temperature should be available with adequate facilities for its storage,
where necessary, and distribution, and with adequate protection against contamination.

2.3.5 Refrigeration

Establishments should have refrigerating and/or freezing cabinets large enough to accommodate raw materials at adequate temperature. All refrigerated spaces should be equipped with temperature measurement devices. Where appropriate the use of temperature recording devices is recommended. They should be clearly visible when used and should be placed in a manner to record the maximum temperature of the refrigerated space as accurately as possible. If possible cabinets for chilled and or/frozen storage of food should be equipped with temperature alarms.

2.3.6 Changing facilities

Changing facilities; adequate, suitable, and conveniently located changing facilities and toilets should be provided in all establishments. Toilets should be designed to ensure hygienic removal of waste matter. These areas should be well lit, ventilated and appropriately heated and should not open directly on to food handling areas. Hand washing facilities with warm or hot and cold water, a suitable hand-cleaning preparation, and with suitable hygienic means of drying hands, should be provided adjacent to toilets and positioned so that the employee must pass them when returning to the processing area. Where hot and cold water are available mixing taps should be provided. Where paper towels are used, a sufficient number of dispensers and receptacles should be provided near to each washing facility. Taps of a non-hand operable type are desirable. Notices should be posted directing personnel to wash their hands after using the toilet.
2.3.7 Cleaning and disinfecting

Cleaning well maintained premises promotes good food hygiene practices, inhibits pests and also results in a safe working environment where damaged equipment and slips, trips and falls are controlled through good housekeeping (Katrin, 2006).

Notes wash with detergent, then add chemical disinfectant, then dry. Use an all-in-one cleaning product that washes and disinfects (e.g. sanitizer). Wash with detergent in a hot dishwasher (very hot water acts as a disinfectant) (Taylor, E. 2007).

2.3.8 Hand washing facilities in processing areas

Hand washing facilities in processing areas; adequate and conveniently located facilities for hand washing and drying should be provided wherever the process demands. Where appropriate, facilities for hand disinfection should also be provided.

Warm or hot and cold water and suitable hand-cleaning preparation should be provided. Where hot and cold water are available mixing taps should be provided. There should be suitable hygienic means of drying hands.

Where paper towels are used, a sufficient number of dispensers and receptacles should be provided adjacent to each washing facility. Taps of a non-hand operable type are preferable. The facilities should be furnished with properly trapped waste pipes leading to drains.

2.3.8 Lighting

Lighting; adequate natural or artificial lighting should be provided throughout the establishment. Where appropriate, the lighting should not alter colors and the intensity should not be less than:
• 540 lux (50 foot candles) at all food preparation and inspection points
• 220 lux (20 foot candles) in work rooms
• 110 lux (10 foot candles) in other areas.

Light bulbs and fixtures suspended over food materials in any stage of production should be of a safety type and protected to prevent contamination of food in case of breakage.

2.3.9 Ventilation

Ventilation; adequate ventilation should be provided to prevent excessive build-up of heat, steam condensation and dust and to remove contaminated air. The direction of the air flow within the plant should never be from a dirty area to a clean area. Ventilation openings should be provided with a screen or other protecting enclosure of non-corrodible material. Screens should be easily removable for cleaning. A device for effectively removing cooking steam and vapors should be installed above cooking units.

In rooms where food is being handled after chilling the temperature should not exceed 15°C. However, if the temperature of 15°C cannot be maintained, food being handled or prepared should be exposed to room temperature for as short a time as possible; ideally, 30 minutes or less (FAO/WHO, 2004).

2.3.10 Toilet facilities

Toilet facilities; every vendor, helper or food handler should have access to facilities which are approved by the relevant authorities and kept at all times in a clean and operational condition (Codex, 2003a).
2.4 General hygiene during preparation

Bacterial contamination in the kitchen often occurs during processing of raw foods. Raw meat and poultry products may be contaminated with pathogens. During food preparation pathogenic organisms may be transmitted to food items by the handler both directly or by cross contamination through hands, surfaces, utensils and equipment that have been inadequately cleaned and disinfected between the preparation of different types of food (Katrin, 2006).

Date on risk factors for food borne diseases imply that most outbreaks result from faulty food handling practices (Katrin, 2006).

2.4.1 Food handler responsibility

Separating raw foods and ready to eat foods is vital to stop harmful bacteria from spreading. Deliveries received in a clean, separate area. Remove the secondary packaging if possible. Defrosting must be carried in a separate safe place. Keep raw food away from ready to eat foods. Prepare different food in different area, if not possible use different timing. Use different color coding boards (FAO and WHO, 2003).

food borne diseases. It is thus recommended that all high risk food items be cooked to a temperature of at least 74°C. Food items prepared in advance of consumption should be rapidly cooked within 90 minutes and stored covered, below 5°C for less than three days (Katrin, 2006).

2.4.4 Food storage

On reaching the kitchen food items should be stored and handled correctly to decrease the growth of the microorganisms already present and to minimize the risk of contamination. For bacterial food borne diseases prevention guidelines in clued that-Keeping high risk foods products at or
below 4\(^{0}\)C, separating raw and ready-to-eat food products during storage and applying the correct procedures when thawing frozen food items (Katrin, 2006).

In order to prevent the growth of pathogens, a refrigerator must be operated correctly to maintain a temperature of below 5\(^{0}\)C (Taylor, 2007). Cross contamination of pathogens from raw commodities to frequently occurs in the refrigerator. Therefore, raw foods, particularly meat, poultry, liquid egg products, fish and shellfish, must be strictly separated from prepared foods, preferably by the use of different refrigerators (WHO/FAO, 1999).

Storing raw meat, poultry or fish on the top shelf in the refrigerator increase the risk of cross contamination due to the potential dripping of raw juices on to other foods stored beneath.

The risk is especially high if the foods stored below are ready to eat items that will not be heated to enough high temperatures to destroy pathogenic bacteria. Frozen meat and poultry should be thawed by putting in refrigerator, placing in a sealed package in cold water or in microwave oven. Destroying frozen food items at room temperature or in warm water is hazardous practice as temperature 5\(^{0}\)C and 60\(^{0}\)C can lead to growth of food borne pathogens (Katrin, 2006).

2.4.6.2 **Personal hygiene of the food handler**

The human body is a source of many pathogens. The nose, throat, hands and faeces are the most important sources. Therefore, personal hygiene, protecting clothing and hand washing play an important role in preventing disease. Table below summarizes food handling practices essential to produce safe food:
2.5 Interdependency between HACCP systems and good hygienic practices

HACCP system is based upon and should take into account basic prerequisite programmes (i.e. GHPs). Prerequisite programmes outline the measures taken to ensure that premises, equipment, transport and employees do not contribute to or become food safety hazards. Without these basic principles (e.g. sanitation, pest control, personnel practices), a risk-based system such as HACCP will fail. The application of GHP and HACCP acknowledges two schools of thought, all the basic prerequisite programmes should be in place in a food business before preparing a HACCP plan. A risk-based approach to food safety management can be applied by strengthening the GHP programme, while completing the HACCP plan (FAO and WHO, 2003).

Which path to take (or whether to use a combination of both) is a matter of national policy with due regard to importing country requirements. The basic GHP programme is of prime importance for food safety, as stressed in the fourth revision of the Annex on HACCP:

“Prerequisite programmes to HACCP, including training, should be well established, fully operational and verified in order to facilitate the successful application and implementation of the HACCP system” (FAO and WHO, 2003).

While following these guidelines and considering the national policy options for the application of HACCP in the small business sector, it is necessary to take account of the existing food hygiene controls in the food business sector being targeted (FAO/WHO, 2004).
2.5.1 Benefits and Challenges to application HACCP in SLDBs

1. Benefits
2. Benefits to consumers
3. Reduced risk of foodborne disease;
4. Increased awareness of basic hygiene;
5. Increased confidence in the food supply; and

7. Benefits to industry
   a) Increased consumer and/or government confidence;
   b) Reduced legal and insurance costs;
   c) Increased market access;
   d) Reduction in production costs (reduced recall/wastage of food);
   e) Improved product consistency;
   f) Improved staff-management commitment to food safety; and
   g) Decreased business risk (WHO/FAO, 1999)

8. Benefits to governments
   a) Improved public health;
   b) More efficient and targeted food control;
   c) Reduced public health costs;
   d) Rade facilitation; and
   e) Increased confidence of the community in the food supply
      (WHO/FAO, 1999).
2.5.2 Barriers

A number of barriers impede the implementation of HACCP in SLDBs. Potential barriers to the implementation of HACCP need to be identified and examined as an initial step in the development of any HACCP implementation strategy. These barriers vary from country to country or from sector to sector. Some may be due to internal factors in individual businesses, e.g. the level of knowledge or resources available to a business. Others may be due to external factors, such as the availability of government or industry support (WHO/FAO, 1999).

The barriers may include:

1. Lack of government commitment;
2. Lack of customer and business demand;
3. Absence of legal requirements;
4. Financial constraints;
5. Human resource constraints;
6. Lack of expertise and/or technical support;
7. Inadequate infrastructure and facilities; and

2.5.2.1 Government commitment

Government commitment is probably the single most important factor in the development and implementation of a successful HACCP initiative. In this respect, one of the most important tasks of governments is to raise the awareness of industry to the benefits of and the need for introducing HACCP to produce safe food.

Government awareness and commitment can be influenced by:
1. Epidemiological data on foodborne diseases and food contamination;
2. Consumer awareness and concerns;
3. The need for food safety and HACCP for export of foods to other countries; and

4. Advocacy by international organizations, e.g. Codex Alimentarius Commission, WHO, FAO and the World Trade Organization (WTO) (WHO/FAO, 1999). To promote HACCP and secure the commitment of enterprises, governments may need to draw.

5. The attention of food enterprises to the:
   a) Benefits achieved in rationalization of food safety management;
   b) Risks inherent in certain foodstuffs or production processes;
   c) Costs, including compensation costs resulting from production failure; and value of HACCP in safeguarding the enterprise’s image from any associated outbreaks and/or product recalls (FAO/WHO, 2004).

2.5.2.2 Customer and business demand

Food safety should form an important part of business-to-business dealings throughout the food chain. As such, businesses should ensure that they purchase food from appropriate suppliers, transporters and retailers who, in turn, implement food safety management systems. This should, in conjunction with better-informed consumers, create a demand for improvements in food safety. Industry and trade associations have a particularly important role to play in promoting HACCP in SLDBs and in supporting them in the implementation of the HACCP system. If associations are not in existence, then consideration should be given to their establishment. The role of such associations may include:

1. Assistance in the production of industry guides.
2. Communication of information pertinent to implementation of HACCP;
3. Collection of data on products, hazards and risks;
a) Development of product specifications;  
b) Information on generic HACCP plans;  
c) Training, material, advice and central expertise;  
d) Negotiating cost-effective services and support for SLDBs (e.g. bulk purchase or reduced prices for trade members);  and  

2.5.2.3 Legal requirements  
In many cases, the move to introducing HACCP systems may be led by industry. The stimulus may come from within a company itself where, for enhancing food safety and/or quality or for market reasons, a decision has been made to adopt HACCP. Food industries experienced in food safety management systems are more likely to appreciate the need to move to HACCP. Generally they recognize the importance of HACCP in allowing them to gain access to domestic and foreign markets, to protect the company’s reputation and to satisfy the customer’s demand. For SLDBs it is more probable that active government intervention will be required to promote and facilitate this change (FAO/WHO, 2004).  

2.5.2.4 Cost considerations  
Economic constraints can be a practical barrier to implementing HACCP for both governments and industry. These constraints could mean that the provision of assistance by government or industry/trade associations or the capacity of the business itself to implement HACCP is considerably reduced. However, in considering the costs of implementing HACCP systems, it is important to take into account the long-term savings that could accrue to government (in particular public health) and industry budget.
These savings could include:
- Reduced public health costs due to reduced foodborne disease;
- Reduced litigation due to reduced food safety failures;
- Reduced spoilage due to improved handling, storage, and processing of food; and
- Reduced labour disputes due to improved management/staff commitment (FAO/WHO, 2004).

2.5.2.5 Human resource constraints

Human resources are valuable assets in any business. However, frequently, outbreaks of foodborne illnesses can be traced back to human failure and weaknesses in the management system. Many barriers encountered in implementing HACCP are also related to human resources. One of the major human resource barriers is the lack of management commitment and understanding of HACCP. In this respect there is often a need to change attitude and organizational culture towards new management approaches. A low perception of risks can also be a fundamental problem encountered when implementing HACCP. Furthermore, lack of time coupled with rapid turnover of staff as well as lack of expertise and training of personnel may prove to be additional barriers. The paucity of expertise is perpetuated by the absence of food safety in the curricula of professional schools (WHO/FAO, 1999).
The following should therefore be considered as part of any HACCP initiative:

1. Food safety is a management function where GHP and HACCP are central to the running of a successful and morally responsible business.
2. Awareness programmes identifying the economics and social benefits of implementing HACCP are essential for regulatory officials, managers of SLDBs and food handlers.
3. During the early stages of the HACCP plan development, businesses need to commit additional staff time and resources, when necessary.
4. Where the introduction of HACCP involves behavioral or organizational changes, the new food safety roles and responsibilities need to be explicitly identified and handled sensitively.
5. Government or trade associations should help with the development and formulation of registers of HACCP qualified advisers or experts (FAO/WHO, 2004).

2.5.2.6 Technical support

SLDBs often lack the technical expertise required to implement HACCP alone and may therefore need external support. The capacity of governments and industry/trade associations to provide adequate technical support is a critical factor in the successful implementation of HACCP by SLDBs. The type of technical support that could be offered by governments or industry/trade associations may include:

1. Providing relevant, technical training with consideration given to the level of education, culture and language of the SLDB managers and staff;
2. Facilitating the availability of appropriate, current, scientific support;
3. Facilitating access to low cost analytical services;
4. Providing accessible, sector-specific generic guidance to businesses, such as industry guides, templates18, and generic HACCP plans; and
5. Establishing and maintaining foodborne disease surveillance programmes and facilitating access to collected epidemiological data (FAO/WHO, 2004).

2.5.2.7 Infrastructure and facilities

Implementation of HACCP may require improvements in the infrastructure and facilities, both within the community and the business itself. In this regard both governments and businesses have certain responsibilities:

1. Governments have a role and, in some instances, even an obligation to ensure that the appropriate infrastructure (electricity, roads, safe water supply, sewage facilities) is in place and that environmental pollution is minimized.

2. Businesses should ensure that:
   a) Premises, work surfaces and equipment are designed, constructed and maintained appropriately to facilitate cleaning and to minimize any possibility of cross-contamination;
   b) Appropriate facilities to encourage personal hygiene are available to staff;
   c) Adequate, calibrated monitoring equipment is available and used correctly; and
   d) In addition to visual assessment, where possible, rapid tests are used to provide real time results (FAO/WHO, 2004)
2.5.2.8 Communications

Inadequate communications between the government and businesses and between businesses can impede the introduction of HACCP. Communication strategies need to be part of any HACCP initiative. Communication strategies should include:

1. Information on the need for change and the benefits of HACCP19.
2. Encouraging production of guides for industry containing exemplary materials detailing the application of HACCP to various sectors of industry.
3. Providing additional and specific guidance for SLDBs.
4. Education of consumers regarding the importance of food safety for health through various channels, including the introduction of food hygiene teaching in schools. Trade associations and consumer groups could also sponsor such measures through providing financial and/or teaching resources. To ensure a common understanding, it is important to use a consistent and accurate terminology, such as that contained in Codex documents. The use of appropriate and effective channels for communication is equally important for effective communication. These may for example include:
   a) Industry/trade associations
   b) Trade press and exhibitions
   c) Enforcement authorities
   d) Mass media
   e) Production of leaflets, posters, videos, and other aids.

2.5.2.9 Management commitment

Management commitment is essential for implementing and maintaining an effective HACCP system. Management commitment should be communicated to all personnel. It should be clear from the beginning who is responsible for the development of the HACCP plan, and in some medium-size industries a HACCP coordinator could be nominated. Management commitment should extend to the provision of appropriate training for managers themselves and staff in basic food hygiene and HACCP to a level commensurate with their responsibilities, as well as validation of the elements of the HACCP plan to ensure that the plan is effective when implemented (FAO/WHO, 2004).

The Salford Model was enthusiastically received by the businesses at the point when it became apparent to the owner that the purpose was to establish the safety of methods used in the business and was not related to an ‘inspection’. The commitment gained was evidenced by the many hours spent by chefs/managers both during ‘mentor’ visits and between them. Many chefs commented on the fact that ‘. . . it’s the first time anyone has come to us to talk about our menu’ and compared this to the confusion and anxiety that they had felt when enforcement officers had talked to them about HACCP. In summary, all businesses were unanimous in their belief that the ‘pack’ would have a positive effect on their business, bestowing realistic control mechanisms to manage food safely. The decision to recruit and train caterers to undertake the ‘mentoring’ process was confirmed to be a key factor in the acceptance of the model within the businesses (Taylor, 2007).
2.5.2.10 Psychological factors

In order to successfully implement HACCP in SLDBs, behaviour change is required. Behaviour is deeply rooted in a person’s psyche and it is sometimes essential to understand the psychological constraints on people in SLDBs faced with implementing HACCP. Katrin (2006) used a medical model to examine this barrier to HACCP implementation in different-sized food businesses. Their findings suggest that more barriers to HACCP implementation were perceived by SLDBs than by larger businesses. Barriers envisaged by all companies, large and small, include:

1. Customer demands;
2. Time/cost pressures;
3. Lack of motivation; and
4. The belief that HACCP would not necessarily make a difference in their own business.

Additional barriers in SLDBs are psychological constraints, including:

a) Lack of self-efficacy (the belief that a person has the capability to organize and execute a course of action);
b) Inertia (the inability to overcome the habit of a previous practice due to lack of desire to change); and

4) Agreement (cannot see how HACCP can deliver safer food on their premises) (FAO/WHO, 2004).

2.6 Hazard analysis and critical control points (HACCP)

The Hazard Analysis and Critical Control Points (HACCP) is a well known and widely accepted management system initially implemented in the food industry. It is the systematic approach to control potential hazards in an operation. The target of the HACCP is to identify the problems
(hazards) before they occur. The system establishes mechanisms to control all stages of a process. This kind of control is proactive which means the identification of potential hazards, preventive measures, and the establishment of monitoring and remedial actions thereby avoiding the occurrence of hazards in advance. HACCP is described as a “concept of zero error“ (Katrin, 2006).

2.6.1 Assemble HACCP team

The food operation should assure that the appropriate product specific knowledge and expertise is available for the development of an effective HACCP plan. Optimally, this may be accomplished by assembling a multidisciplinary team. Where such expertise is not available on site, expert advice should be obtained from other sources, such as, trade and industry associations, independent experts, regulatory authorities, HACCP literature and HACCP guidance (including sector-specific HACCP guides). It may be possible that a well-trained individual with access to such guidance is able to implement HACCP in-house. The scope of the HACCP plan should be identified. The scope should describe which segment of the food chain is involved and the general classes of hazards to be addressed (e.g. does it cover all classes of hazards or only selected classes) (Codex, 2003a).

2.6.2 Describe product

A full description of the product should be drawn up, including relevant safety information such as: composition, physical/chemical structure (including Aw, pH, etc), microcidal/static treatments (heat-treatment, freezing, brining, smoking, etc), packaging, durability and storage conditions and method of distribution. Within businesses with multiple
products, for example, catering operations, it may be effective to group products with similar characteristics or processing steps, for the purpose of development of the HACCP plan (Codex, 2003a).

2.6.3 Identify intended use

The intended use should be based on the expected uses of the product by the end user or consumer. In specific cases, vulnerable groups of the population, e.g. institutional feeding, may have to be considered (Codex, 2003a).

2.6.4 Construct flow diagram

The flow diagram should be constructed by the HACCP team (see also paragraph 1 above). The flow diagram should cover all steps in the operation for a specific product. The same flow diagram may be used for a number of products that are manufactured using similar processing steps. When applying HACCP to a given operation, consideration should be given to steps preceding and following the specified operation (Codex, 2003a).

2.6.5 On-site confirmation of flow diagram

Steps must be taken to confirm the processing operation against the flow diagram during all stages and hours of operation and amend the flow diagram where appropriate. The confirmation of the flow diagram should be performed by a person or persons with sufficient knowledge of the processing operation (Codex, 2003a).
2.6.6 Conduct a hazard analysis (PRINCIPLE 1)

The HACCP team (see “assemble HACCP team” above) should list all of the hazards that may be reasonably expected to occur at each step according to the scope from primary production, processing, manufacture, and distribution until the point of consumption. The HACCP team (see “assemble HACCP team”) should next conduct a hazard analysis to identify for the HACCP plan, which hazards are of such a nature that their elimination or reduction to acceptable levels is essential to the production of a safe food. In conducting the hazard analysis, wherever possible the following should be included:

1. The likely occurrence of hazards and severity of their adverse health effects;
2. The qualitative and/or quantitative evaluation of the presence of hazards;
3. Survival or multiplication of micro-organisms of concern;
4. Production or persistence in foods of toxins, chemicals or physical agents; and,
5. Conditions leading to the above.

Consideration should be given to what control measures, if any exist, can be applied to each hazard. More than one control measure may be required to control a specific hazard(s) and more than one hazard may be controlled by a specified control measure (Codex, 2003a).

2.6.7 Determine critical control points (PRINCIPLE 2)

There may be more than one CCP at which control is applied to address the same hazard. The determination of a CCP in the HACCP system can be facilitated by the application of a decision tree (e.g., Diagram 2), which indicates a logic reasoning approach. Application of a decision tree should be flexible, given whether the operation is for

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production, slaughter, processing, storage, distribution or other. It should be used for guidance when determining CCPs. This example of a decision tree may not be applicable to all situations. Other approaches may be used. Training in the application of the decision tree is recommended.

If a hazard has been identified at a step where control is necessary for safety, and no control measure exists at that step, or any other, then the product or process should be modified at that step, or at any earlier or later stage, to include a control measure (Codex, 2003a).

2.6.8 Establish critical limits for each CCP (PRINCIPLE 3)

Critical limits must be specified and validated for each Critical Control Point. In some cases more than one critical limit will be elaborated at a particular step. Criteria often used include measurements of temperature, time, moisture level, pH, Aw, available chlorine, and sensory parameters such as visual appearance and texture. Where HACCP guidance developed by experts has been used to establish the critical limits, care should be taken to ensure that these limits fully apply to the specific operation, product or groups of products under consideration. These critical limits should be measurable (Codex, 2003a).

2.6.9 Establish a monitoring system for each CCP (PRINCIPLE 4)

Monitoring is the scheduled measurement or observation of a CCP relative to its critical limits. The monitoring procedures must be able to detect loss of control at the CCP. Further, monitoring should ideally provide this information in time to make adjustments to ensure control of the process to prevent violating the critical limits. Where possible, process adjustments should be made when monitoring results indicate a trend
towards loss of control at a CCP. The adjustments should be taken before a deviation occurs. Data derived from monitoring must be evaluated by a designated person with knowledge and authority to carry out corrective actions when indicated. If monitoring is not continuous, then the amount or frequency of monitoring must be sufficient to guarantee the CCP is in control. Most monitoring procedures for CCPs will need to be done rapidly because they relate to on-line processes and there will not be time for lengthy analytical testing. Physical and chemical measurements are often preferred to microbiological testing because they may be done rapidly and can often indicate the microbiological control of the product. All records and documents associated with monitoring CCPs must be signed by the person(s) doing the monitoring and by a responsible reviewing official(s) of the company (Codex, 2003a).

2.6.10 Establish corrective actions (PRINCIPLE 5)

Specific corrective actions must be developed for each CCP in the HACCP system in order to deal with deviations when they occur. The actions must ensure that the CCP has been brought under control. Actions taken must also include proper disposition of the affected product. Deviation and product disposition procedures must be documented in the HACCP record keeping (Codex, 2003a).
2.6.11 Establish verification procedures (PRINCIPLE 6)

Establish procedures for verification. Verification and auditing methods, procedures and tests, including random sampling and analysis, can be used to determine if the HACCP system is working correctly. The frequency of verification should be sufficient to confirm that the HACCP system is working effectively. Verification should be carried out by someone other than the person who is responsible for performing the monitoring and corrective actions. Where certain verification activities cannot be performed in house, verification should be performed on behalf of the business by external experts or qualified third parties.

Examples of verification activities include:
1. Review of the HACCP system and plan and its records;
2. Review of deviations and product dispositions;
3. Confirmation that CCPs are kept under control. Where possible, validation activities should include actions to confirm the efficacy of all elements of the HACCP system (Codex, 2003a).

2.6.12 Establish documentation and record keeping (PRINCIPLE 7)

Efficient and accurate record keeping is essential to the application of a HACCP system. HACCP procedures should be documented. Documentation and record keeping should be appropriate to the nature and size of the operation and sufficient to assist the business to verify that the HACCP controls are in place and being maintained. Expertly developed HACCP guidance materials (e.g. sector-specific HACCP guides) may be utilised as part of the documentation, provided that those materials reflect the specific food operations of the business. An example of a HACCP worksheet for the development of a HACCP plan is attached as Diagram 3. A simple record-keeping system can be effective and easily communicated...
to employees. It may be integrated into existing operations and may use existing paperwork, such as delivery invoices and checklists to record, for example, product temperatures (Codex, 2003a).

2.7 Training

Training of personnel in industry, government and academia in HACCP principles and applications and increasing awareness of consumers are essential elements for the effective implementation of HACCP. As an aid in developing specific training to support a HACCP plan, working instructions and procedures should be developed which define the tasks of the operating personnel to be stationed at each Critical Control Point. Cooperation between primary producer, industry, trade groups, consumer organisations, and responsible authorities is of vital important. Opportunities should be provided for the joint training of industry and control authorities to encourage and maintain a continuous dialogue and create a climate of understanding in the practical application of HACCP (Codex, 2003a).

2.8 The Sharjah food safety program (SFSP)

The Sharjah Food Safety Program (SFSP) is a government initiative being led by the team at the Quality and Health Education Office (QHEO) of Sharjah Municipality. The program is bringing innovative and integrated food safety training, assessment, management system implementation, audit and certification to the food sector in the Emirate of Sharjah, which includes over 7,000 food service, food retail, and food-manufacturing businesses. The program has recently completed its Pilot stage, and is showing evidence of success to a degree previously unseen in

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government food safety initiatives. The SFSP is gaining attention from other Municipalities in the UAE and countries in the GCC region.

2.8.1 Program aims

The primary aim of the SFSP is to improve food safety standards in the Emirate of Sharjah. Related aims include the protection and improvement of public health, the creation of sustainable local food safety expertise and an increase in private sector investment in sectors such as tourism. From a practical perspective, the SFSP aims to establish good hygiene practice (GHP) and hazard analysis critical control point (HACCP) systems in food businesses following international best practice with particular reference to recent guidance issued by the Food and Agriculture Organization of the United Nations. (Sharjah Municipality. (2010).

2.8.2 Program structure

The SFSP has been planned in multiple components, and sequenced in a manner that will enable realistic uptake by industry and that priorities those areas judged to have the greatest impact on public health. The components include phases, sectors, stages, and steps:

Phases: Broad functional divisions of program implementation.

Sectors: Groupings of businesses undertaking broadly similar activities.

Stages: Hierarchical groupings from businesses in each sector.

Steps: Implementation activities at each stage required to implement program solutions. The overall program structure, focused on phases and structures, is shown in Figure 1.
2.8.2.1 Program structure: Phases

The two phases of the SFSP are GHP and HACCP, i.e.:

**Phase 1-GHP:** This covers general hazards such as cleaning, personal hygiene, and pest control. It aims to raise the baseline standard of hygiene to a consistent level across the food industry in Sharjah.

**Phase 2-HACCP:** This covers specific hazards, including areas such as cooking, cooling, and cold preparation. Sequencing the program in this manner enables businesses to adopt food safety management practices in an achievable way within a realistic timeframe. It also enables the Sharjah program team, regulators and inspection functions to provide oversight in a timely and effective manner. Both phases involve the design, development, and implementation of appropriate food safety management system solutions.

2.8.2.2 Program structure: Sectors

In each phase, the program roll out is sequenced by sector. From a program management perspective this enables a realistic level of focus for planning, monitoring, and control. It also enables a prioritization aligned to perceived risk. For example, based on an analysis of Sharjah Municipality data, the food service sector (catering) has been prioritized in Phase 1; it was agreed by the program team that food safety improvements in this sector would have the most immediate impact on public health. (Sharjah Municipality, 2010).

This decision informed the planning for Phase 2 (HACCP). Simultaneous implementation of both GHP and HACCP in the same sector was not deemed realistic. Therefore, Phase 2 implementation for the food
service and retail sectors has been sequenced after the Phase 1 (GHP) implementation.

Furthermore, following existing legislation, many large manufacturing businesses in Sharjah had already implemented a HACCP system. It was, therefore, judged sensible to sequence food manufacturing at the start of Phase 2.

Related to this, the program management team recognized an urgent need to address HACCP implementation in food-manufacturing businesses due to increasing levels of data that pointed to a lack of completeness, accuracy, and quality in the HACCP projects completed to date. In response, sequencing the food-manufacturing sector at the start of Phase 2 is also intended to quickly address any shortcomings in the existing third-party commercial provision of HACCP training, consulting, audit, and certification in the manufacturing sector. This will enable the accurate correction and/or completion of HACCP implementation. (Sharjah Municipality, 2010).

2.8.2.3 Program structure: Stages

A further subdivision has been applied to each sector, namely the staging of training. In each sector, training will be delivered firstly to managers in each business. The term “manager” is defined as “the person most responsible for food safety” in each business. This could be the head chef, owner, operations manager, or a comparable role. Importantly, these individuals must be consistently present in the operation and in a position of sufficient influence to decide and implement internal food safety policies and practices and lead on-the-job training for employees. (Sharjah Municipality, 2010).
The prioritization of manager training was based on the need for changes in food safety practices that can only be prompted by individuals with sufficient power in each operation. For example, a shift from the use of multi-use cloths to the purchase of single-use paper towels for cleaning tasks is a decision that cannot be made by food handlers.

Once manager-level training is complete, other employees will be trained. By this time, the trained managers will have begun the implementation of the applicable food safety management solutions in their business, which will include the on-the-job training. Therefore, program training of employees is intended to be a consolidation of the “mentoring” already provided by their managers. (Sharjah Municipality, 2010).

2.8.2.4 Program structure: Steps

For each stage, there are multiple steps. There is broad commonality in the steps applicable in each stage, sector, and phase, but certain specific steps will be applied differently depending on specific requirements. The common sequence is shown in Figure 2. Each step is explained below (Sharjah Municipality, 2010).

2.8.2.4.1 Program structure: Steps-training

SFSP training will be designed by the team and delivered by approved third-party trainers. See the “Third-party approval” and “Training materials” sections below for more details. This step applies to managers and employees.
2.8.2.4.2 Program structure: Steps-examination

Candidates will attend independent exams hosted by Sharjah Municipality. This step applies to managers and employees. (Sharjah Municipality, 2010).

2.8.2.4.3 Program structure: Steps-management system implementation

Once a manager has been trained, they will implement a food safety management system solution specifically designed for their business type. See the “Food safety solutions” section below for details. Implementation support will be available by phone, e-mail and/or on-site visit by a dedicated Municipality support team. In the case of large manufacturing businesses, HACCP support may be provided by Sharjah Municipality approved third-party commercial consultants. (Sharjah Municipality, 2010).

2.8.2.4.4 Program structure: Steps-certification audit

Program auditors will visit businesses to assess their food safety management system implementation and provide certification to successful businesses. In the case of large manufacturing and food service businesses, approved third-party commercial bodies may provide audit and certification. (Sharjah Municipality, 2010).
2.8.3 Food safety solutions

One of the most important elements of the SFSP is the inclusion of food safety management system solutions for every business in scope; this is a unique feature of the SFSP. Research and practical experience confirms that the most effective method for improving food safety practices in food businesses is to implement food safety management systems, supported by a structured training program. (Sharjah Municipality, 2010).

The food safety solutions that will form part of the SFSP will be designed specifically for the Sharjah program and, more importantly, specifically for each category of business. (Sharjah Municipality, 2010).

2.8.4 SFSP GHP system compliant with Codex GHP requirements

For each sector, the SFSP team will design and develop a set of GHP safe-operating procedures (SOPs). GHP SOPs will cover activities such as hand washing, personal hygiene, operational hygiene, and pest control. Customized GHP SOPs will be provided for food service, food retail, and food-manufacturing businesses. (Sharjah Municipality, 2010).

These SOPs will be closely based on the research and development that led to the Menu-Safe GHP and HACCP food safety management system (Bas et al., 2006). This “evolving method” of HACCP (FAO/WHO, 2006) has approved by multiple governments and Municipalities, and it has been trained, implemented, and certified in food services businesses of all types and sizes. (Sharjah Municipality, 2010).

As with the SOPs structure in Menu-Safe, the SOPs in the SFSP-specific systems are designed to overcome traditional barriers to food safety implementation, and form the basis for the Phase 1 training, examination, implementation, and certification audit. (Sharjah Municipality, 2010).
2.8.5 Third-party approval

Both phases of the SFSP involve the provision of training to managers and employees from food businesses. Additionally, Phase 2 will involve the provision of HACCP consulting and audit to large manufacturing businesses. As a result, the success of the program will be influenced by the quality and effectiveness of this service provision. (Sharjah Municipality, 2010).

Training to all businesses, and consulting and audit provided to large manufacturing businesses will be delivered by third-party commercial providers. To maximize the quality of the services provided, the SFSP team has designed and implemented a rigorous third-party approval process. (Sharjah Municipality, 2010).
CHAPTER THREE
METHODOLOGY AND MATERIALS

3.1 Study area

Sharjah is the third largest emirate in the United Arab Emirates (U.A.E.), with an area of 1,000 square miles. Seventy-five percent of its 400,000 inhabitants (2001 estimate) live in the capital city of the same name on the Persian Gulf coast, just north of Dubai. Three exclaves on the Gulf of Oman coast - Dibba Alhisin, Kalba, and Khor Fakkan - belong to Sharjah and make it the only one of the seven emirates to share borders with all the others. It has the extreme summer heat and aridity of its neighbors, but agriculture is possible in the Dhayd Oasis and in the exclave territories. Sharjah population is about 188,102. Sharjah there are 71 hotels. (Sharjah Chamber and Commerce, 2010).

The study was carried out in Sharjah the third largest Emirate of United Arab Emirates in January 2012. The following are some information about Emirate of Sharjah:

Sharjah: The third largest Emirate of United Arab Emirates.
Language: Arabic.
Area: 2,600 km².
Climate: Hot & Humid (most of the year).
Summer: Max - 113°F (45°C) | Min-72°F (13°C).
Winter: Max - 74°F (23°C) | Min-55°F (13°C).
Also known as: Cultural Capital of UAE & the Pearl of the Gulf
Geographical Location: Bordered by Gulf & Musandam Peninsula in UAE, Middle East Latitude, Longitude & Altitude: 25° 26' 0" N, 55° 23' 0" E & 108 ft (above sea level)

Neighboring Cities: Dubai, Ajman, Umm Al Qaiwain & Ras Al Khaimah.

The third largest Emirate of United Arab Emirates, Sharjah is a unique city to have land on both Arabian Gulf and Gulf of Oman. Containing the main administrative and commercial centers together with an impressive array of cultural and traditional projects, the city of Sharjah won "The Cultural Capital of the Arab World" Award (UNESCO) for the year 1998. While several museums and mosques enhances its historical value, exceptional souks and famous Expo Center on the other hand enhances city’s commercial value. Other distinctive landmarks include number of recreational areas and public parks together with traditional market places, and unspoiled beaches. (Sharjah Chamber and Commerce, 2010).

There are currently over 2,775 stand-alone restaurants in Sharjah, serving both residents and tourists. Dining outlets range from high-end restaurants and buffets, to fast food chains and cafés. These restaurants serve multinational cuisine including traditional Arabic, European, American, Chinese, Thai, Indian, Pakistani, among others, to meet the demands of a diverse pool of consumer groups. Dining out is becoming increasingly fashionable in Sharjah and new dining facilities are opening every year to meet the rising demand.

People in Sharjah like to spend time in restaurants with family or friends. Weekends and Islamic holidays are the busiest days for restaurants and buffets in Sharjah, especially during the holy month of Ramadan. The thriving restaurant business in Sharjah is also a result of the growing number of expatriates in the country. A significant number of the
temporary foreign workers in Sharjah typically come to the country without their families. As a result, these single professionals tend to eat outside the home. Fast food outlets and casual restaurants with take-out service will continue to be popular among time-pressured foreign workers. (Sharjah Chamber and Commerce, 2010).

3.2 Study design

This study was conducted descriptive cross-sectional study design. All information have been gathered throughout this study from different types of SLDBs were represents the answers research questions of application HACCP in SLDBs.(mention the source) Also throughout cross-sectional study design, the study was determined the relationship between the benefits of application HACCP, and the challenges facing this processing in SLDBs. The population in this study was SLDBs such as fast food restaurants, hotels three stars, caterer's restaurants, etc. The study was conducted to a representative sample of these restaurants.

3.3 Data collection

The collection of data in this study was collected throughout conducting standard interview-questionnaire with owners or managers of the representative sample of SLDBs, and observational check list was conducted to the facilities and constructions in representative sample of this study. The questions check list was focused into the benefits and challenges of application HACCP in SLDBs, according to high levels of technical and professional options.
3.4 Sampling

The total population (restaurants) in this study when the proposal was prepared were about 1000 locations in the electronic database in Food Control Section-Sharjah Municipality, but actually the number of the population was found (900) nine hundred restaurants, so the sample size of the study became (90) ninety restaurants (10% of 900). In addition to some limitations when the data was collected such as about 20 restaurants from the study sample were closed temporary or completely, or not found in that area, the corrective action taken was collecting the data from the nearest one to that location, without any others considerations could led to bias in data collection. The interviews were conducted to the owners or managers in the restaurants of the study sample by the researcher himself only, for that reason the data collection took time more than that which was estimated in the research plan in the proposal.

3.5 Variables

The variables in the study were included numbers of expected benefits and challenges of application HACCP in SLDBS, such as:

1. Reduced risk of foodborne disease;
2. Increased awareness of food hygiene;
3. Increased confidence in the food costumers.
4. Types of foods.
5. Manger/owner qualifications;
6. Manger/ owner gender;
7. Reduction in production costs (reduced recall \ wastage of food);
8. HACCP awareness among food handlers;
9. Improved staff-management commitment to food safety; and
10. Decreasing business risk.
11. Government commitment;
12. Absence of legal requirements;
13. Financial constraints;
14. Human resource constraints;
15. Lack of expertise and/or technical support;
16. Infrastructure and facilities;
17. Communications.
18. Written procedures for personal hygiene.
19. Written procedures for internal training.
20. Written procedures for cleaning and sanitizing.
21. Written procedures for keeping records and documentation.
22. Written procedures for temperatures control.
23. Delivery services.
CHAPTER FOUR
RESULTS

Figure (1)

This figure shows the level of managers/owners qualifications in this study. Intermediate level 6 out of 90 (7%), undergraduate 56 out of 90 (62%) graduate level 28 out of 90 (31%).

Table (1): The age of the manager a/owner.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager age</td>
<td>34.7667</td>
</tr>
</tbody>
</table>

This table shows the ages of the managers/ owners. The maximum age is 55 years, and the minimum age is 20 years old, with a mean age of 34.7 years old.
Figure (2):

This figure shows that Arabic foods have been introduced in 17 out of 90 restaurants (19%). Asian foods have been introduced in 61 out of 90 restaurants (68%). Fast foods have been introduced in 12 out of 90 restaurants (13%).

Figure (3):

This figure shows that only 6 out of 90 managers were females (6.7 percent). And the balance 84 out of 90 managers were males (93.3 percent).
Figure (4):

This figure describes the number of managers who recognized the meaning of HACCP 32 out of 90 (36%). The number of the managers who did not recognize the meaning of HACCP 58 out of 90 (64%).

Figure (5):

The figure shows the number of managers who attended a training course in HACCP 32 out of 90 (35.6%). The managers who did not attend any training course in HACCP were 58 out of 90 (64.4%).
Figure (6):

![Pie chart showing technical experiences in HACCP application]

This figure shows the number of managers who have technical experience in HACCP 32 out of 90 (36%). Managers who did not have technical experience in HACCP were 58 out of 90 (64%).

Figure (7):

![Pie chart showing financial ability to implement HACCP]

This figure shows 39 out 90 restaurants (43%) have got financial ability to implement HACCP. Whereas 51 out of 90 restaurants (57%) did not have financial ability to implement HACCP.
Figure (8):

*This figure shows the number of restaurants which have communications with food inspectors 33 out of 90 (36.7%). Whereas did not have communications with food inspectors were 57 out of 90 (63.3%).

**Table (10): Essential difference due to implement HACCP.**

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>33</td>
<td>36.7</td>
<td>36.7</td>
<td>36.7</td>
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<tr>
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<td>1.1</td>
<td>1.1</td>
<td>37.8</td>
</tr>
<tr>
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<td>56</td>
<td>62.2</td>
<td>62.2</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>90</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>

The table shows the number of restaurants which have communications with food inspectors 33 out of 90 (36.7%). Not have communications with food inspectors were 57 out of 90 (63.3%).
Table (11): Problems in labors supplies.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1</td>
<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>No</td>
<td>89</td>
<td>98.9</td>
<td>98.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table shows the number of restaurants which have communications with food inspectors 33 out of 90 (36.7%). Not have communications with food inspectors were 57 out of 90 (63.3%).

Table (12): External technical support in HACCP.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1.1</td>
<td>1.1</td>
<td>1.1</td>
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<tr>
<td>No</td>
<td>89</td>
<td>98.9</td>
<td>98.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table shows the number of restaurants which have got external technical support 1 out of 90 (1.1 %). But the number of that which have not got external technical support 89 out of 90 (98.9%).
Table (13): Application HACCP will reduce business risks.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
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<td>37.8</td>
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</tr>
<tr>
<td>Do not know</td>
<td>56</td>
<td>62.2</td>
<td>62.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table describes the number of managers who have awareness about the role of HACCP in reducing business risks 34 out of 90 (37.8%). And the number of managers who were not have awareness about the role of HACCP in reducing business risks 56 out of 90 (62.2%).

Table (14): Application HACCP will reduce foodborne diseases.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
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<td>34</td>
<td>37.8</td>
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</tr>
<tr>
<td>Do not know</td>
<td>56</td>
<td>62.2</td>
<td>62.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table describes the number of managers who have awareness about the role of HACCP in reducing foodborne diseases 34 out of 90 (37.8%). And the number of managers who were not have awareness about the role of HACCP in reducing foodborne diseases 56 out of 90 (62.2%).
Table (15): Application HACCP will create confidence in foods supply.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
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<td>34</td>
<td>37.8</td>
<td>37.8</td>
<td>37.8</td>
</tr>
<tr>
<td>Do not know</td>
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<td>62.2</td>
<td>62.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table describes the number of managers who have awareness about the role of HACCP in creating confidence in foods supply 34 out of 90 (37.8%). And the number of managers who were not have awareness about the role of HACCP in creating confidence in foods supply 56 out of 90 (62.2%).

Table (16): A written procedures for personal hygiene.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>34</td>
<td>37.8</td>
<td>37.8</td>
<td>37.8</td>
</tr>
<tr>
<td>No</td>
<td>56</td>
<td>62.2</td>
<td>62.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table describes the number of managers who have a written procedures for personal hygiene 34 out of 90 (37.8%). And the number of managers who were not have a written procedures for personal hygiene 56 out of 90 (62.2%).
Table (17): A written procedures for cleaning and sanitation operations.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>35</td>
<td>38.9</td>
<td>38.9</td>
<td>38.9</td>
</tr>
<tr>
<td>No</td>
<td>55</td>
<td>61.1</td>
<td>61.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table describes the number of managers who have a written procedures for cleaning and sanitation operations 35 out of 90 (38.9%). And the number of managers who were not have a written procedures for cleaning and sanitation operations 55 out of 90 (61.1%).

Table (18): Written procedures for conducting internal training.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>34</td>
<td>37.8</td>
<td>37.8</td>
<td>37.8</td>
</tr>
<tr>
<td>No</td>
<td>56</td>
<td>62.2</td>
<td>62.2</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table describes the number of managers who have a written procedures for conducting internal training 34 out of 90 (37.8%). And the number of managers who were not have a written procedures for conducting internal training 56 out of 90 (62.2%).
Table (19): A written procedures for keeping records and documentation.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>40</td>
<td>44.4</td>
<td>44.4</td>
<td>44.4</td>
</tr>
<tr>
<td>No</td>
<td>50</td>
<td>55.6</td>
<td>55.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table describes the number of managers who have a written procedures for keeping records and documentation 40 out of 90 (44.4%). And the number of managers who were not have a written procedures for keeping records and documentation 50 out of 90 (55.6%).

Table (20): Organizations which have a rest room for staff.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>14</td>
<td>15.6</td>
<td>15.6</td>
<td>15.6</td>
</tr>
<tr>
<td>No</td>
<td>76</td>
<td>84.4</td>
<td>84.4</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table shows the number of restaurants which have got a rest room were 14 out of 90 (15.6%). But the restaurants which have not got a rest room were 76 out of 90 (84.4%).
Table (21): Organizations which have one bathroom for each 8 employees.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>49</td>
<td>54.4</td>
<td>54.4</td>
<td>54.4</td>
</tr>
<tr>
<td>No</td>
<td>41</td>
<td>45.6</td>
<td>45.6</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table shows the number of restaurants which have got one bathroom for each 8 employees were 49 out of 90 (54.4%). But the restaurants which have not got one bathroom for each 8 employees were 41 out of 90 (45.6%).

Table (22): Organizations which have got enough storage area.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>75</td>
<td>83.3</td>
<td>83.3</td>
<td>83.3</td>
</tr>
<tr>
<td>No</td>
<td>15</td>
<td>16.7</td>
<td>16.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table shows the number of restaurants which have got enough storage area were 75 out of 90 (83.3%). But the restaurants which have not got enough storage area were 15 out of 90 (16.7%).
Table (23): Organizations which have a layout and size of location supporting implementing HACCP.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>72</td>
<td>80.0</td>
<td>80.0</td>
<td>80.0</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
<td>20.0</td>
<td>20.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table shows the number of restaurants which have got a layout and size of location supporting implementing HACCP were 72 out of 90 (80.0%). But the restaurants which have not got a layout and size of location supporting implementing HACCP were 18 out of 90 (20.0%).

Table (24): Organizations which have a written procedures to control cross-contamination.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>35</td>
<td>38.9</td>
<td>38.9</td>
<td>38.9</td>
</tr>
<tr>
<td>No</td>
<td>55</td>
<td>61.1</td>
<td>61.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table describes the number of managers who have a written procedures to control cross-contamination 35 out of 90 (38.9%). And the number of managers who were not have a written procedures to control cross-contamination 55 out of 90 (61.1%).
Table (25): Organizations which have a food delivery services.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>69</td>
<td>76.7</td>
<td>76.7</td>
<td>76.7</td>
</tr>
<tr>
<td>No</td>
<td>21</td>
<td>23.3</td>
<td>23.3</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table shows the number of restaurants which have a food delivery services 69 out of 90 (76.7%). Not have a food delivery services were 21 out of 90 (23.3%).

Table (26): Organizations which have a written procedures for temperatures control.

<table>
<thead>
<tr>
<th>Items</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid percent</th>
<th>Cumulative percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>36</td>
<td>40.0</td>
<td>40.0</td>
<td>40.0</td>
</tr>
<tr>
<td>No</td>
<td>54</td>
<td>60.0</td>
<td>60.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

The table describes the number of managers who have a written procedures for temperatures control 36 out of 90 (40.0%). And the number of managers who were not have a written procedures for temperatures control 54 out of 90 (60.0%).
5.1 Lack of HACCP meaning

The interviews showed that 13 of the managers (59 percent) had not heard of HACCP, and had no awareness of the term. Nine managers (41 per cent) had an awareness of HACCP or recognised the term, but most of these admitted they did not know much about it. Approximately 57% of managers said they had heard of HACCP system. 18.3% of those who had heard of the term, since most food business managers presently have limited understanding of the HACCP and other food safety management systems strategy, there is necessity that the regulatory authority clarifies the goals of the strategy, and provides effective information to ensure uniformity in the application of food safety principles (Bas et al., 2006).

Owners often enter the industry with little or no previous food knowledge or hygiene training. This, the lack of structured channels of food safety communication, and the need to prepare often quite large quantities of food in advance, contribute to the relatively large proportion of food-borne illness outbreaks attributed to catering establishments (Bas et al., 2006).

In another study which was implemented in UK this factor was not a barrier. (Lack of HACCP awareness) There is no requirement in the new method for caterers to be aware of or know anything about HACCP in order to develop and implement the system and comply with the legislation. This barrier has been eliminated (Taylor, 2008).
This study found that 32 of the managers (35.6 percent) not aware about HACCP, and that is due to the level of their education (62.2 percent undergraduate), and even those who are graduated (31.1 percent) have different educational background, than food safety studies. So according to this study it is a barrier.

5.2 Lack of HACCP training

The food business directors were in agreement that employee training is the biggest barrier. Ninety-one percent of food business directors agreed that employees needed more training to improve food safety practices, and this finding was consistent with the findings of Bas et al. (2006). Also found that the availability of sanitation training had a positive relationship to implementing HACCP. Ideally, training courses should be developed specially for groups of personnel depending on their level of technical expertise and their degree of responsibility in the overall HACCP process. (Bas et al., 2006).

The Codex (2003b), guidelines also recognizes that the need for training of personnel in the industry is essential for the effective implementation of HACCP (Bas et al., 2006).

Appropriate training does not necessarily involve participation in training courses. Training can also be achieved through information campaigns from professional organizations or from the competent authorities, guides to good practice etc. It must be kept in mind that HACCP training of staff in food businesses should be proportionate to the size and the nature of the business (European Commission, 2005).

This study found there is a great gap in food safety training among food handlers, and the majority of managers attributed that to the time and
financial ability, as challenges despite of their recognizing the importance of the training to the food safety and to their business.

5.3 Lack of Technical experiences

SLDBs are limited by the technical capacity at their disposal; consequently, they often require external technical help from government, associations, education institutions or commercial advisors. The growth of HACCP is mirrored by the growth in available advice. However, not all advice is appropriate or applicable and the quality of professional advice can vary considerably among consultants. Consultants may have the required HACCP knowledge, but they may make its implementation very complicated for SLDBs; in other cases, consultants may lack practical knowledge in a specific field. Ideally, a government ensures that the provision of advice is regulated. In reality, governments rarely have the resources to do this. However, governments can seek to ensure that approved sources of advice are available and accessible; to this end, various measures can be taken (FAO/WHO, 2004).

1. Some countries have systems of consultant registration and certification—useful for maintaining the quality of advice. In New Zealand, for example, consultants are assessed against a unit standard, and they can be recognized as being competent in that area (FAO/WHO, 2004).

2. Guidelines help SLDBs select consultants; but this does not give a 100 percent success rate (e.g. Ireland) (FAO/WHO, 2004).

3. Many governments link up with education institutes to deliver training and consultancy or they support trade association initiatives; however, given the sheer number of SLDBs, it is difficult to meet the demand for advice.
4. Written advice can be provided to food businesses to assist them in selecting an appropriate food consultant.

5. Groups of SLDBs some extent learn from each other; this can also lead to reduced costs for SLDBs in securing advice (FAO/WHO, 2004).

For HACCP to be implemented in a hospitality business it requires not only basic food safety knowledge but also specific microbiological and HACCP expertise. Large food manufacturing companies often employ a full-time technical director, with expertise specific to the needs of their operation. Many also employ consultants when they need additional help setting up their HACCP systems. Most hospitality businesses are micro businesses and cannot afford either (Taylor, 2008).

According to the results that found in this study (35.6 per cent) of the SLDBs of the study sample have got technical and educated expertise staff, those including the fast foods series such as McDonalds’, KFC, Hot Pizza, etc. Those premises could implemented HACCP system because they have educated staff and financial abilities, and also already they are implementing Good Hygiene Practices systems. (64.4 percent) of SLDBs included in this study those have not got rather technical expertise, nor financial abilities to provide the technical experience.

5.4 Lack of Financial ability

Time and money have been identified as obstacles in implementing HACCP (Bas et al., 2006). Food service directors positively agreed on the benefits of certification and continuing education related to food safety. In our study, time and money were identified as the greatest barriers to improve food safety (Bas et al., 2006).
In the first narrative interviews it could be seen that inadequate premises and equipment and a lack of staff, time and money could all act as a barrier to the implementation of food safety management systems. All were in short supply in the average hospitality business (Taylor, 2008).

The study found that the financial ability factor was one the obstacles regarding implementation of HACCP in SLDBs in Sharjah city, in addition to the international crisis which actually affected the food services process.

5.5 Lack of HACCP Knowledge, Practices, and Attitudes

Changes in food safety knowledge, attitude and behavior are difficult to assess using traditional research methods because of the sensitive issues of legal compliance with many true thoughts and actions deliberately concealed. Such issues point towards the necessity for a qualitative, in-depth, discovery-based method and for this reason the narrative interview approach (based on Hollway & Jefferies, 2000) was selected and used. Narrative interviews were undertaken in a pre and post intervention scenario in order to evaluate the effectiveness of the new system in the pilot sites (Taylor, 2008). Initial analysis revealed several themes that would consequently act as indicators of change during subsequent interviews. These included management control, knowledge, awareness of risk, and food safety behaviors. Some of the initial findings were:

(1) A change in management style was identified in most businesses. Managers became more involved, adopting a ‘stricter’ approach to food safety. Responsibilities were more clearly defined and staff involvement increased.
(2) For many respondents the pack and mentoring process allowed the business to gain valuable information on aspects of food safety. The idea that ‘its all common sense’ changed to an acceptance that were things the respondents did not know and that there was a need for staff and themselves to be educated on issues surrounding food safety. Findings also suggest that the pack bridged the gap between a managerial instruction and its effective, ongoing implementation. Managers reported that staff were ‘now more inclined’ to change their behavior as they aware given valid reasons ‘why’.

(3) Respondents highlighted a marked improvement in their knowledge and awareness of food safety risks within their businesses. This was a change from the initial interviews where many ascertained they already had a comprehensive understanding of all food safety and food safety management issues.

(4) Businesses were seen to be taking a more active role in controlling food safety with routine monitoring and documentation undertaken, changing practices where necessary and in some cases investing in new equipment. Indeed, many businesses took independent initiatives to experiment, particularly with chilling and hot-holding, to determine if their practices met safety limits discussed during ‘mentor’ visits (Taylor, 2008).

This study agrees with above studies regarding lack of HACCP knowledge, practices, and attitudes among majority of managers did aware about implementation of HACCP regarding the essential differences could made in food premise such as reduction of fines from food authority, foodborne poisoning, cost of operation, time, improvement in
management, dealing only with approved suppliers, consumers confidence, and compliance with regulations.

5.6 Lack of risk awareness

In the first set of narrative interviews, a lack of risk awareness pervaded many of the stories that were told. This was not the case in the interviews carried out after the implementation of the new method, in which stories demonstrated a consideration of food safety risks and customers were no longer blamed for their symptoms (Taylor, 2008).

This study found that most of educated managers and owners would like to know more about HACCP system and its benefits and how to be implemented in small food businesses. But those who were not well educated they did not give any attention about HACCP, and were not cared about all that information related to it and its benefits to their business and management, and really this was big challenge, how to change thinking, attentions, behavior, attitudes, and believes of people regarding food safety and application of HACCP. Many interviewees believed that there was no major risk of food borne disease in the hospitality industry, or in their particular sector of the hospitality industry. This is in spite of the consistent increase in food borne disease outbreaks across the country and worldwide, and the regular citing of hospitality establishments as the source of the outbreak. (Joanne Taylor, 2008).

5.8 Lack of Documents and records keeping

Increase in documentation and record keeping. An essential requirement of any HACCP system is the need for documents and records (Principle 7). Examining paperwork is therefore an objective method of finding evidence of control of food safety procedures within a business.
When asked prior to the start of the project to provide evidence of any food safety documentation and record keeping, the majority of the 50 restaurants (65%) had none at all. Of the remaining 35%, there was a mixture of partially complete and piecemeal Good Hygiene Practice documents and record sheets, mostly unused. These ranged from a pest control contract to several sets of cleaning and temperature charts for staff to fill in (Taylor, 2008).

Many documents were not filled in, or said to be completed ‘sometimes’ or ‘usually’. Indeed, only 17% had any form of record keeping. Only two businesses had some form of HACCP documentation but there were no records to support these. Within 6 months of the intervention all businesses had started to document their food safety practices (100%). Two thirds of these (66%) had a fully documented system, with the others were at various stages of completion. As had been anticipated, a correlation was found between menu complexity and implementation time. The Diary was put into action immediately by all the businesses upon completion of the documentation. Half (50%) of the pilot sites were demonstrating full use of all diary components within the first 6 months. These findings are of particular relevance when set against the backdrop of previous negativity concerning HACCP focused primarily on perceived demands for ‘excessive paperwork’ (Taylor, 2008).

In the measuring and recording category, taking and recording end-point temperatures of all cooked food was the only practice that 10.1% food businesses directors always implemented. In the storage food safety category, the minority (19.3%) of food business directors reported properly labeled and dated of foods (Bas et al., 2006).
The prevention and control of food-borne diseases. 10.1% of the food businesses routinely use gloves. For food temperatures taken by the study team, temperatures of hot foods were frequently (78.1%-non-compliance) below the recommended 63°C, while a majority of food businesses (78.1%-non-compliance) held cold foods above 4°C (Bas et al., 2006).

Only 36.7% food business directors were not reported for taking endpoint temperatures of all cooked food at any time during pre-preparation. Cooling food temperatures have never been determined in 78.0% of the food businesses. The other common observed food safety problem was the failure to food thawing. Food thawing at room temperature also was mostly observed (Bas et al., 2006).

Respondents with a FSMS were asked how long they spent each day completing their FSMS records. The answers given were surprisingly high although there is strong evidence to suggest that respondents were confusing record keeping with the actual FSMS tasks (FAO/WHO, 2006).

The median time spent on completing FSMS records was 15 minutes a day. Time spent was higher among retailers (median time of 19 minutes) and those based outside England (22 minutes in Scotland, 23 minutes in Wales and 21 minutes in NI). We then asked a selection of 100 respondents what sorts of things they were recording. The key themes mentioned were as follows:

Checking and recording temperatures, cleaning, incident recording, recording actions in log/diary, checking and monitoring food, equipment and working areas, maintaining separation of raw, and cooked food.

A selection of verbatim comments below demonstrate some of the confusion with the question with some people talking about the procedure itself rather than the recording of that procedure:
a) Checking time, checking all utensils, that fridges are working, temperature records, delivery records, cooking and cooling of foods and hot holding display.

b) Checking the fridges, that’s the main thing-ensuring they are clean and tidy and we are rotating the stock.

c) Fully completing any required documents and filling out the diary.

d) Temperature checks on stock to ensure food is fresh. Probing food to make sure it is cooked properly.

When asked whether they felt the amount of time they spent on recording their FSMS procedures was too long, about right or not enough, the vast majority (87%) felt the time spent was ‘about the right amount of time’ (chart 5.3.1). 11% felt they spent too long on it (rising to 23% in Scotland and 16% of those with a partial FSMS), while 2% said not enough time was spent (rising to 5% of those with a partial FSMS) (FAO/WHO, 2006).

Findings in this study regarding the restaurants which were not implemented a written procedures in temperatures control (60.0%), control of cross-contamination (61.1%), conducting internal training (62.1%), cleaning and sanitation operations (61.1%), and personal hygiene (62.1%). And they were attributed that to many reasons such as time, not important, no needed, some said they already they were implemented the procedures without writing and records.
5.9 Lack of communication

Conducted a national study and found three types of barriers: resource management, employee motivation, and employee confidence. Employees are nervous about taking food safety certification examinations and often are not comfortable with the change needed for implementation of a program like HACCP. Identified employee and resource barriers in a national study of school foodservice directors. Lack of employee training was the biggest employee barrier and lack of financial resources to devote to food safety was the biggest resource barrier (Bas et al., 2006).

A third of businesses (34%) claimed that their local authority did have a scheme, while 39% claimed that it didn’t and 27% didn’t know. The regions with local authorities which businesses claimed were most likely to have a scheme were the North East (63%), East Midlands (65%) and Northern Ireland (46%), while those least likely were claimed to be the South East (15%), Wales (20%), Scotland (20%) and Yorks/Humberside (24%) (FAO/WHO, 2006).

Those respondents who thought they were operating in a local authority with a scoring scheme were asked how important the scheme was in encouraging them to implement a FSMS. Just under half (46%) claimed the scheme encouraged them ‘a lot’ to have a FSMS, while a further 11% claimed it encouraged them ‘a little’. Just over a third (36%) said it had no impact, while 8% couldn’t remember. Caterers were more likely than retailers to be influenced by a local scheme, especially restaurants, pubs and care homes/hospitals (FAO/WHO, 2006).

Respondents were also asked similar questions about local authority food hygiene awards i.e. Did their local authority have these awards? And if so, did the award encourage them to have a FSMS (COI/FSA, 2007).
As with the schemes, there was large variation across the country when it came to the use of awards. A third of businesses (34%) claimed their local authority did offer awards, while 38% claimed it didn’t and 28% didn’t know. The regions claimed to be most likely to offer awards were the East Midlands (51%), Wales (49%), Northern Ireland (45%) and North East (44%), while those claimed to be least likely were Yorks/Humberside (26%), Greater London (27%), and Scotland (27%). Over a third (38%) claimed the award encouraged them ‘a lot’ to have a FSMS, while a further 15% claimed it encouraged them ‘a little’. 42% said it had no impact, while 6% couldn’t remember (FAO/WHO, 2006).

Results in this study regarding the communications between SLDBs and food control section inspectors, 36.7%, out of 90 businesses had have got communications with food inspectors, and 63.3%, out of 90 businesses had have not got any kind of communications with food inspectors, and this can prove the weak of the relationship between food inspectors and small food businesses regarding HACCP system. Working together between regulatory authorities, and managers or owners in SLDBs can make the greatest impact on food safety, and can lead to implement HACCP system there. Because the responsibility of providing safe food to the consumer is shared by many people in every stage in the production of food, including consumers, themselves.

**Sharjah Food Safety Program (SFSP);**

Sharjah Food Safety Program (SFSP) (GHP). The study found that there are 15 restaurants (16.6%) had succeeded in implementing of Sharjah food safety program (GHP), which is recognised as the basis of HACCP system. All these SFSP certified businesses have been completed the implementation of pre-requisite program. A study was conducted in SFSP
as a pilot stage included 70 SLDBs to assess the application of Good Hygiene Practices (GHP). The result in that study was significant, and essential improvement in documentation management, food safety knowledge, and good hygiene practices was observed in the study sample. For example, the food safety knowledge level was improved from (63.5%) before (GHP) training to (85.5%) after the training, documentation management from (10%) to (90%), hands washing practices and facilities from (51.5%) to (90%), kitchen hygiene from (40%) to (58%), personal hygiene from (93%) to (98%), cleaning and sanitizing from (40%) to (65%), food storage procedures from (55%) to (80%), pest control management from (49%) to (71%), waste management from (45%) to (65%). The study was attributed the successful of that project to the technical supporting process which was provided by the SFSP members team throughout the assistance in documentation management and discovering the food safety problems and sharing the finding of suitable economic and healthy solutions to that problems. (SFSP, 2011).
Chapter Six

Conclusion and Recommendations;

This study found that there was a great gap between the standing situations and the application of HACCP in SLDBs in Sharjah, and that gap was very clear in some aspects such as;

Low level of managers and owners qualifications, and education. Lack in HACCP awareness, training, technical experience, financial ability, risk awareness, risks of foodborne awareness and communications with food control authorities. Lack of food safety managerial requirement, such as written procedures in personal hygiene, cleaning and sanitizing operations, storage temperatures control, records and documentations keeping, control of cross-contamination, and conducting internal training. The findings of this study indicated that most of managerial staff and food handlers have not received basic food hygiene training. And most food business managers presently have limited understanding of the HACCP and other food safety management systems. Managers and Owners often enter the industry with little or no previous food knowledge or hygiene training. This is due to the lack of structured channels of food safety communication, and the need to prepare large quantities of food in advance. Fifteen SLDBs (16.6%) of study sample (90), have implemented Sharjah Food Safety Program (GHP) after have got training, examination, implementation, and auditing. Those businesses became ready to implement HACCP system. Another challenge could increased the load on of responsibilities to SFCS, that a significant number of the foreign workers in Sharjah typically come to the country without their families. As a result, these single professionals tend to eat outside the home. In addition
to above challenges the food handlers speak different languages such as Arabic, English, Malayalam, Hindi, Urdu, etc.

All these results increase the challenges to food businesses managers and food control authorities, to increase efforts needed to protect the public health.

**Recommendations:**

1- Sharjah authorities, throughout food control section should continued implementation of Sharjah Food Safety Program (SFSP) Good Hygiene Practices (GHP), to provide foundations of HACCP system.

2- Sharjah authorities, throughout food control section should directly implement HACCP system in fast foods establishments in Sharjah.

3- Sharjah authorities, throughout food control section should implement HACCP system in SLDBs through foods inspectors with a little amount of money, thus will reduce the financial cost and overcome technical experience barrier.

4- Sharjah authorities, throughout food control section, foods consultancy companies, and food trade organizations should conduct more studies in food safety barriers, benefits, and challenges.
REFERENCES


