CHAPTER 7
RESULT OF SYSTEM IMPROVEMENT AND CONCLUSSION

This chapter is an essential part in realizing the improvement ideas and to achieve company's goals. The design and result of improvements for the ideas proposed in the previous chapter and the implementation of the improvements are explained in this chapter.

7.1. HACCP Team in Restaurant "X"

The preliminary step in realizing the improvement ideas is to conduct the HACCP team. HACCP team is a group of workers within the company who are responsible for designing, implementing, and controlling HACCP system. HACCP Team is necessary to be conducted in order to ensure system implementation is well-implemented.

The team will be involving all staff/employees in Kitchen and Service Department. The employees in both departments are involved based on its job description and responsibility. A team is consisting of a team leader and team members. The team organizational structure can be seen in the following figure.

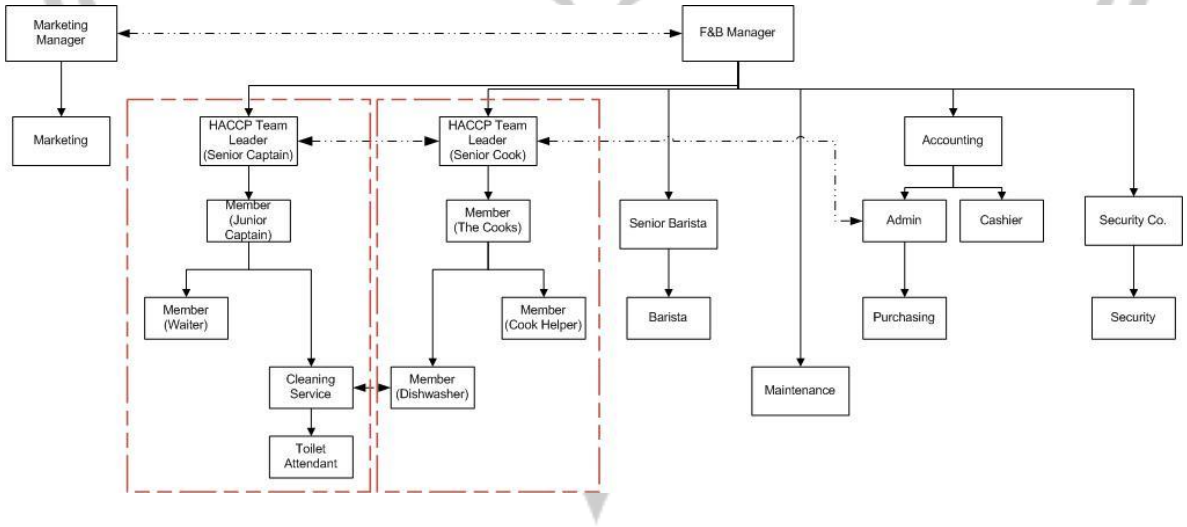

Figure 7.1. HACCP Team Organizational Structure for Kitchen and Service Department

Kitchen department is consists of 9 employees with 3 employees as senior cook and the remaining employees as junior cooks and cook helpers. Meanwhile, Service department is consist of 15 with 3 employees as senior captains and the remaining employees as junior captains and waitress. Each leader is responsible for controlling and monitoring its department.

7.2. Documents in Critical Control Points (CCPs) Processes

Based on the process step decision tree in the previous chapter, there are twelve CCPs have been founded in the food processig of Restaurant “X”. These CCPs are mainly caused by the possible survival of some pathogens during the cooking process. Therefore, cooking at certain temperature is sugessted to kill the pathogens in products. Freezing and chilling at certain temperatures is prevent the growth of ptahogens and keep the products fresh.

A monitoring procedures to control the product from deviation and list of corective action to fix the deviation have been conducted accordingly to the critical limit in each process, as it can be seen in table 6.9 and table 6.10. on previous chapter.

As it was explained in the previous chapter, the monitoring procedures have been conducted for twelve CCPs. Monitoring procedures consists of monitoring freezer and chiller temperature in storage stage, and monitoring heat temperature in cooking process. According to those scopes, monitoring storage temperature will be recorded to the montoring worksheet as its presented in the figure 7.2. and 7.3..

A worksheet for monitoring raw material supply such as fish, raw chicken and raw meat also have been conducted in order to acknowledge the frequency of product supply and preventing the used of long-held raw materials, the worksheet is presented in the figure 7.4. to figure 7.6.. Futhermore, the worksheet of corrective action for whole CCP is presented in figure 7.7.

A worksheet of monitoring record and corrective action records were designed to ensure that the system has been well implemented in the restaurant, warranties of rules fulfilment, and as supported documents for verification stage.

BULAN : .....

Pemeriksaan kondisi dan suhu pembeku –DISARANKAN 2X/HARI					
TGL	WAKTU		PEMERIKSA	PARAF PENANGGUNG JAWAB	CATATAN
	AM	PM			
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
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31					

Nama Alat	Batas Kritis	Tindakan Perbaikan
Freezer / Pembeku	- Suhu lemari pembeku -17 °C sampai (-40°C) - Pilih product yang sudah lama tersimpan di lemari pembeku	- Periksa kembali suhu dan pertimbangkan kembali keamanan produk - Jangan gunakan produk yang sudah tidak layak konsumsi atau sudah terkontaminasi - Hubungi teknisi untuk memeriksa dan memperbaiki alat - Kaji ulang pelatihan staff
Apakah tindakan perbaikan telah dilaksanakan ?		☐ Ya ☐ Tidak ☐ Tidak dapat digunakan

Tgl. diperiksa oleh Manajer	TTD Manajer

Figure 7.2. Temperature Monitoring Record for Freezer

BULAN : .....

Pemeriksaan kondisi dan suhu pendingin –DISARANKAN 2X/HARI

TGL	WAKTU		PEMERIKSA	PARAF PENANGGUNG JAWAB	CATATAN
	AM	PM			
1					
2					
3					
4					
5					
6					
7					
8					
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10					
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Nama Alat	Batas Kritis	Tindakan Perbaikan
CHILLER/ Pendingin	- Suhu lemari pendingin 5°C sampai 8°C	- Periksa kembali suhu dan pertimbangkan kembali keamanan produk - Jangan gunakan produk yang sudah tidak layak konsumsi atau sudah terkontaminasi - Hubungi teknisi untuk memeriksa dan memperbaiki alat - Kaji ulang pelatihan staff
Apakah tindakan perbaikan telah dilaksanakan ?		☐ Ya ☐ Tidak ☐ Tidak dapat digunakan

Tgl. diperiksa oleh Manajer	TTD Manajer

Figure 7.3. Temperature Monitoring Record for Chiller

Lembar Pemantauan Jumlah Produk Dalam Lemari Pembeku

Nama Produk : Ikan Mentah

Catatan :

- Periksa suhu lemari pembeku 2 kali/hari

-Periksa kembali kelayakan produk yang sudah tersimpan lebih dari 7 hari

- Pemesanan dilakukan apabila jumlah produk didalam lemari pendingin kurang dari 10 plastik.

- Beri tanda untuk produk lama apabila produk baru telah diterima

Tgl. Masuk	Jumlah yang diterima	Tgl. Keluar	Jumlah yang dikeluarkan	Jumlah didalam *Freezer*	Pemeriksa	Ttd Chef	Catatan

Tgl. diperiksa oleh Manajer	TTD Manajer

Figure 7.4. Worksheet of Fish Supply

Lembar Pemantauan Jumlah Produk Dalam Lemari Pembeku

Nama Produk : Daging Ayam

Catatan :

- Periksa suhu lemari pembeku 2 kali/hari

-Periksa kembali kelayakan produk yang sudah tersimpan lebih dari 7 hari

- Pemesanan dilakukan apabila jumlah produk didalam lemari pendingin kurang dari 10 plastik.

- Beri tanda untuk produk lama apabila produk baru telah diterima

Tgl. Masuk	Jumlah yang diterima	Tgl. Keluar	Jumlah yang dikeluarkan	Jumlah didalam *Freezer*	Pemeriksa	Ttd Chef	Catatan

Tgl. diperiksa oleh Manajer	TTD Manajer

Figure 7.5. Worksheet of Raw Chicken Supply

Lembar Pemantauan Jumlah Produk Dalam Lemari Pembeku

Nama Produk : Daging Sapi

Catatan :

- Periksa suhu lemari pembeku 2 kali/hari

-Periksa kembali kelayakan produk yang sudah tersimpan lebih dari 7 hari

- Pemesanan dilakukan apabila jumlah produk didalam lemari pendingin kurang dari 10 plastik.

- Beri tanda untuk produk lama apabila produk baru telah diterima

Tgl. Masuk	Jumlah yang diterima	Tgl. Keluar	Jumlah yang dikeluarkan	Jumlah didalam *Freezer*	Pemeriksa	Ttd Chef	Catatan

Tgl. diperiksa oleh Manajer	TTD Manajer

Figure 7.6. Worksheet of Raw Meat Supply

Rekaman Tindakan Perbaikan

Tgl.	Nama Produk	Penyimpangan yang diamati	Tindakan Perbaikan	Penanggung jawab	Ttd Manajer/Chef	Catatan

Tgl. diperiksa oleh Manajer	TTD Manajer

Figure 7.7. Corrective Action's Worksheet

7.3. Process/Step/Product Improvement

The improvement in activities stages are purposed to reduce the potential hazard contains in the raw material during each steps of food processing. However, some processes were founded as CCPs as it was explained in the previous section. Futhermore, this section is explaine the improvement for remaining processes.

According to the result of Decision Tree, there were founded thirteen processes that have to be improved. As explained in the previous chapter, there are four stages in food processing which had been analyzed using Decision Tree to determine the Critical Control Points.The the thirteen processes consists of 4 processes in Receiving and Storage Stage, Therefore, 4 prcesses in Food Preparation Stage, 3 processes in Cooking Stage, and 2 processes in Food Serving Stage. An improvement was conducted in each stage to control and reduce the potential hazards contains.

7.3.1. Receiving and Storage Stage

This stage covering number of activities from raw material receiving process to raw material stored. As explained in previous section, some improvement were conducted in 4 processes on this stage to reduce the hazard contain.

First process has been improved is Checking Raw Material. Activities at this stage should include checking raw materials received from suppliers. The objective is to ensure that raw materials received by restaurant are in good condition, suitable for consumption and not contaiminated either microbiologically, chemically, or physically. However, the activity is different from the activity applied by Restaurant “X”. Process of raw material checking only includes checking in quantity and suitability of order. Therefore, a proposed procedure for Receiving and Raw materials Storage stage is provided to achieve the restaurant’s objective. Figure 7.8. is presented the proposed procedures for this stage.

According to proposed procedures, a worksheet monitoring of raw material receipt was made to ensure the improvement is well-implemented, and as the records for management to control the quality of raw material and supplier. Figure 7.9. is presented the worksheet monitoring of raw material receipt.

Second process to be improved is Weight Measurement, Look backward into the condition of unclean receiving area, an improvement is needed to control and reduce the contamination during this process. An unclean area can cause a cross contamination among the waste and the raw material that damage the products. The conducted improvement was clean up the receiving area by eliminates the unused stuff around receiving area and prohibited waste/garbage disposal. Therefore, a waste disposal procedure is structured to remind the workers in maintaning cleanliness and disposing of waste at the designated time and place and as it presented in the figure 7.10. The past and current condition can be seen in figure 7.11.

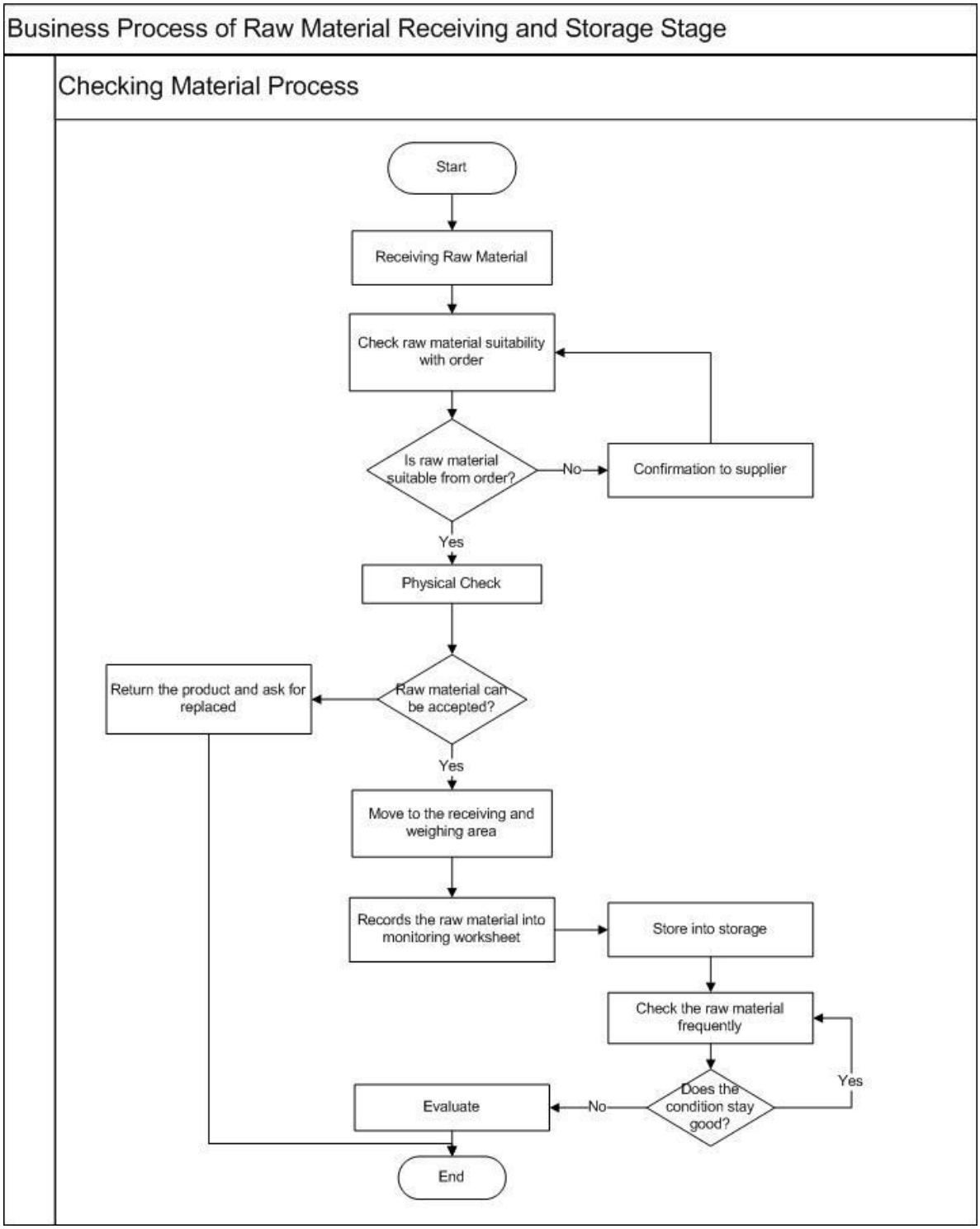

Figure 7.8. Receiving and Raw Material Storage Diagram Flow

Lembar Pemantauan Penerimaan Bahan Baku

Catatan :

-Periksa kembali kelayakan produk yang diterima

- Tolak bahan baku dengan kondisi yang tidak baik atau sudah terkontaminasi

- Kaji ulang pemasok

Tgl. Masuk	Nama Produk	Berat	Pemasok bahan baku	Kondisi	Pemeriksa	Ttd Chef	Catatan

Tgl. diperiksa oleh Manajer	TTD Manajer

Figure 7.9. Worksheet Monitoring of Raw Material Receipt

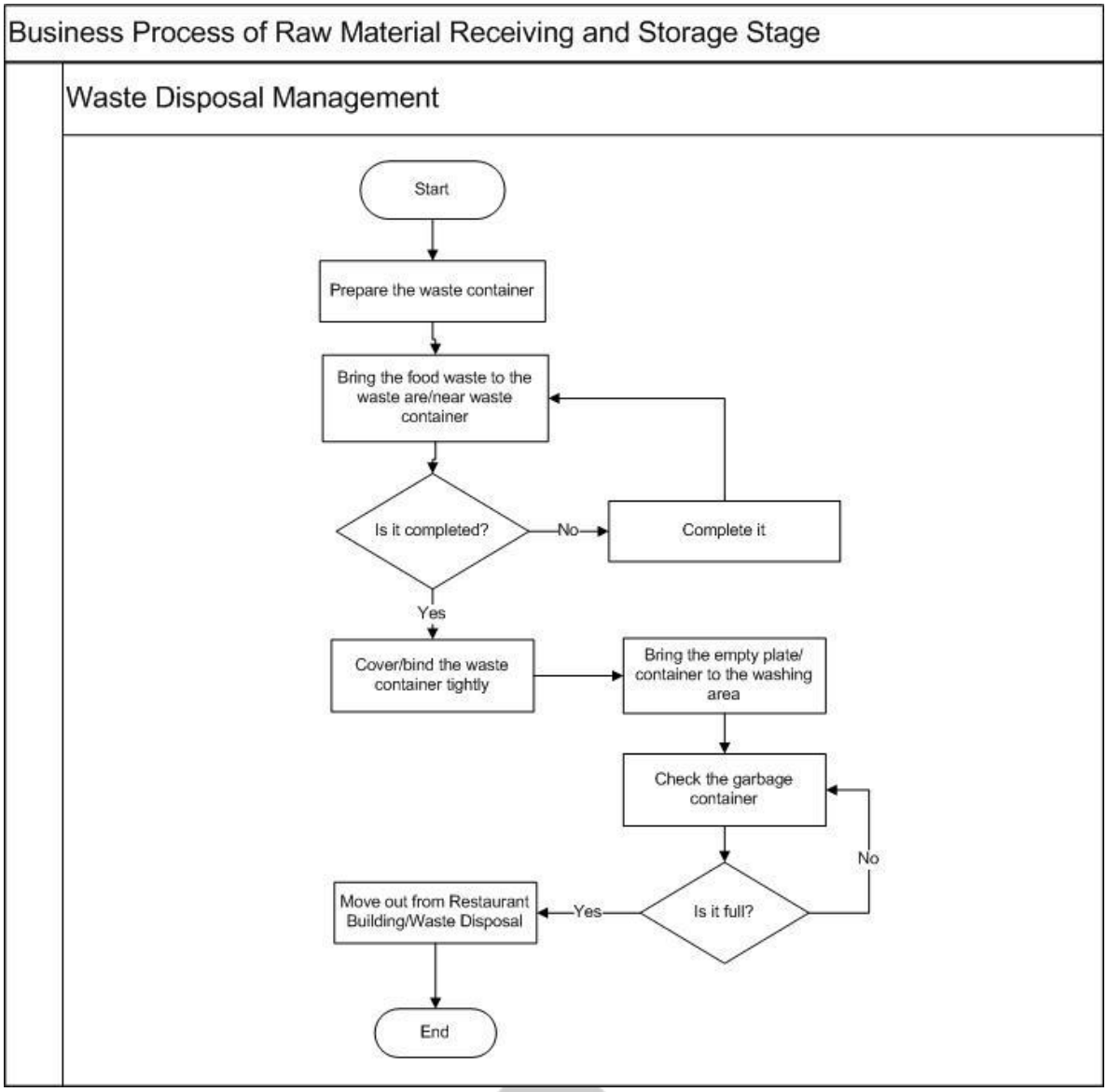

Figure 7.10. Waste Disposal Procedure

Figure 7.11. Receiving and Food Area Measurement before Improvement

Figure 7.12. Receiving and Food Area Measurement after Improvement

Furthermore, the following step which has been improved is cleaning and packaging process specially designed for raw fish. During the cleaning and washing process, a personal hygiene program was conducted in order to protect the product safety to avoid the contamination between the workers and products. An apron is needed to prevent the contamination from the worker's clothes, a mask works for preventing the spread of infectious diseases originating from the mouth and nose, and use of gloves is to prevent the contamination from human body parts. Any sanitizer substances are prohibited to be

placed in food washing area, does not use of sanitizer substance during food washing process and ensure its packaging material use colorless palstic to avoid the unwated substance contained in plastic packaging. A complete illustration in using personal hygiene equipment can be seen in figure 7.13.

Figure 7.13. Food Washing before and after Improvement

The last stage to be controled to reduce the potential hazard is raw material stored in ambient. Some rules apply to food stored at rom temperature/ambient such as :1) ensure the area is clean and dry, 2) ensure the pest control program is working well, 3) reduce the damage products, and 4) audit the contractor of pest control frequently.

7.3.2. Food Preparation and Cooking Stages

Cleanliness of the area, the environment, and kitchen equipment in the kitchen is a support in producing the good, healthy, clean and safety food for consumption. As it is known that food preparation/producing is very important so it is not cause any sick/poisoning when consumed. Also, as preventing the growth of bacteria which is caused by negligence in maintaining kitchen hygiene and food processing itself. Based on the result of CCPs Decision Tree, there are two processes in food procesing stage that need to be improved such as chopping vegetables & spices, also peel off spices & Egg. Three processes in cooking stage are need to be improved such as seasoning raw material, moving food to container, and stored it to ready-to-serve table. Proposed improvements to the processes in both departments are the establishment of Safety rule Kitchen and Personnal Hygiene

Program and set up a flow diagram for food processing, cooking & stored to ready-to-serve table.

A counseling about the importance of maintaining kitchen cleanliness and during food preparation process in both departments has been done. A poster as the media outreach on kitchen hygiene regulation was conducted in order to remain the employees about the predefined rules, as it can be seen in figure 7.14. The rules involve several aspects, such as: (1) Personal &Environment cleanliness, (2) Treatment of raw food and ready-to-eat (RTE), and (3) Cooking process.

In addition to maintaining the overall processes undercontrolled and cleanliness of kitchen area, all equipments and employees cleanliness are also very importance to emphasize. An employee is an object that comes in contact with the food from washing, cleaning, chopping, cooking to serving food.

Therefore, maintaining individual hygiene means keeping the habits clean and keeping the clean habits and keeping the whole body clean. The habits that need to be considered to achieve individual hygiene include the hands, nails, hair, face, nose, mouth, ear, legs, an physical fitness. A personal hygiene program was conducted in order to realizing the ideas as a part of safety kitchen. A poster related to the personal hygiene program has been made, it can be seen in the figure 7.15 and figure 7.16. Personal hygiene program has been inform and applied in to the food processing activity, as it was shown in the previous sections and as it can be seen the figure 7.17. After applying the safety rule kithcen and personal hygiene program, in order to provide guidance on the process and make it easier and more manageable a proposed flow diagram for those processes was made and it presented in the figure 7.18.

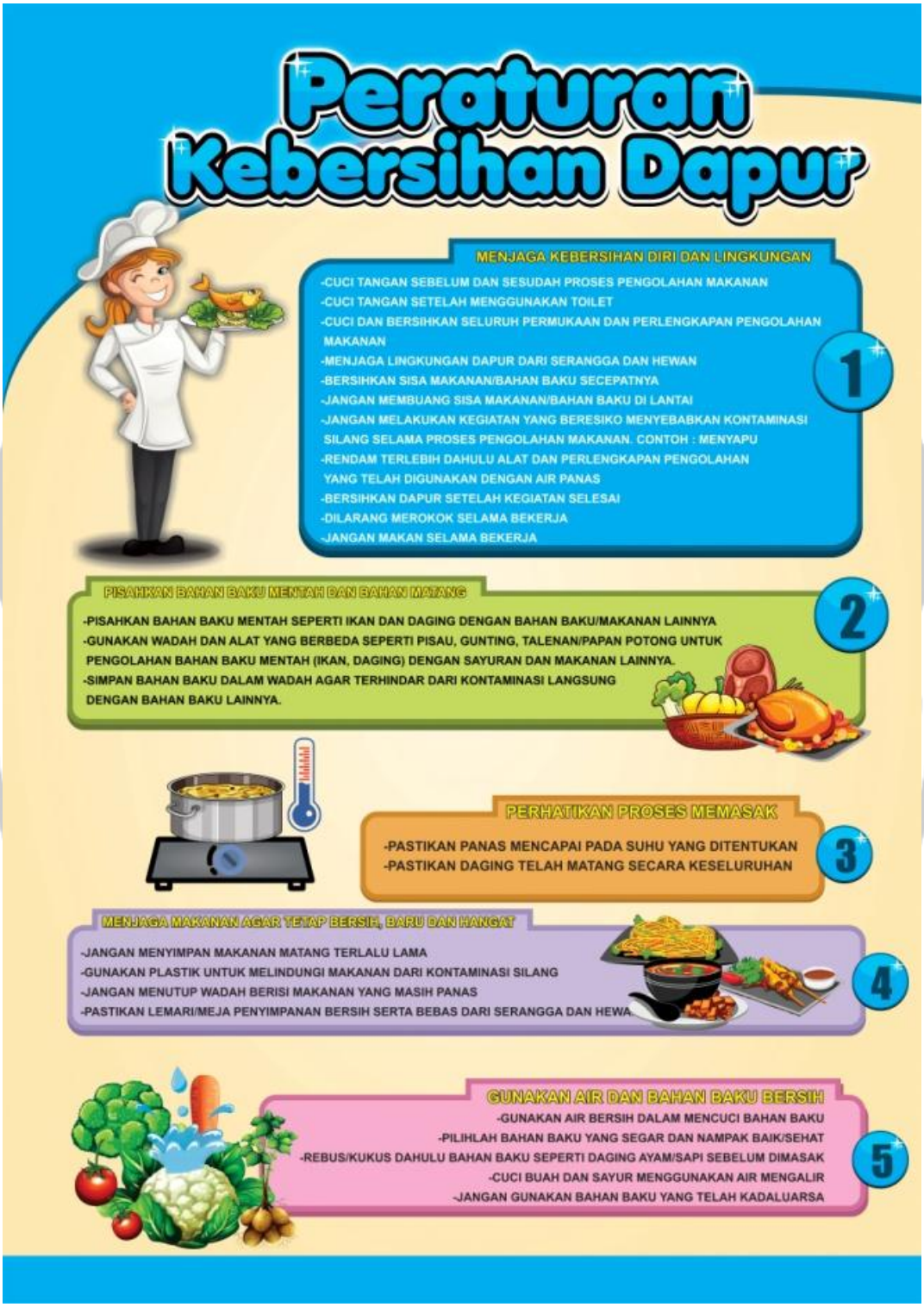

Figure 7.14. Safety Rule Kitchen

Figure 7.15. Poster of Personal Hygiene Program

Figure 7.16. Poster of Hand Wash Procedure

Figure 7.17. Food Preparation Process using Hygiene Equipments

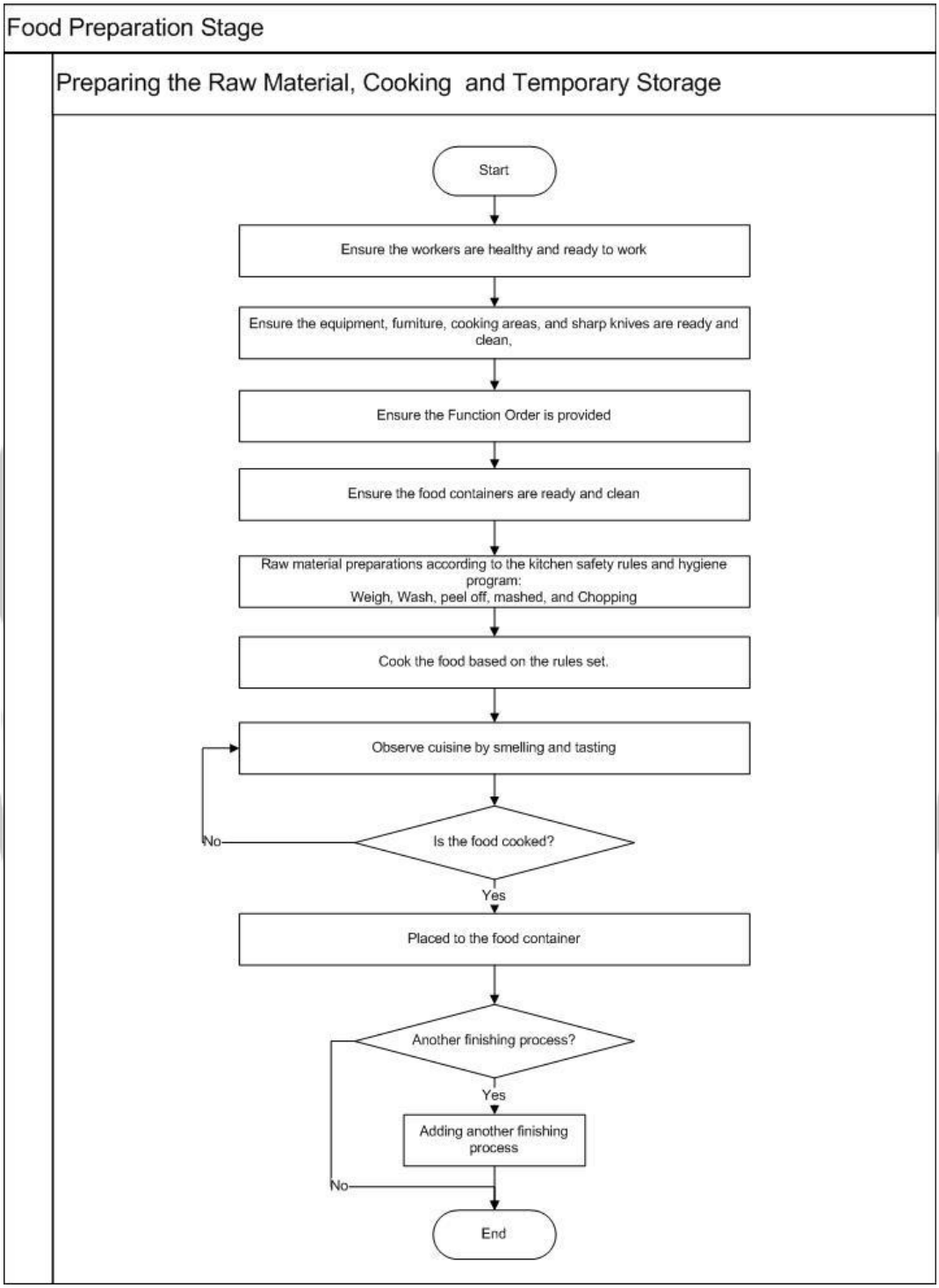

Figure 7.18. Flow Diagram for Food Preparation, Cooking, and Temporary Storage

7.3.3. Serving Stage

Food serving is one of food hygiene and sanitation principal. An improperly serving will not only reduce the appetite but also increase the possibility of food contamination. Some several factors have to be considerate in food serving start from the temporary storage for RTE food, food container and equipment, food temperature, equipment and food handling. The temporary storage used as a place to freshly cooked food before it is placed on the dining table.

The condition of a storage area should be clean to prevent contamination from either dust/dirt or from insects. Figure 7.19. shows the condition of previous food storage which are inappropriate since the condition of the storage itself which is already rusted, unreachable shelf placement from the cooking area also makes the work inefficient .Therefore, a new food storage has been provided with better condition with reachable placement from the cooking area to make it more efficient.

Figure 7.19. Fresh Food Storage Condition before and after improvement

Food container and equipment have to be clean and in a good condition. Clean means to be washed in hygienic way. Good means no damage or defective and used. The aims are to prevent the disease transmission and provide an aesthetic appearance. Meanwhile, food temperature keeps the freshness of food to be consumed by customers.

Food handling is the activities of taking food from the kitchen to serving food to the dining table. The principal of food handling are to avoid the food and equipment from cross

contamination caused by environment or workers body parts and also to provide a polite, nice and neat appearance. Therefore, use of personal hygiene equipment is necessary to achieve the objective of this process. Figures 7.20 and Figure 7.21. show the proper way in food handling and serving.

Figure 7.20. Food Delivery Technique

Figure 7.21. Food Serving Technique

Figure 7.21. Food Serving Technique (Continue)

7.4. Analysis Comparison Before and After Improvement

In the previous chapter, Hazard Analysis of previous condition in Restaurant “X”, was conducted and the risks level were obtained for each process according to its condition. In order to acknowledge the differences in hazard analysis after applying improvements, the current condition at Restaurant “X” is compared to the purposed measures are conducted. Table 7.1. to Table 7.4. show the hazard analysis for condition after improvement. In order to see the difference in risk level of both conditions, a summary of both risk analysis is provided in table 7.5.

Table 7.1. Hazard Analysis after Improvement for Receiving area

Process Step	Products	Potential Hazard	Hazard Characteristic				Risk Level
			B (Contain Hazard)	C (No Control Step)	D (Contamination during process)	E (Mishandling the Product)	
Module 1. Receiving and Storage							
1.1. Checking Raw Material	a. Fish	Biological hazard : *Salmonella, Staphylococcus aureus, Listeria monocytogenes, Escherichia coli (E. Coli)*	1	0	0	0	1
		Chemical hazard :	0	0	0	0	0
		Physical hazard :	0	0	0	0	0
	b. Raw chicken	Biological hazard : *Salmonella, Campylobacter jejuni*	1	0	0	0	1
		Chemical hazard :	0	0	0	0	0
		Physical hazard :	0	0	0	0	0
	c. Raw meat	Biological hazard : *Salmonella, Staphylococcus aureus, Campylobacter jejuni, Escherichia coli (E. Coli)*	1	0	0	0	1
		Chemical hazard :	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	d. Tempe	Biological hazard : *Staphylococcus aureus,*	1	0	0	0	1
		Chemical hazard :	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	e. Egg	Biological hazard : *Salmonella*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	f. Vegetable	Biological hazard : *E.Coli*	1	0	0	0	1
		Chemical hazard : Pesticide residual	1	0	0	0	1
		Physical hazard	0	0	0	0	0
	g. Spices	Biological hazard : E. Coli	1	0	0	0	1
		Chemical hazard : *Pesticide residual*	1	0	0	0	1
		Physical hazard	0	0	0	0	0
1.2. Weight Measurement	a. Fish	Biological hazard : *Salmonella, Staphylococcus aureus, Listeria monocytogenes, Escherichia coli (E. Coli)/ possible growth of pathogens*	1	0	0	0	1

Table 7.1. Hazard Analysis after Improvement for Receiving area (Continue)

		Chemical hazard : sanitizer substance	1	0	0	0	1
		Physical hazard : gravel, twigs, dirt and insects	1	0	0	0	1
	b. Vegetable	Biological hazard : *E.Coli*	1	0	0	0	1
		Chemical hazard : *Pesticide residual,* sanitizer substance	1	0	0	0	1
		Physical hazard : dirt	1	0	0	0	1
	c. Spices	Biological hazard : *E.Coli*	1	0	0	0	1
		Chemical hazard : *Pesticide residual,* sanitizer substance	1	0	0	0	1
		Physical hazard : dirt	1	0	0	0	1
1.3. Cleaning and Washing	a. Fish	Biological hazard : *Salmonella, Staphylococcus aureus, Listeria monocytogenes, Escherichia coli (E. Coli)/ contamination with pathogens*	1	0	0	0	1
		Chemical Hazard : Sanitizer Substance	1	0	0	0	1
		Physical hazard : Due to personal hygiene program	1	0	0	0	1
1.4. Packaging fish per 5 kg	a. Fish	Biological hazard : *Salmonella, Staphylococcus aureus, Listeria monocytogenes, Escherichia coli (E. Coli)/ possible growth of pathogens*	1	0	0	0	1
		Chemical hazard : Contamination comes from the content of the wrapping material	1	0	0	0	1
		Physical hazard : due to personal hygiene	1	0	0	0	1
1.5. Transfer to freezer	b. fish	Biological hazard : *possible growth of pathogens (enteropathogenic E.Coli,Clostridium perfringens)*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	c. Raw chicken	Biological hazard : *possible growth of pathogens (Clostridium perfringens)*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0

Table 7.1. Hazard Analysis after Improvement for Receiving area (Continue)

	d. Raw meat	Biological hazard : *possible growth of pathogens (Clostridium perfringens)*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
1.6. Stored in freezer	a. fish	Biological hazard : *possible growth of pathogens (enteropathogenic E.Coli,Clostridium perfringens)*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	b. Raw chicken	Biological hazard : *possible growth of pathogens(Clostridium perfringens*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	c. Raw meat	Biological hazard : *possible growth of pathogens (Clostridium perfringens)*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
1.7. Transfer to chiller	a. Vegetable	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	b. Tempe	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard :	0	0	0	0	0
		Physical hazard	0	0	0	0	0
1.8. Stored in chiller	a. Vegetable	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard : some pesticide are left	1	0	0	0	1
		Physical hazard	0	0	0	0	0
	b. Tempe	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard :	0	0	0	0	0
		Physical hazard	0	0	0	0	0
1.9. Transfer to ambient	a. Spices	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard :	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	b. Egg	Biological hazard : *possible growth of pathogens (Salmonella enteritidis)*	1	0	0	0	1

Table 7.1. Hazard Analysis after Improvement for Receiving area (Continue)

		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
1.10. Stored to ambient	a. Spices	Biological hazard Biological hazard : *possible growth of pathogens (bacillus cereus, clostridium botulinum)*	1	0	0	0	1
		Chemical hazard : some pesticide are left	1	0	0	0	1
		Physical hazard	0	0	0	0	0
	b. Egg	Biological hazard : *possible growth of pathogens (Salmonella enteritidis)*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0

Table 7.2. Hazard Analysis after Improvement for Food Preparation

Process Step	**Products**	**Potential Hazard**	**Hazard Characteristic**				**Risk Level**
			B (Contain Hazard)	**C** (No Control Step)	**D** (Contamination during process)	**E** (Mishandling the Product)	
Module 2. Preparation of Frozen Food							
2.1. Transfer to the kitchen	a. fish	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	b. Raw chicken	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	c. Raw meat	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
2.2. Defrosting	a. Fish	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	b. Raw chicken	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0

Table 7.2. Hazard Analysis after Improvement for Food Preparation (Continue)

	c. Raw meat	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
Module 3. Preparation of Chilled Food							
3.1. Transfer to the kitchen	a. Vegetable	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard : pesticide is left	1	0	0	0	1
		Physical hazard	0	0	0	0	0
	b. Tempe	Biological hazard : *possible growth of pathogens*	1	0	0	0	1
		Chemical hazard : pesticide is left	0	0	0	0	0
		Physical hazard	0	0	0	0	0
3.2. Chopping (according to receipt)	a. Vegetable	Biological hazard : contamination with other material / due bad personal hygiene	1	0	0	0	1
		Chemical hazard : pesticide is left	1	0	0	0	1
		Physical hazard : contamination with foreign substance	1	0	0	0	1
	b. Tempe	Biological hazard : contamination with other material / due bad personal hygiene	1	0	0	0	1
		Chemical hazard :	0	0	0	0	0
		Physical hazard : contamination with foreign substance	1	0	0	0	1
3.3. Washing	a. Vegetable	Biological hazard : *some pathogens are left*	1	0	0	0	1
		Chemical hazard : pesticide is left/ sanitizer substance	1	0	0	0	1
		Physical hazard	0	0	0	0	0
	b. Tempe	Biological hazard : *some pathogens are left*	1	0	0	0	0
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
Module 4. Preparation of Ambient Food							
4.1. Peel of spices		Biological hazard : contamination with other material / due bad personal hygiene	1	0	0	0	1
		Chemical hazard : pesticide is left	1	0	0	0	1
		Physical hazard :	0	0	0	0	0

Table 7.2. Hazard Analysis after Improvement for Food Preparation (Continue)

4.2. Washing Spices		Biological hazard : some pathogens are left	1	0	0	0	1
		Chemical hazard : pesticide is left/ sanitizer substance	1	1	1	1	4
		Physical hazard	0	0	0	0	0
4.3. Chop the spices		Biological hazard : contamination with other material / due bad personal hygiene	1	0	0	0	0
		Chemical hazard :	0	0	0	0	0
		Physical hazard	0	0	0	0	0
4.4. Egg Boiling process		Biological hazard : survival of pathogents	1	0	0	0	1
		Chemical hazard : pesticide is left	1	0	0	0	1
		Physical hazard :	0	0	0	0	0
4.5. Peel of the eggshell		Biological hazard : some pathogens are left	1	0	0	0	1
		Chemical hazard : pesticide is left/ sanitizer substance	1	0	0	0	1
		Physical hazard	1	0	0	0	1

Table 7.3. Hazard Analysis after Improvement for Cooking

Process Step	**Products**	**Potential Hazard**	**Hazard Characteristic**				**Risk Level**
			B (Contain Hazard)	**C** (No Control Step)	**D** (Contamination during process)	**E** (Mishandling the Product)	
5.1. Seasoning the raw material	a. Fish	Biological hazard : contamination with other material/due to bad personal hygiene	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard : contamination with foreign substance	1	0	0	0	1
	b. Raw chicken	Biological hazard : contamination with other material/due to bad personal hygiene	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard : contamination with foreign substance	1	0	0	0	1
	c. Raw meat	Biological hazard : contamination due to bad personal hygiene	1	0	0	0	1

Table 7.3. Hazard Analysis after Improvement for Cooking (Continue)

		Chemical hazard	0	0	0	0	0
		Physical hazard : contamination with foreign substance	1	0	0	0	1
	d. Vegetable	Biological hazard : contamination with other material/due to bad personal hygiene	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard : contamination with foreign substance	1	0	0	0	1
	e. Tempe	Biological hazard : contamination with other material/due to bad personal hygiene	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard : contamination with foreign substance	1	0	0	0	1
	f. Egg	Biological hazard : contamination with other material/due to bad personal hygiene	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard : contamination with foreign substance	1	0	0	0	1
5.2. Cook according to receipt	a. Fish	Biological hazard : survival of pathogens caused by inadequate heat temperature	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	b. Raw chicken	Biological hazard : survival of pathogens caused by inadequate heat temperature	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	c. Raw meat	Biological hazard : survival of pathogens caused by inadequate heat temperature	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	d. Vegetable	Biological hazard : survival of pathogens caused by inadequate heat temperature	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0

Table 7.3. Hazard Analysis after Improvement for Cooking (Continue)

	e. Tempe	Biological hazard : survival of pathogens caused by inadequate heat temperature	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
	f. Egg	Biological hazard : survival of pathogens caused by inadequate heat temperature	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
5.3. Move to clean container		Biological hazard : cross contamination with other materials/due to bad personal hygiene	1	0	0	0	1
		Chemical hazard : some sanitizer left in container	1	0	0	0	1
		Physical hazard :	0	0	0	0	0
5.4. Placed into ready-to-serve-table		Biological hazard : contamination of other material/insects (flies)	1	0	0	0	1
		Chemical hazard :	0	0	0	0	0
		Physical hazard :	1	0	0	0	1

Table 7.4. Hazard Analysis after Improvement for Serving

Process Step	**Products**	**Potential Hazard**	**Hazard Characteristic**				**Risk Level**
			B (Contain Hazard)	**C** (No Control Step)	**D** (Contamination during process)	**E** (Mishandling the Product)	
6.1. Transfer cooked food into dining table by Using trolley		Biological hazard : contamination of other material/insects (flies)	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard	0	0	0	0	0
6.2. Serving to dining table		Biological hazard : contamination of other material/insects (flies)	1	0	0	0	1
		Chemical hazard	0	0	0	0	0
		Physical hazard : presence of pets/contamination with foreign substance	1	0	0	0	1

Table 7.5. Summary of Risk Level Before and After Improvement

Process Step	Products	Potential Hazard	Risk Level	
			Before Improvement	After Improvement
Checking Raw Material	Fish	Biological hazard	3	1
	Raw chicken	Biological hazard	3	1
	Raw meat	Biological hazard	3	1
	Tempe	Biological hazard	3	1
	Egg	Biological hazard	3	1
	Vegetable	Biological hazard	3	1
		Chemical hazard	3	1
	Spices	Biological hazard	3	1
		Chemical hazard	3	1
Weight Measurement	Fish	Biological hazard	3	1
		Chemical hazard	3	1
		Physical hazard	3	1
	Vegetable	Biological hazard	3	1
		Chemical hazard	3	1
		Physical hazard	3	1
	Spices	Biological hazard	3	1
		Chemical hazard	3	1
		Physical hazard	3	1
Cleaning and Washing	Fish	Biological hazard	2	1
		Chemical hazard	3	1
		Physical hazard	3	1
Packaging fish/5kg		Biological hazard	3	1
		Chemical hazard	3	1
		Physical hazard	3	1
Transfer to Freezer	Fish	Biological hazard	3	1
	Raw chicken	Biological hazard	3	1
	Raw meat	Biological hazard	3	1
Stored in freezer	Fish	Biological hazard	3	1
	Raw chicken	Biological hazard	3	1
	Raw meat	Biological hazard	3	1
Transfer to chiller	Vegetable	Biological hazard	3	1
	Tempe	Biological hazard	3	1
Stored in chiller	Vegetable	Biological hazard	3	1
		Chemical hazard	3	1
	Tempe	Biological hazard	3	1
Transfer to ambient	Spices	Biological hazard	3	1
	Egg	Biological hazard	3	1
Stored to ambient	Spices	Biological hazard	3	1
		Chemical hazard	2	1
	Egg	Biological hazard	3	1
Transfer to the kitchen	Fish	Biological hazard	3	1
	Raw chicken	Biological hazard	3	1
	Raw meat	Biological hazard	3	1
Defrosting	Fish	Biological hazard	3	1
	Raw meat	Biological hazard	3	1
	Raw meat	Biological hazard	3	1

Table 7.5. Summary of Risk Level Before and After Improvement (Continue)

Transfer to the kitchen	**Vegetable**	Biological hazard	3	1
		Chemical hazard	2	1
	Tempe	Biological hazard	3	1
Chopping (according to receipt)	**Vegetable**	Biological hazard	4	1
		Chemical hazard	3	1
		Physical hazard	3	1
	Tempe	Biological hazard	4	1
		Physical hazard	3	1
Washing	**Vegetable**	Biological hazard	3	1
		Chemical hazard	3	1
Peel of spices		Biological hazard	4	1
		Chemical hazard	2	1
Washing Spices		Biological hazard	3	1
		Chemical hazard	3	1
Chop the spices		Biological hazard	4	1
Egg Boiling process		Biological hazard	4	1
		Chemical hazard	3	1
Peel of the eggshell		Biological hazard	3	1
		Chemical hazard	4	1
		Physical hazard	3	1
Seasoning the raw material	**Fish**	Biological hazard	4	1
		Physical hazard	3	1
	Raw chicken	Biological hazard	4	1
		Physical hazard	3	1
	Raw meat	Biological hazard	4	1
		Physical hazard	3	1
	Vegetable	Biological hazard	4	1
		Physical hazard	3	1
	Tempe	Biological hazard	4	1
		Physical hazard	3	1
	Egg	Biological hazard	4	1
		Physical hazard	3	1
Cook according to receipt	**Fish**	Biological hazard	3	1
	Raw chicken	Biological hazard	3	1
	Raw meat	Biological hazard	3	1
	Vegetable	Biological hazard	3	1
	Tempe	Biological hazard	3	1
	Egg	Biological hazard	3	1
Move to clean container		Biological hazard	3	1
		Chemical hazard	3	1
Placed into ready-to-serve-table		Biological hazard	4	1
		Physical hazard	3	1
Transfer cooked food into dining table using trolley		Biological hazard	4	1
Serving to dining table		Biological hazard	4	1
		Physical hazard	4	1

According to table above, it can be seen that risk level of raw material cheking processs is one compared to the previous risk level was three. Since the restaurant has applied the proposed control measure, which is do the physical hazard and frequentlly audit the supplier, the hazard now has the control step. Eventhough, the preventive actions have been taken, there is still a chance of biological hazard occurrence since fish, meat and chicken are very easily becomes contaminated. Therefore, it assign one on the hazard characteristic B. In order to ensure the that hazard can be controlled is by frequently auditing the supplier and checking whether the supplier have the proper conditions of preent this biological hazard from proliferating. After receiving the raw material, the way restaurant can control the hazard is to inhibit the proliferation of biological hazards by cooking it at the later step. As it can be seen there are overall improvements in each process either the process of CCP or Non-CCP. By applying the proposed control measure and critical points, the risk level can be reduced from high to very low risk.

7.5. Conclussion

HACCP is a method used for assessing a potential hazard and establishing a hazard control system that focuses on the prevention of the identified hazard. The HACCP-based approach requires researchers to recognize all types of hazards in every process in the restaurant / catering industry.

HACCP is consists of seven principles, such as: (1) Hazard Analysis, (2) Determine of CCP, (3) Establish Critical Limit, (4) Establish Monitroing Procedures, (5) Establish Corrective Actions, (6) Establish Verification Procedures, and (7) Establish Documents Records. The first and second principles are the phases where the previous processes are analyzed and the determine of control measures. The third to sixth principles are the phases where the idea of improvements are relized and the effect of improvements are measured. The last principles is the phases where the monitoring of new system is being recorded.

The application of HACCP method in Restaurant "X" are done by utilizing the haccp principles. The principles are used to analye the hazard potential of raw material and processes, establish the improvement ideas, measure the improvements, and monitoring the improvement to ensure that the new system is well-implemented.

With the improvement applied , the risk level in each process is reduced from high to very low risk. It also resulted a significant improvement from the previous and current condition in the restaurant's kitchen, adding more employees knowledgement related to the quality management. Hence, it can be concluded that usage of HACCP method can be used to eliminate / prevent the hazard potential in products and processes, improving the performance both service and products.

7.5. Suggesstion

According to the sixth principal of Hazard Analaysis Critical Control Points which is HACPP Verification that have not been implemented in this research due to the limitation of time, resource and cost. Therefore, author would like to give a suggestion to the restaurant management for hiring the consultant related to the Food Quality Management / HACCP System.

By hiring the consultant for Food Quality Management / HACCP System, restaurant will be able to be analyzed and evaluated by authorized workers, also be able to do a HACCP Verification that it helps the management to be officialy recognized as a restaurant that has an official certificate of HACCP as evidence that the Restaurant "X" has implemented a quality assurance system for each processed food.

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