PRE REQUISITE STUDY ON APPLICATION OF HAZARD ANALYSIS CRITICAL CONTROL POINT MANAGEMENT SYSTEM FOR ON BOARD TUNA LONGLINER

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ABSTRACT

Along with the era of globalization and free market an approach for managing quality through testing the final product is considered not able to meet consumer demands. It drives to a new approach based on prevention and control efforts during the process. Hazard analysis critical control point quality management system is considered appropriate because it can prevent the distortion and instead of waiting until the problems arise. The process of handling the fish on the boat as a part of the production chain affects the quality of tuna products, so the application of the hazard analysis critical control point quality management system on board tuna longline is considered important. Effectiveness of hazard analysis critical control point implementation as a quality system control is affected by sanitation standard operating procedure and good handling processing as the basic requirements (pre requisite), where the assessment can be a measure of readiness hazard analysis critical control point implementation. The purpose of this study is to determine the feasibility of the basic requirements of hazard analysis critical control point implementation in the tuna longline vessels. The research has been carried out by taking 10 samples of tuna longline vessels in the Nusantara Fishing Port of Pelabuhan Ratu and Samudera Fishing Port of Nizam Zachman, Jakarta. The basic requirements of eligibility conditions on longline vessels fishing in the port are pretty good. Results showed general assessment Y values are in the range of $2 \leq Y < 4$. This can be concluded that the applications of a pre requisite in sanitation standard operating procedure and good handling processing on tuna longline vessels in the both fishing ports were quite close to the standard, but improvements are still needed.

KEYWORDS: quality management systems, hazard analysis critical control point, basic requirements, tuna longline vessels

INTRODUCTION

Tuna is one of the main export commodities besides shrimp and seaweed. In 2008, tuna export was the second ranks after the shrimp up to 130,056 tons with a value of U.S. $ 347.189 million up to October 2008 (Anonymous, 2009). The success of the Ministry of Marine Affairs and Fisheries to prove that no Indonesia tuna has high histamine content, the European Union revokes the ban tuna exports by Indonesia (Kusdiantoro, 2008).

Indonesia became a major exporter of fresh and frozen tuna to the United States and Japan in addition to canned tuna exporters to the European Union, especially United Kingdom. Ministry of Marine Affairs and Fisheries stated recently that the tuna export volume was 88,791 tons, in which mostly sold as fresh (Agung, 2009).

Globalization era and free markets lead to increase the awareness of consumer demand on food quality and safety including fishery products. These problems arise because of internal factors due to bad quality and safety assurance of Indonesia fisheries products

and external factors caused by the tight competition and increasing level requirements of international standards (Poernomo, 2008). It drives to a new approach based on preventive measures as well as supervision during the process (in process inspection), not to defective products. Quality management system of hazard analysis critical control point is considered appropriate because it can prevent the distortion, instead of waiting until problems arise.

Quality is the main requirement of tuna to be exported. Tuna quality can be affected by how the fish to be caught, handled, landed, stored, and distributed. According to the result of research conducted by Menai (2007), the process of tuna handling on board determines product quality because tuna handling process is the beginning of the production chain. If there any mistake in this stage, it can not be fixed in later stage. Tuna with bad quality will be rejected as it does not meet export quality. Therefore the price bad quality tuna will be much lower than the products that meet the export quality.

Implementation of the hazard analysis critical control point quality management system starting from

the beginning of fish caught becomes important factor in order to guarantee the quality of fish at the earliest level. Implementation of sanitation standard operation procedure and good handling processing as the pre requisite for the application of hazard analysis critical control point in the tuna vessels are expected to improve the tuna quality. This study was aimed to determine the feasibility of applying the basic requirements of quality management systems and the possibility of the hazard analysis critical control point quality management system implementation in the tuna longline vessels.

MATERIALS AND METHODS

Time and Place of Study

Research was conducted in Nizam Zachman Samudera Fishing Port, Jakarta and Pelabuhan Ratu Nusantara Fishing Port, West Java in the periode of May until June 2009.

Data Collection

Sampling was conducted by using purposive sampling method. The data were collected in the form of primary and secondary data. Primary data in the form of feasibility assessment towards the basic requirements from the researchers and the respondents' perspective were obtained through interviews and direct observation to the unloading process of the catch and the condition of the tuna vessels facilities. The number of sample was 10 vessels, i.e. four vessels from Nizam Zachman Samudera Fishing Port, Jakarta and six vessels from Pelabuhan Ratu Nusantara Fishing Port, West Java. The number of respondents are 10 people including the longline vessels captain and crew who were responsible for quality, handling, and cooling temperatures controller. The researchers were equiped with a questionnaire as an assessment list which refered to the provisions of the CAC/RCP 52-2003 Rev.2-2005 code of practice for fish and fishery products and the decree of the Minister of Marine Affairs and Fisheries Republic of Indonesia No.01/ Men./2007. The questionnaire consisted of six elements of the basic requirements, namely the location and environment; design and construction of vessels and facilities; equipment and handling equipment; operational handling of fresh tuna; sanitation and health of workers; and quality management systems.

Data Analysis

An assessment of the feasibility of applying the basic hazard analysis critical control point quality management system was conducted by observing the condition of some basic requirements elements which were described by the value of Y and deviation described by rating. Table 1 below shows the criteria that were used to assess the extent to which the application of the basic requirements was conducted.

Table 1. Criteria assessment questionnaire

Score	Criteria
0	No, not yet implemented at the processing units.
1	No, but the company wants to implement it.
2	Yes, but still not be documented.
3	Yes, this is in the implementation phase, but not fully in accordance with existing standards.
4	Yes, this condition is in conformity with existing standards.

Sources: Hadiwiardjo (1997)

Y value was obtained by using the formula (Hadiwiardjo, 1997):

$$yi = \frac{\sum Xi}{M}, i = 1,2,...,n. \quad \text{.................................} \quad (1$$

where:

yi = an element of the basic requirements to-i

$\sum xi$ = a number of values attained in the i-th element

M = the maximum amount of each element, namely the number of questions on each element multiplied by the maximum score

Assessments of how closely the possibilities of application of the hazard analysis critical control point system in the tuna longline vessels were conducted using the formula (Hadiwiardjo, 1997):

$$Yi = \sum yi, i = 1,2,...,6. \quad \text{.......………………….} \quad (2$$

Determination of rating by using the list of basic requirements is shown in Table 2 below.

RESULTS AND DISCUSSION

As previously mentioned, the observation was carried out towards 10 tuna vessels. Table 3 below shows the detail description of sampled vessels.

Table 2.   Determination of the value (rating) of the basic requirements based on the number of deviations

Rating	Number of deviations			
	Mn (minor)	My (major)	Sr (Serious)	Kr (Critical)
A (Very good)	0-6	0-5	0	0
B (Good)	≥7	6-10	1-2	0
C (Less)	NA	≥11	3-4	0
D (Bad)	NA	NA	≥5	≥1

Remarks: NA = not applicable
Sources: Direktorat Jenderal Perikanan Tangkap (1999)

Table 3.   Samples of tuna longline vessels

Vessel code	Name of vessel	Size (GT)	Kind of activity	Type of product	Fishing base
A	Jimmy Wijaya 04	127	Fishing	Fresh	PPS NZ
B	Jimmy Wijaya 34	73	Fishing	Fresh	PPS NZ
C	Dwi Sukses Bahari	140	Fishing	Fresh	PPS NZ
D	Haslindo 01	429	Fishing	Frozen	PPS NZ
E	Efani 01	87	Fishing	Fresh	PPN Plr
F	Jaya Mitra 03	26	Fishing	Fresh	PPN Plr
G	Hanindo 04	28	Fishing	Fresh	PPN Plr
H	Trans Bahari	18	Carrier	Fresh	PPN Plr
I	Maju Setia	44	Fishing	Fresh	PPN Plr
J	Andita Jaya	75	Fishing	Fresh	PPN Plr

Remarks: PPN NZ = PPS Nizam Zachman, Jakarta; PPN Plr = PPN Pelabuhan Ratu, Sukabumi West Java

Among 10 sampled vessels was only one operating with frozen product. This is due to the high operation cost of frozen tuna vessel. Therefore nowadays, it is quite difficult to find any vessel operating with freezing facilities.

Based on the above fact Implementation of hazard analysis critical control point on board became an important factor to guarantee the quality and safety of the catch, since hazard analysis critical control point is one of preventive system from quality management system point of view. This is in line with recommendation of a committee in the National Academic of Sciences concluding that prevention system as shown by hazard analysis critical control point gives better assurance for food safety, compare to final product control system (Departemen Ilmu dan Teknologi Pangan, 2005). Basic feasibility for applying the basic requirements of the hazard analysis critical control point quality management system can be determined from the condition of some elements of the basic requirements (Y value) and deviations either minor, major, serious, or critical (rating).

Y Value

In general, the basic feseability requirements on longline vessels in both ports considered as pretty good level. Assessment results for range of Y values were on 2≤Y<4 in general. This means that the application of a pre requisite of the hazard analysis critical control point requirements in the form of good handling processing and sanitation standard operation procedure on longline vessels in both ports were close enough to the standard, but still needed some improvements prior to apply the hazard analysis critical control point quality management system. Table 4 and Figure 1 shows the Y values according to researchers and the respondents.
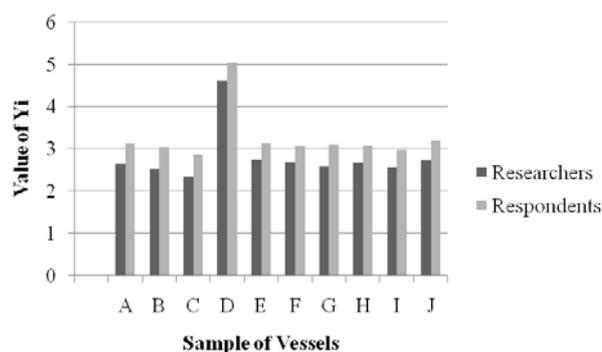

Figure 1.   The value of the basic requirements (Yi) of the vessels from the researchers and respondents point of view.
Remarks: A = K. M. Jimmy Wijaya 04; B = K. M. Jimmy Wijaya 34; C = K. M. Dwi Sukses Bahari; D = K. M. Haslindo 01; E = K. M. Efani 01; F = K. M. Jaya Mitra 03; G = K. M. Hanindo 01; H = K. M. Transbahari; I = K.

Table 4.   The value of Y according to the researcher and respondent

Vessel code	Name of vessel	Researcher		Respondent	
		Y	%Y	Y	%Y
A	Jimmy Wijaya 04	2.66	266.42	3.12	311.86
B	Jimmy Wijaya 34	2.54	254.38	3.05	304.66
C	Dwi Sukses Bahari	2.35	235.20	2.87	286.90
D	Haslindo 01	4.63	463.50	5.05	504.83
E	Efani 01	2.76	276.21	3.15	314.74
F	Jaya Mitra 03	2.69	268.71	3.06	306.01
G	Hanindo 04	2.60	260.37	3.10	310.21
H	Trans Bahari	2.68	268.25	3.08	307.82
I	Maju Setia	2.58	257.83	2.99	299.09
J	Andita Jaya	2.74	274.41	3.20	320.03

Rating of Value

Value rating was to identify total deficiency for minor, major, serious, or critical found in the tuna longline vessels in applying the basic requirements of the hazard analysis critical control point quality management system. The researcher observations and the respondents' point of view toward the tuna longline vessels are described in the following sections. In general, observation result from 10 vessel seems to be not significantly different among the vessels, therefore only three vessels will be discussed to represent the result for vessel from Nizam Zachman Samudera Fishing Port, Jakarta and Pelabuhan Ratu Nusantara Fishing Port, Sukabumi, West Java and one vessel producing frozen tuna product.

Jimmy Wijaya 04 Vessel

Observations toward the basic feasibility requirements for applying hazard analysis critical control point in the 04 Jimmy Wijaya vessel showed that this vessel was category C (less), while according to the respondent's rating this vessel was classified category B (good). Assessment result of deficiency occurred in this vessel is as shown in Table 5.

Table 5.   Deficiency of Jimmy Wijaya 04 vessel

No.	Aspects of assessment for	Researcher				Respondent			
		Mn	My	Sr	Kr	Mn	My	Sr	Kr
1.	Location and environment	2	-	-	-	1	-	-	-
2.	Design and construction vessel, facilities	5	8	-	-	1	4	-	-
3.	Tools and equipment handling	3	2	2	-	1	-	-	-
4.	Fresh tuna handling operations	-	6	-	-	-	2	-	-
5.	Sanitation and health of workers	7	5	-	-	5	-	-	-
6.	Quality management system	11	4	-	-	9	2	-	-
	Total	**28**	**25**	**2**	**0**	**17**	**8**	**0**	**0**

Haslindo 01 Vessel

Observations toward the basic feasibility requirements for applying of hazard analysis critical control point in the Haslindo 01 vessel showed that the vessel belongs to category C (less), while according to the respondent's rating this vessel belongs to category B (good). Deficiencies encountered in Haslindo 01 vessel is shown in Table 6.

Trans Bahari Vessel

Observations towards the basic feasibility requirements for applying hazard analysis critical control point in the Trans Bahari vessel indicated that the vessel was classified as category C (less), while according to the respondent's rating this vessel was in category B (good). Result of deficiency assessment found in Trans Bahari vessel is as shown in Table 7.

Table 6.   Deficiency of Haslindo 01 Vessel

No.	Aspects of assessment for	Researcher				Respondent			
		Mn	My	Sr	Kr	Mn	My	Sr	Kr
1.	Location and environment	2	-	-	-	1	-	-	-
2.	Design and construction vessel, facilities	3	8	-	-	1	-	-	-
3.	Tools and equipment handling	2	1	1	-	-	-	1	-
4.	Fresh tuna handling operations	-	2	-	-	-	-	-	-
5.	Sanitation and health of workers	6	4	-	-	3	-	-	-
6.	Quality management system	12	2	-	-	2	1	-	-
	Total	**25**	**17**	**1**	**0**	**7**	**1**	**0**	**0**

Table 7.   Deficiency of Trans Bahari vessel

No.	Aspects of assessment for	Researcher				Respondent			
		Mn	My	Sr	Kr	Mn	My	Sr	Kr
1.	Location and environment	1	-	-	-	-	-	-	-
2.	Design and construction vessel, facilities	4	8	-	-	1	3	-	-
3.	Tools and equipment handling	3	5	2	-	2	-	-	-
4.	Fresh tuna handling operations	-	2	-	-	-	1	-	-
5.	Sanitation and health of workers	6	6	-	-	4	1	-	-
6.	Quality management system	12	3	-	-	9	1	-	-
	Total	**26**	**24**	**2**	**0**	**16**	**6**	**0**	**0**

In general, according to researcher observations, rating of 10 vessels under assessment for applying the basic requirements of hazard analysis critical control point mostly were classified as category C (less), while according to the respondent's point of view were in category B (good) (Table 8).

Table 8.   Feasibility rating according to the researchers and respondents

Vessel code	Name of vessel	Feasibility rating	
		Researchers	Respondent
A	Jimmy Wijaya 04	C (Less)	B (Good)
B	Jimmy Wijaya 34	C (Less)	B (Good)
C	Dwi Sukses Bahari	D (Less)	C (Less)
D	Haslindo 01	C (Less)	B (Good)
E	Efani 01	C (Less)	B (Good)
F	Jaya Mitra 03	C (Less)	B (Good)
G	Hanindo 04	C (Less)	B (Good)
H	Trans Bahari	C (Less)	B (Good)
I	Maju Setia	C (Less)	B (Good)
J	Andita Jaya	C (Less)	B (Good)

The differences between researchers and respondents point of views were due to that the basic feasibility assessments were to be subjective, really depending on personal impression toward the parameters of basic feasibility requirement. Most of the respondents stated that implementation of the basic elements is already good enough to maintain the quality of the catch. Most respondents gave assessment based on the easiness of work on board, even though actually to comply with standard was not easy. Researchers gave more objective assessment because the reference standard has been previously set.

In general, deficiency found was quite small, in which there was no critical deficiency category. In general, fishing ground had good water quality and far from pollutant source. However on board handling and unloading process of fish has not been conducted properly.

The majority of fresh tuna design and construction have met the existing standards. Handling area was constructed in accordance to handling process flow, and the process may run efficiently, effectively, and quickly without any delay and physical damage. Handling area was designed to prevent the product from potential sources of contamination or cross contamination. This is supported by previous study (Lafi & Novita, 2005) which stated, storage system of tuna longline vessels are good.

Ilyas (1983), stated that tuna handling on the boat mostly has been conducted according to the standard procedure, although there are still some drawbacks. There were some standard procedures that have been applied on board, such as avoiding fish from direct sunlight by hauling at night; checking storage temperature periodically and avoiding fish from potential contaminants.

The unloading process of tuna has been conducted appropriately in accordance with standard procedures. Unloading process was carried out in special places provided by port management. The process was under cold chain system and controlled by the captain and officers from longline companies. Besides that, there was still in consistent in using foam carpet on the vessel's deck and the use of tarp.

Sanitation and health elements of workers were classified as the worse. Awareness of workers to their health, personal hygiene, clothing, and work environment was categorized as below standard. Workers were free to do prohibited things that potentially induced contamination to the products such as smoking, coughing, sneezing, and spitting during handling process of the cacth.

Most entrepreneurs of fresh tuna longline vessels in the study have not applied good management system yet. These elements did not directly affect the product therefore the entrepreneurs did not pay enough attention. In facts these elements play an important role in the quality management system and in the regulation and documentation to support the production of good quality tuna. As stated by Nurani *et al.* (2007), longline tuna fishing business requires a professional management system, because this is an industrial scale business with high risk product and unpredictable catch volume. From 10 studied vessels only frozen tuna vessels have implemented good management system.

Comparing to fresh tuna vessel, frozen tuna vessel was better in applying the basic requirement elements, so this vessel was actually ready for implementing hazard analysis critical control point system. In terms of cooling system point of view, fresh tuna vessel with the refrigerated sea water system was better than the other vessel using ice for cooling the fish. This fact could be assessed from the quality of tuna produced. In accordance with the opinion of Lafi & Novita (2005), generally the quality of the tuna from longline vessels using refrigerated sea water cooling system was better.

Ministry of Marine Affairs and Fisheries has continuously made efforts to improve the safety guarantee of fishery products, particularly through the policy of the cold chain system, the socialization of international regulations and product standards, and quality and safety assurance systems of fishery products and as well as training programs in integrated quality management/hazard analysis critical control point (Poernomo, 2008). Awareness of fishery entrepreneurs to implement the hazard analysis critical control point system on fishing vessels is very important. In general, hazard analysis critical control point quality management system can be applied to the tuna longline vessels, with previously improving of management system and providing documents of the handling procedures and facilities. In addition, a strict implementation of the rules that have been made for all workers and improvement of awareness of each worker to the importance of quality are needed.

CONCLUSION AND RECOMMENDATIONS

Conclusion

1. Feasibility of applying the basic requirements of hazard analysis critical control point quality management system in the tuna longline vessels based in the Pelabuhan Ratu Nusantara Fishing Port, Sukabumi, West Java and Nizam Zachman Samudera Fishing Port, Jakarta was generally quite good. The rating values of 10 observed tuna longline vessels according to researchers and respondents were classified as category C (less) and category B (good) respectively.

2. Y values were in the range 2d"Y<4, reflecting that the application of a pre requisite of hazard analysis critical control point consisting of sanitation standard operation procedure and good handling processing on tuna longline vessels in both of port were quite close to the standard. However, improvements are needed prior to the implementation of hazard analysis critical control point so that quality management system.

Recommendations

Employers need to improve awareness of the importance of tuna longline to implement hazard analysis critical control point quality management. Role of employers is important because they have authority to take decisions. This can be conducted with the support of port management as a government representative that should be more assertive in implementing of existing regulation and give more attention to the proper implementation of sanitation standard operation procedure and good handling processing.

ACKNOWLEDGEMENTS

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