

Monitoring and Evaluation of Fish Quality Standard Compliance

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2 Monitoring and Evaluation of Fish Quality Standard Compliance

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Abstract. Fresh fish is a major prerequisite for consumers to be consumed as a side dish or as a raw material in the technology of fishery products. This study aims to determine the compliance of fishery producers, especially fish sellers in maintaining the standard of fresh fish quality, in order to remain eligible for consumption. The research method used survey method (direct observation) at the location. The survey location is in the Sentral market of Gorontalo city. Data analysis was done descriptively qualitative based on Indonesian National Standard of fresh fish. Based on the results of monitoring and evaluation shows that the process of procurement of fresh fish is good enough in implementing standards, which means internally does not indicate quality deviations. When fresh fish began to be marketed, the results of monitoring and evaluation showed a less than optimal value, meaning that the effect of decreasing the quality of fresh fish is more dominant due to external factors.

Keywords. compliance; evaluation; monitoring; fish quality; standard.

1. Introduction

Fishery products are generally marketed in fresh form. Fresh fish has properties like live fish. Fresh fish are fish that have not undergone preservation treatment except cooling [1]. Handling of fresh fish is done after the fish is harvested with low temperature treatment and pay attention to sanitation. Handling aims to maintain the freshness of the fish into the hands of consumers.

Quality assurance and safety of fresh fish food that is marketed locally and abroad is demanded according to the provisions contained in the Indonesian National Standard 2729: 2013. The specifications of fresh fish that are explained include slime, body surface, meat, odor, texture. Assessment of the quality of fresh fish that is relatively easy to do and immediately known the results can be tested through organoleptic or morphological. Organoleptically the quality of fresh fish has the characteristics of bright, specific type of fresh smell, elastic, solid and compact texture.

The marketing of fresh fishery products in Gorontalo is generally done in traditional markets. Traditional markets have mutual bargaining methods of payment, development is generally carried out by local governments, for example the Sentral market. Sentral market is one of the 11 markets located in the city of Gorontalo. Sentral market ownership is the regional government with full responsibility submitted to the market management office. The Sentral market with an area of about 13,306m² is very instrumental in the economy of the community and becomes a marketing destination for fish [2]. Sentral



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market is active from 06:00 am until 06:00 pm. There are several types of fresh fish chosen by consumers which are identified, namely pelagic, demersal, crustacean and mollusca fresh fish species [3].

Problems that arise in the marketing of fresh fish, especially in traditional markets in the form of a decrease in fish quality. The root problem of decreasing the quality of fresh fish is inseparable from the seller's action on the process of handling fish as long as the fish is marketed. In addition, the absence of a special body tasked with sorting the quality of fish into the traditional market or censoring sellers' compliance with the standard of fresh fish that has been made government. Fish quality standards are usually applied to fresh and processed fish sold outside, especially abroad.

Monitoring is an activity of observing, monitoring or checking carefully the condition or work of a system, while evaluation is an activity of assessing the results obtained during monitoring activities. Compliance means compliance or obedience following a rule. Previous research on the level of freshness of fish in the market has been informed by Lestari et al. [4], while the compliance of fresh fish quality standards by sellers in the market, especially traditional dairy markets has not been reported. This study aims to determine the compliance of fish sellers in maintaining the quality standards of fresh fish, so that they are still suitable for consumption.

2. Data Method

This research is a survey by collecting data and information from the Sentral market of Gorontalo city. Respondents were taken from 20 permanent fresh fish sellers, consisting of 15 people selling sea fish and 5 people selling freshwater fish. The data collected is as primary and secondary data. Primary data was obtained through direct visits to fresh fish sellers, while secondary data was obtained from the Gorontalo Sentral Market Management Office.

Monitoring and evaluating the compliance of producers (sellers) with fresh fish quality standards, scoring is carried out on the handling aspects by assessing 7 (seven) handling variables considered in determining the quality standards of fresh fish. The seven handling variables are (1) transport distance of fish resources, (2) method of transportation, (3) equipment used, (4) washing, (5) use of refrigeration materials, (6) storage methods, and (7) sorting. The weighting of each variable for handling fresh fish uses a multi-criteria analysis method [5]. Then the scoring values are included in each unit of the variable unit for handling fresh fish. This process is done digitally. After each unit of handling variable gets the total score, each variable handling unit is divided into its suitability classes (class of compliance with quality standards). Based on the results of the assessment of the characteristics and variable characteristics of handling the quality standards of fresh fish, it is added and classified into 1-3 interval scoring. Then to determine the suitability class, discovering each variable handling fish, so that the highest score 3 and the lowest value are obtained 1. To determine the suitability grade of quality standards, equation $I = R / N$ is used [6]. Where I is a class interval, R is the difference between the highest and lowest values, N is the number of intervals desired. The number of intervals of values, classes and categories based on the standard quality criteria for handling fresh fish in the Sentral market of Gorontalo city, the results are shown in the following table.

Table 1. Seller compliance categories for fresh fish quality standards in the Sentral market of Gorontalo city

Value Scale	Category	Description of Compliance
1,0 - 1,75	Not appropriate	Low compliance with fresh fish quality standards
1,75 - 2,25	Quite appropriate	Adequate compliance with fresh fish quality standards
2,25 - 3,0	appropriate	High compliance with fresh fish quality standards

3. Result and Discussion

3.1. Fresh Fish Sales in the Sentral Market

The place for selling fresh fish in the Sentral market is in the South position, mixed with beef, chicken and tofu sellers. The process of handling fresh fish is done in the Sentral market, namely the reception of whole fresh fish, storage, laying on the sales table. The condition of selling fresh fish in the Sentral market can be seen in Figure 1. The handling of fresh fish in the Sentral market is not carried out by sorting and washing. Based on the standard quality of fresh fish Indonesian National Standard 2729: 2013, that the handling of fresh fish starts from sorting, washing 1, weeding, washing 2, weighing, packaging and labeling and loading.



Figure 1. Description of the place for fresh fish sellers in the Sentral market

Freshfish sellers are divided into permanent sellers and retail sellers. The seller still fresh fish usually pays a contribution to the market manager. Fish sellers still get fresh fish directly from fish suppliers, while retail sellers buy fish from permanent sellers. Sellers who are respondents in this study are permanent sellers. A seller still sells in a day ranging from 1 to 4 types of fresh fish, depending on the fish put in by the fish suppliers. The average total fresh fish sold by a fish seller in a day is 2-170 kg of sea fish, while the fish is about 1-70 kg, but they are not sold out, so they are stored for resale the next day.

The sellers keep fresh fish when selling using lamps as shown in Figure 1 with the aim that the fish they sell look fresh. Based on the results of the sampling conducted in the morning against 4 types of fish obtained a value of 7-9 means that it meets the quality standards of fresh fish. In the morning fish sold in Sunday market of the Bengkulu city, all types of fish were fresh, but during the day some fish experienced a decrease in freshness and in the afternoon everything was not fresh [4].

The results of monitoring of 20 fresh fish sellers in the Sentral market found that the fish sold came from the Gorontalo fish auction place, Limboto lake, Gorontalo district, partly from Bone Bolango district, North Gorontalo, Pohuwato, even from outside the province of Gorontalo, Banggai district of Middle Sulawesi. Fish entering the market are brought by fish suppliers in the morning at 06:00 am and noon at 02:00 pm. The condition of sea fish brought to the Sentral market uses styrofoam containers or buckets containing ice cubes, while freshwater fish is carried using ice-free plastic sacks. The ice used during the distribution even from the observations does not match the comparison, more fish than ice. This condition will accelerate the decline in the quality of fresh fish. Containers containing fresh fish brought to the Sentral market by fish suppliers can be seen in Figure 2.



a. Styrofoam box

b. Fish and ice in a box

Figure 2. Fresh fish containers used when fish are brought to the Sentral market

In styrofoam containers containing fish and ice with ice conditions do not cover the whole body of fish (Figure 2). This condition will worsen the quality of fish, coupled with the cleanliness of styrofoam that is not noticed by sellers and suppliers of fish. Some types of fresh fish brought by fish suppliers to the Sentral market are milkfish, baronang, pomfret, skipjack, squid, cork, snapper, quwe, bloating, kite, lolosi, mujair, selar, tongkol, tuna, shrimp. Fresh fish species identified in the Sentral market were mujair (*Oreochromis mossambicus*) of 16.87%, skipjack (*Katsuwonus pelamis, L*) 13.60%, selar (*Selaroides leptolepis*) 13.39%, tuna (*Thunnus sp.*) 9.66%, tongkol (*Euthynnus affinis*) 8.42%, snapper (*Lutjanidae*) 6.42%, kite (*Decapterus*) 5.57%, kuwe (*Caranx ignobilis*) 5.29%, vaname shrimp (*Litopenaeus* vannamei) 4.24%, grouper (*Epinephelus*) 3.09%, squid (*Loligo sp.*) 2.81%, yellowfin tuna (*Thunnus albacares*) 2.70%, lolosi (*Caesio chrysozona*) 1.90%, cuttlefish (*Sepiida*) 1.45%, milkfish (*Chanos chanos*) 1.36%, mas (*Cyprinus carpio, L*) 1.31%, cork (*Channa striata*) 1.03%, cockatoo (*Scaridae*) 0.46%, bawal (*Bramidae*) 0.23%, tiger shrimp (*Penaeus monodon*) 0.04%, bloating (*Rastrelliger*) 0.03%, crab (*Brachyura*) 0.01%, payangga (*Ophieleotris aporos*) 0.01% [3].

3.2. Weight Criteria for Quality Standards for Fresh Fish

The results of weighting criteria on Fresh Fish Quality Standards Parameters analyzed based on Multi Criteria Analysis Methods [5] are as follows:

Table 2. Comparative analysis between parameters of fresh fish quality standards

Num	Item Number	1	2	3	4	5	6	7
No	Quality standard indicator	Fish source transport distance	How to transport	Equipment used	Washing	Use of coolant	Storage method	Sorting
1	Fish source transport distance	1,00	1,0	1,0	3,0	5,0	7,0	9,0
2	How to transport	1,00	1,00	1,0	3,0	5,0	7,0	5,0
3	Equipment used	1,00	1,00	1,00	1,0	3,0	5,0	3,0
4	Washing	0,33	0,33	1,00	1,00	3,0	5,0	5,0
5	Use of coolant	0,20	0,20	0,33	0,33	1,00	3,0	5,0
6	Storage method	0,20	0,14	0,20	0,20	0,33	1,0	3,0
7	Sorting	0,33	0,20	0,33	0,20	0,20	0,3	1,0
	SUM	4,07	3,88	4,87	8,73	17,53	28,33	31,00

Source: Results of analysis

Table 3. Weight of analytical hierarchy Process (AHP) fresh fish quality standard parameter

No	Quality standard indicator	Fish source transport distance	How to transport	Equipment used	Washing	Use of coolant	Storage method	Sorting	SUM	SUM/Weight
1	Fish source transport distance	0,27	0,25	0,18	0,43	0,38	0,30	0,36	2,17	8,09
2	How to transport	0,27	0,25	0,18	0,43	0,38	0,30	0,20	2,01	8,04
3	Equipment used	0,27	0,25	0,18	0,14	0,23	0,22	0,12	1,40	7,75
4	Washing	0,09	0,08	0,18	0,14	0,23	0,22	0,20	1,14	8,00
5	Use of coolant	0,05	0,05	0,06	0,05	0,08	0,13	0,20	0,62	8,12
6	Storage method	0,05	0,04	0,04	0,03	0,03	0,04	0,12	0,15	3,58
7	Sorting	0,09	0,05	0,06	0,03	0,02	0,01	0,04	0,23	5,69
	SUM	1,09	0,97	0,88	1,24	1,33	1,22	1,24	7,72	49,27

count 7,00
lambda max 7,039
CI 0,007
CR 0,00
constant 1,32

Table 4. Normalization matrix weight of fresh fish quality standard parameter

No	Quality standard indicator	Fish source transport distance	How to transport	Equipment used	Washing	Use of coolant	Storage method	Sorting	Weight
1	Fish source transport distance	0,25	0,26	0,21	0,34	0,29	0,25	0,29	26,8%
2	How to transport	0,25	0,26	0,21	0,34	0,29	0,25	0,16	24,9%
3	Equipment used	0,25	0,26	0,21	0,11	0,17	0,18	0,10	18,1%
4	Washing	0,08	0,09	0,21	0,11	0,17	0,18	0,16	14,2%
5	Use of coolant	0,05	0,05	0,07	0,04	0,06	0,11	0,16	7,6%
6	Storage method	0,05	0,04	0,04	0,02	0,02	0,04	0,10	4,3%
7	Sorting	0,08	0,05	0,07	0,02	0,01	0,01	0,03	4,0%
	SUM	1,00	1,00	1,00	1,00	1,00	1,00	1,00	100,0%

Based on the assessment using the fresh fish quality standard indicator variables in Table 3, the consistency test was conducted to see the level of consistency of the fish quality standard variables. In accordance with the requirements, that consistency tolerance is 10%, or the value of consistency ratio (CR) is 0.1 [5]. Table 3 above shows the CR value of 0.00 so that the calculation can proceed to the next stage and it can be said that the variables of quality standards of fresh fish that are built, consistent and feasible to use.

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3.2.1. Average Criteria Weight. After calculating the criteria for 7 (seven) fresh fish quality standard parameters, the calculation of the average criteria weight of all variables is carried out.

Table 5. Weight (Kg) of average criteria from 7 (Seven) quality standards for fresh fish

No	Fresh Fish Standard	Total weight	Percentage
1	Fish source transport distance	1,88	26,80%
2	How to transport	1,75	24,90%
3	Equipment used	1,27	18,10%
4	Washing	1	14,20%
5	Use of coolant	0,53	7,60%
6	Storage method	0,3	4,30%
7	Sorting	0,28	4,00%
	Amount	7	100%

Based on the calculation of the average criteria weight for all parameters of fresh fish quality standards, it can be seen that the weight criteria for the parameters of the fresh fish quality standard in the Sentral market

of Gorontalo city. Based on Table 5, criteria for hauling source of fish are the biggest and dominant criteria of consumer (customer) preferences. The criteria for how to transport and the equipment used are enough to influence consumer choice, in determining the quality criteria for fresh fish. Previous research stated that the bad condition of transportation and handling methods, long storage of fish can make some fresh fish sold in the Saudi fish market experience a decrease in quality [7]. Quality index methods can be a quick tool to evaluate the quality of freshness of fish [8].

3.3. Fresh Fish Quality Standard Value Based on Criteria Weight

Calculation of the standard value of fresh fish quality is done with the help of an excel program based on the weight of the criteria that have been obtained previously. Value scale (scoring) that is used at intervals 1-3 by considering objectivity and subjectivity aspects supported by data from field observations, interviewing respondents and tracing fresh fish quality standard documents. The standard classification built to measure the value of producers (sellers) compliance to the quality standards of fresh fish sold in the Sentral market are as follows.

Table 6. Results of assessment of fresh fish quality standards in the Sentral market of Gorontalo city

No	Feasibility indicator	Rating result	Score	Weight (%)	Rating result S x W
1	Fish source transport distance	> 100 km	1	26,79%	0,54
		50 - 100 km	2		
		< 50 km	3		
2	How to transport	Transport not insulated	1	24,95%	0,25
		Insulated transport without refrigeration	2		
		Refrigerated insulated transport	3		
3	Equipment used	Inadequate	1	18,12%	0,36
		Adequate enough	2		
		Adequate	3		
4	Washing	Not clean	1	14,24%	0,14
		Clean enough	2		
		Clean	3		
5	Use of coolant	Ice is not a proportion	1	7,59%	0,08
		Enough ice proportion	2		
		Proporsional ice	3		
6	Storage method	Without container	1	4,30%	0,09
		Open container	2		
		Closed container	3		
7	Sorting	Not sorted	1	4,01%	0,04
		Sort randomly	2		
		Regular sort	3		
Amount				100,00%	1,49
Quality Standards Class					Quite appropriate

The results of the assessment were obtained quite in accordance with the quality standards of fresh fish in the Sentral market of the city of Gorontalo. It is very important to increase awareness of risks in the stages of seafood supply through compliance work [9]. Fish producers need assistance to achieve compliance with hazard and critical control point processes and food safety standards [10]. Every fish that enters the traditional market, including the Sentral market, should be sorted according to quality. Low quality fish or not meeting the fresh fish quality standards should be immediately rejected by the market coordinator. Compliance with the quality standards of fresh fish, generally only applied in modern markets, while traditional markets have not been optimal in applying according to standards.

4. Conclusions

The handling of fish vendors is closely related to the quality of fresh fish. The feasibility of transporting fish resources, transportation methods, equipment used, washing, use of cooling materials, storage and sorting methods provide unequal values. The results of the assessment indicate that the compliance of producers (sellers) with the quality standards of fresh fish is less optimal.

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