Journal of Engineering and Applied Sciences 11 (8): 1774-1778, 2016
ISSN: 1816-949X

Implementation of the Hazard Analysis and Critical Control Point (HACCP) in Malaysia

[1]Norazmir Md Nor, [1, 2, 3]Mohd Bakri Jaliabc and [3]Maaruf Abdul Ghani
[1]Universiti Teknologi MARA, Puncak Alam, Selangor, Malaysia
[2]SIRIM Training Services Sdn Bhd, ShaDecember 24, 2016h Alam, Selangor, Malaysia
[3]Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia

Abstract: HACCP System is a food safety assurance system through 7 principles to control the biological, chemical and physical hazards. HACCP system in Malaysia is executed based on the MS 1480 : 2007-Hazard Analysis Critical Control Point and prerequisite programmes according to MS 1514 : 2009-Good Manufacturing Practice (GMP) For Food. The involvements of Small and Medium Enterprises (SMEs) play a significant role in the food processing sub-sector in the country. A wide range of certification schemes has been developed for HACCP and GMP which involves ministries, government agencies and the private sector. Various guidelines as a reference also developed by ministries and government agencies involved in the certification programs offered to SMEs. Development of quality assurance programs and food safety are intended to meet the level of achievement of the SMEs in the provision of quality and safe food.

Key words: Food safety, food hygiene, GMP, HACCP, Malaysia

INTRODUCTION

Hazard Analysis and Critical Control Point (HACCP) is a safety and quality management tools developed by Pillsbury Corporation in the 1960s (Bennet and Steed, 1999). HACCP system development is intended to reduce the dependence on testing of the end product (Ropkins and Beek, 2000; Soon *et al*., 2011). Application of the HACCP system has been received well in developed countries as well as developing countries like Malaysia. Obstacles and problems that occur in developing countries now is similar to what has been identified to happen to small and medium enterprises in developed countries (Ropkins and Beek, 2000).

MATERIALS AND METHODS

Experimental: This systematic review was undertaken with the source data Scopus, Google Scholar and ISI Thompson. The study included the standard, reports and journals that reported on "Hazard Analysis Critical Control Point" of each study studies according to the criteria set.

RESULTS AND DISCUSSION

Types of industries in Malaysia: Malaysia exported processed food products to >200 countries (Malaysian Investment) with an estimated value of annual exports in excess of MYR 11 billion. Although export performance has increased in the past 10 year however, Malaysia still is a country that import packed with a value in excess of MYR 30 billion. With changes in the standard of education and income among Malaysians who also contributed to lifestyle changes, then the demand for food that is ready for serving and ready for consumption is high (Noor *et al*., 2014). According to a statement issued by the PEMANDU, the estimated demand will increase by 10% per annum. However, the food processing sector is unable to meet domestic demand and finally Malaysia was facing a negative trade balance for food products. In addition, the national food processing industry sector does not fully comply with the standard requirements of cleanliness and security of the world such as HACCP and GMP (Noor *et al*., 2014). Compliance of HACCP and GMP is a symbol of customer confidence to quality and food safety in the domestic and international levels. The inability of Malaysian food processing sector producing quality food and safe can be linked with the presence of an extensive number of SMEs. Is known of SMEs facing very tough in prepare to improve the performance of production and comply with the requirements of hygiene and food safety. The food processing sub-sector is below the manufacturing sector. Food processing sector represented by 10% yield manufacturing Malaysia (Ropkins and Beek, 2000). According to the statistics issued there were 37 861 number of SMEs involved in the manufacturing sector and 6016 of them are SMEs involved in processing and manufacture of food products and beverages, 2007; Ropkins and Beek, 2000). As such, Malaysian food processing industry is dominated by SMEs with a total of >96% of the premises.

Corresponding Author: Norazmir Md Nor, Universiti Teknologi MARA, Puncak Alam, Selangor, Malaysia

Agencies and bodies involved with HACCP in Malaysia: In Malaysia, there are 3 government agencies involved in the HACCP scheme; Ministry of Health, Department of Veterinary and the Department of Fisheries. Department of Veterinary in charge for slaughterhouses and a farm and the Department of Fisheries for fish and aquaculture products. The private certification bodies are also involved in HACCP scheme after getting the recognition of accreditation of the Department of Standards Malaysia or equivalent accreditation such as UKAS (United Kingdom Accreditation Services) for the scheme is offered to customers. This certification bodies can provide certification according to the needs of the industry based on the schemes applied by reference to existing standards such as HACCP (Malaysian Standard MS1480, 2007). Auditor who involved in the HACCP scheme offered by government agencies or private certification bodies must first meet the eligibility requirements may be prescribed. Between the requirements set out in the scheme of HACCP MOH as MCS3 is:

- Posses a degree in food science/food technology
- Pass courses Lead Auditors recognized by MOH
- Has 5 year of experience in the field of specialization
- Are required to undergo the audit process as' observer' under the supervision of experienced Auditors
- Need to undergo 5 times an audit satisfactorily prior to be appointed as Chief Auditor

In terms of training and consulting there are various government agencies or partial government such as universities, MARDI, SIRIM with SME Corp, Training Services Pt Ltd., MPC and other private companies. However, there are a guideline set by any government bodies including the Ministry of Health which is the form of training and the criteria required by a consultant to carry out training and consultancy in the field of GMP and HACCP. The absence of the guidelines led to inconsistency in training and consulting, and renders to understand the requirements of the GMP and HACCP among industry, consultants and authority.

Certification scheme types in Malaysia: The implementation of HACCP in Malaysia is on a voluntary basis. Ministry of Health has implemented HACCP authentication on the food industry in Malaysia since 1995. In 1997, Ministry of Health has established procedures for third-party certification based on ISO system used by the Department of Standards Malaysia (Merican, 2000). For the purposes of certification, Ministry of Health acts as certification bodies. In the early stages, certification only based on the Malaysian Standard MS1480:1999. Later MS1480:1999 was revised to MS1480:2007 with based on the Codex Alimentarius standard. To assist the food industry, especially SMEs implementing HACCP, Ministry of Health through Division of Food Safety and Quality Division has developed guidelines for HACCP (MCS1). These guidelines describe the requirements for certification as a need to the application, the application process, audit procedures, the auditors, the assessment process, maintenance of certification and others. Ministry of Health also has developed HACCP compliance audit guidelines (MCS2), guidelines compliance auditor with HACCP (MCS3) and guidelines for monitoring audit (MCS4) in matters relating to certification process requirements. The requirements of HACCP, food industry should first meet the prerequisite requirements, MS1514: 2001-General Principles of Food Hygiene. This standard was then made revisions back to MS1514: 2009-Good Manufacturing Practice (GMP) for food. Food safety and quality division itself have developed guidelines of good manufacturing practice. The goals of these standards and guidelines are developed to meet the requirements of GMP to enhance the effectiveness of the implementation of HACCP. Therefore, the Ministry of Health has developed Security Scheme (SK1M) Food 1Malaysia in 2010 because aware of the difficulties faced by small and medium industries in Malaysia to obtain HACCP and GMP (Noor *et al*., 2014). The main goal of SK1M is to help food industry directly to comply with food hygiene regulations in stages and as a platform to GMP and HACCP certification scheme (2010). SK1M contains 3 types of schemes namely food safety inspection, GMP1M and HACCP1M. There are some guidelines available to the industry to achieve SKM1M certification schemes including:

- Guidelines and checklist of the operators of the food industry
- Food safety assurance programme guidelines
- Examples of food safety assurance program manual
- Checklist of food safety assurance program
- Tracing system guidelines for operators
- Guidelines HACCP1M

The requirements to achieve food safety inspection scheme (PKM), GMP1M and HACCP1M are shown in Table 1.

SK1M have gone through rebranding as a certification scheme "Secure Food Industry Responsibility (MeSTI)" in the year 2012. Certification schemes shall be SK1M improvements to facilitate food premises, especially small and medium enterprises to meet the requirements provided under the food hygiene regulations and help towards the implementation of food safety Assurance (2014). Rebranding SK1M lead GMP1M scheme of PKM and HACCP1M has been cancelled. The scheme MeSTI has been more favorable to SMES including:

Table 1: Scheme requirements of PKM, GMP1M and HACCP1M

PKM requirements	GMP1M requirements	HACCP1M requirements
Water supply	Training	Process flow chart
Medical examination	Employees	The hazard analysis process
Cleanliness	Maintenance and sanitation	A summary of the HACCP plan
Storage	Control process of food	Descriptions of products
Removal and disposal of garbage	Food packaging	and users
Pest control	Food distribution	Monitoring record
Aining for food handlers	Control of raw materials	
Infrastructure	Pest control	
Location and design	Chemical control	
	Control of waste and	
	Waste disposal	
	Food system tracing	
	The records and proof of the	
	implementation of the verification and authorized officer	

Ministry of Health in 2010

- Meet regulatory requirements under the food hygiene regulations with established food safety assurance program
- Providing convenience in obtaining a certificate of non sale without a Certificate of Analysis (COA).
- Guidance in terms of technical and labelling by MOH
- Assist the SMEs to participate in development programmes under SME Corp and guidance in terms of financial access
- Facilitate product marketing at the hypermarket, 1Malaysia, Coop1M and so on
- Get the benefit of through promotional activities
- Logo sticker MeSTI be given free of charge to all operators of food premises that received certifications for the first time
- The logo MeSTI be on the label of food products will be able to convince the customer to the food safety of the product.

MOH has developed guidelines for certification schemes Secure Food Industry Responsibility (MeSTi) as a reference for SMEs to achieve certification MeSTI (Table 2).

In terms of positive, additional certification figures MeSTI show more and more companies SMES in Malaysia have successfully fulfilled the essential elements of GMP by towards certification GMP and HACCP. However, the negative aspects of SME Malaysia has not been fully ready to face global competition in context industry food processing with a variety of weaknesses that need to be further improved especially hygiene and food safety.

In addition to the GMP and HACCP certification scheme managed by the MOH, there is another government agency actively promote certification schemes and HACCP, GMP of Department of Veterinary. This certification scheme known as the Veterinary Health mark which will be assigned to an industry that includes the abattoir and processing plant and/or livestock products food products in Malaysia. The conditions set for the Veterinary Health Mark is that entrepreneurs must develop a quality assurance programme that contains GMP, GHP and HACCP Plan based on MS1480:2007.

A special scheme has also been developed by the Department of Veterinary to the food industry, small-scale and medium-scale known as Good Veterinary Hygiene Practices certification scheme (GVHP). The scheme was specific to SMEs involved in processing livestock products processing and downstream products based on livestock products not <5%. Guidelines have been developed to explain to SMEs the basic requirements of hygiene and sanitation in the preparation of the end product produced is of high quality and safe to eat and help SMEs meet the pre-requisite of GMP requirements prior to acquiring certification of Veterinary Health Mark. Certification scheme requirements of Good Veterinary Hygiene Practices (GVHP) are shown in Table 3.

HACCP study in Malaysia: Study by Toh and Birchenough (2000) shows education has influence on the knowledge and attitude for food handlers. Knowledge also varies from one race to another race. Pang and Toh (Pang and See, 2008) also make a review of the hawker food in Malaysia industries involving hawkers in urban areas with outside urban areas for looking at factors socio-demographics that affect food safety knowledge, practices and the effectiveness of the food safety strategy hawkers.

Saad *et al.* (2013a, b) has undertaken a review in respect of hygiene practices in National Service training centre (PLKN). Results of the study found using questionnaires has shown a good level of awareness among food handlers that stemmed from the work experience and the frequency of monitoring by the authorities.

Table 2: Certification Scheme Requirements of MeSTI

Part	Element	Sub-element
Control of premises	Design and facilities	Site of location
		The layout plan
		Equipment and hardware
		Water/ Ice/ Steam
		Hand wash sinks
		Toilet
		Rooms/dressing area
		Warehouse
	Food handler	Medical examination
		Anti-typhoid vaccine injection
		Operating practices
		Cleanliness operators and visitors
	Training	Training course for food handlers
		Training record
	Maintenance and sanitation	State of the floor
		Condition of walls, ceilings, fans, windows and doors
		The lamp Condition
		Drainage
		Garbage dump
		On-premises environment
		Cleaning Activities
		Pest control
		Waste management
Operational	Control of raw materials	Control of raw material reception
		Receiving area
		Ease of washing raw materials
	Process control	Control over biological hazards
		Control of chemical hazards
		Control over physical hazards
		Compliance standard
	Packaging control	The material covering
		The packaging
		Labelling
	The storage control	Isolation retention
		Storage systems
		Storagemethod
		Labelingraw material
	The storage control	The carrier
		The cleanliness ofthe carrierfor the purpose of
		Temperaturecarrier
	Distribution control	Tracing

Swab method tests carried out on surfaces in contact with food shows the existence of contamination coliform (Saad *et al*., 2013a, b). The scope of the same field of research is also done in Hulu Langat district, Selangor with emphasis on hand hygiene knowledge, attitudes and practices among food handlers (Tan *et al*., 2013). However, most of the food handlers not confidence about the difference types of pathogens that cause diseases, dangerous zone for storage of ready-to-eat food (Sani and Siow, 2014). Soon and Baines (2012) studies the food safety training done on vegetable farm workers and found there was a significant increase in knowledge. The study also found employees tend to wash the hands before the process of harvesting and packaging vegetables if there are no difficulties doing so (Soon and Baines, 2012).

Table 3: Certification Scheme Requirementsfor Good Veterinary Hygiene Practice (GVHP)

Element	Sub-element
Design and facilities	Site of location
	Building
	Hardwareand equipment
	Facilities
Operating control system	Temperature controland time
	Contamination ofgerms, chemicals andforeignsubstances
	Raw material resource requirements
	Packaging
	Water control system
	Documentation and process control
	Room storage facilities
Maintenance and cleaning	General cleaning program
Maintenance and Sanitation	
Personal hygiene	
Transportation and	
Training	

Department of Veterinary Services in 2013

Table 4: Knowledge Score Index (KSI) of Food Safety Scheme Certification (GMP, HACCP, ISO22000)

Frequency of answer	Percentage score	Confusion	Results
True>False	75-100	Low	Appropriate
True = False	50-74	Medium	Marginal
True<False	0-49	High	Unsafe

Fernando *et al*. (2014) conducted a survey on companies involved in the certification MeSTI in northern Malaysia for determining activity, motives and external factors. The study found the companies admitted their involvement in the MeSTI is making quality products while an external factor is the level of consumer awareness of food safety and improve customer confidence in their products. There is a study that is more focused on HACCP practices among SMES in Malaysia have done. A study using qualitative methods has revealed the main motive for SMES implementing HACCP in Malaysia are client's needs and commitment of management and employees to the HACCP practices also are at a satisfactory level. The study also revealed the company's advantages in productivity despite various obstacles. Difficult to change among workers, the burden of paper documentation and records and the extent of compliance of HACCP have been identified as contributor in its implementation.

Based on the studies on food hygiene that is done by researchers' mostly focused on knowledge, practice and attitudes of food handlers. If seen as a closer form of this study is not comprehensive because generally this study focused on two GMP requirements of hygiene and sanitation and personal hygiene only under GMP requirements there are 10 needs that must be met by the industry (MS1514:2007). Therefore, it should be supported and compliment with proposed Knowledge Score Index (KSI) of food safety scheme certification as shown in Table 4.

CONCLUSION

A wide range of certification schemes has been developed for HACCP and GMP which involves ministries, government agencies and the private sector. Various guidelines as a reference also developed by ministries and government agencies involved in the certification programs offered to SMEs. Development of quality assurance programs and food safety are intended to meet the level of achievement of the SMEs in the provision of quality and safe food.

ACKNOWLEDGEMENTS

This research was self-funded and study sponsored by SIRIM Training Services Sdn Bhd, subsidiary of SIRIM Berhad.

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