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Implementation of A Traceability System for Canned Fish Products using The FMECA Approach

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ABSTRACT

PT. XYZ is a company that operating in the canned fish processing sector. In implementing the traceability system, traceback product still experiences obstacles so it cannot be implemented properly in the Company. This research was conducted to determine the traceability critical point which is a weakness of the traceability system being implemented. The method used is the FMECA (Failure Modes, Effects, and Criticality Analysis) approach, which is a development of the FMEA (Failure Mode Effect Analysis) method with the inclusion of the CA (Criticality Analysis) method to evaluate the effective level and efficiency of the traceability system being implemented. The results of the analysis showed that 43 possible failure points were identified, of which 2 points were in the unacceptable area, 3 points were in the undesirable area, 12 points were in the acceptable with revision area, and 26 points were in the acceptable without revision area. Traceability of canned fish products at fish canning companies has been going well with 5 critical points of traceability, namely the absence of information on the origin of the fish, not providing special coding for each fish received, not carrying out microbiological testing on the fish received, each fish received is not differentiated. The storage location is between each supplier, and no special records are made at the draining stage.

1. INTRODUCTION

Fish canning is one form of fish processing that is popular among the public. According to Arini & Sri (2019), fish processing holds the main principle, namely to protect fish from damage and extend their shelf life. The demand for canned fish products will continue to increase along with an instant and productive lifestyle, where this product is easy to serve, practical, and has a long shelf life, and contains the nutritional content needed by the human body. With the increasing market demand for canned fish products, attention to quality, safety, and production processes are of key importance to ensure that these products are safe for consumption and free from contamination that can harm consumer health (Rini & Lestari, 2020).

Every industry engaged in food processing, of course has endeavoured to be able to produce products that are in accordance with the specifications set by world food institutions. However, the Company's activities cannot be separated from uncertainties or unexpected events that can affect the smooth flow of materials and components in the process chain, as well as the success of the processed products (Febrianik *et al*., 2017). In this case, the possibility of failure to maintain the quality of the products produced and the potential risks that endanger consumers cannot be ignored because it can trigger product recalls from the market. To avoid product recalls, it is important to implement a traceability system to track the production history of a product unit. Traceability is the ability to track batches of

products and their history as a whole, or part of the production chain from upstream to downstream that can be identified from recording documents (Olsen & Borit, 2013). Although many canned fish processing industries have implemented a traceability system in their production process chain, there are still obstacles and shortcomings in its implementation, especially in tracking the origin of the fish raw materials used.

Based on the flow, traceability is divided into three functions, namely trace forward, trace back, and a combination of both (Sudibyo, 2012). In this case, the Company implemented both traceability flows. However, the Company has not been able to carry out the trace-back system properly, especially in the local fish raw materials used, where the Company experienced a loss of information regarding the origin of the fish raw materials used, resulting in a break in the traceability chain carried out in the Company.

Basically, the traceability process must be carried out effectively and efficiently to ensure that the traceability system is able to collect comprehensive product information in a short time to reduce product safety risks and improve the canned fish industry's response to product recalls that could harm consumers. In addition, traceability also assists the industry in monitoring and tracking the movement of the product in its process flow to ensure that the product has been processed in accordance with established standards. By implementing a traceability system, food product manufacturers can ensure good documentation of the history of raw materials, additives, and product distribution. This aims to create good traceback conditions in the event of unwanted events after food products are distributed (Dwiyitno, 2017).

In order to achieve optimal traceability implementation conditions, it is important for the Company to identify the critical points in order to prevent product traceability chain breaks. Traceability critical points are locations where loss of product information occurs systematically (Karlsen & Olsen, 2011). Identification of traceability critical points can be done using various methods, namely the FMEA (Failure Mode Effect Analysis), FMECA (Failure Modes, Effects, and Criticality Analysis), and FTA (Fault Tree Analysis) methods. The FTA (Fault Tree Analysis) method is a structured approach to identifying factors that can cause failure. However, this FTA method has limitations in its scope and is subjective, and requires special expertise in the calculation process (Satriyo & Puspitasari, 2017).

The FMEA method is an analytical approach that can be used in identifying and resolving all possible failures in products and processes as a whole through process improvement by generating RPN (Risk Priority Number) values. It aims to identify problems systematically in order to prevent failures in the process and products produced (Pratama & Suhartini, 2019). However, FMEA has weaknesses in the flexibility of use, especially in terms of design improvement. In addition, statements in FMEA tend to be subjective.

The FMECA method is a development of FMEA (Failure Mode Effect Analysis) with the inclusion of the CA (Criticality Analysis) method, which aims to identify and analyse traceability critical points. FMEA is present to identify possible failures that occur in a system and analyse their impact. Meanwhile, Criticality Analysis is an analytical approach that is carried out to identify key failures that have a significant impact on the system, as a preventive measure for corrective actions that may be needed (Sultan, *et al*., 2023).

The FMECA method has the advantage of being able to improve maintenance functions. In addition, FMECA can also produce a reliable system to minimise failures and keep components and functions well controlled, so it can be applied to aspects that are crucial in controlling failures, especially to factors that have the highest critical risk (Rahman & Fahma, 2021). According to Ulfah (2018), states that FMECA can be used in identifying possible failures in the implementation of a system, analysing potential factors and causes or impacts resulting from system failures by giving a priority scale to each possible failure identified, so that quick and appropriate corrective action can be formulated. Based on this, the FMECA method was chosen in this study to be applied to corrective research to prevent it. This has also been proven by research conducted by Suryono *et al* (2023), with the result that the implementation of the FMECA (Failure Modes, Effects, and Criticality Analysis) method was successful in identifying and establishing traceability critical points.

Through the FMECA approach, possible failures will be identified, the risk value will be assessed to determine the priority of failures in the implementation of traceability, and can provide recommendations to reduce or avoid traceability failures in the Company. The aim research is to determine the critical level of each failure mode, determine

the critical point of the application of internal traceability, and provide solutions that can be used by the Company as a guideline in optimising the implementation of traceability, so that traceability can run well, effectively, and efficiently, and prevent the break of the traceability chain in the production process chain carried out in the Company.

2. MATERIALS AND METHODS

2.1. Research Time and Location

The research was conducted for four months, in the period from September to December 2023 at one of the fish canning companies (PT. XYZ) in Bali Province.

2.2. Research Methods

This research was conducted using the FMECA (Failure Mode, Effect, and Critically Analysis) method approach which is a method of combining qualitative and quantitative approaches by involving experts from the industry. This analysis was conducted to identify potential risks that may arise in the production process chain, assess the priority of failure for each possible failure identified, and find improvement steps for the traceability management system implemented in the Company. FMECA analysis is conducted in two stages of analysis, namely Failure Mode and Effect Analysis (FMEA) and Criticality Analysis (CA). This research uses a single-shot study approach, which implies that data is collected only once without additional iterations to ensure proper representation of the observed phenomenon.

2.2.1 Failure point analysis and impact analysis (FMEA)

This analysis was conducted in two stages of analysis, there are:

1. Analysis of traceability failure points (failure mode analysis)

The steps that need to be taken include: a) Specify the function ID; b) Determine the process stage (function), and c) Determine the possible failure modes and cause of failures.

Identification of failure modes was done through observation or analysis of documents that record information on how often failures occur in a process stage.

2. Effects analysis

Impact analyses were conducted on both local and global impacts. Local impacts are specific errors that occur in a limited context within the company and arise due to system failures at critical points. Meanwhile, the global impact is a general type of error that occurs on a wider scale of problems.

2.2.2 Critical Analysis (CA)

This analysis was carried out in several steps, there were:

1. Determining the severity (S), occurrence (O), and detection (D) of failure by experts with a scale ranging from 1-10 with criteria referring to the US Department of Defence (1980). This standard is specifically used in applying the FMECA method, where this standard has been recognised and accepted, and has obtained accurate and precise results in identifying and reducing risks that have the highest level.
2. Determining the value of each failure point using the RPN method: [RPN = S×O×D]
3. Determining the position in the criticality matrix. The position in the criticality matrix is determined qualitatively based on severity and likelihood of occurrence, by applying the judgement of experts.
4. Determining the criticality level or critical area. This step is used to determine the critical level of each failure point obtained from reading the critical matrix, including unacceptable, undesirable, acceptable with revision, and acceptable without revision.

3. RESULTS AND DISCUSSION

3.1. Failure Mode and Effect Analysis (FMEA)

The initial step in analysing FMECA is to identify potential failures at each process step through FMEA analysis. The FMEA process is divided into two stages, namely the identification of traceability failure points and evaluation of their impacts, which include local and global impacts. To determine traceability failure points, interviews with experts are required to obtain concrete and relevant information. An expert is someone who has expertise in a particular field and can give his opinion on the topic discussed (Hakim, 2018).

Failure probability analysis involves observing potential failures and their impact at each stage of the production process, where each possible failure identified is given a unique code to facilitate data analysis. FMEA is used in identifying failure modes in order to reduce or prevent failures in the system by taking the correct corrective action (Susendi, *et al*., 2021). The results of possible failure points in the traceability system are presented in Table 1.

Table 1. Failure Mode and Effect Analysis (FMEA)

Process Stages	Possible Failure/Cause	Local Effect	Global Effect
Procurement of fish raw materials	No information on the origin of the fish	The name of the vessel and the person conducting the fishing is unknown	The company is unable to know where the fish was caught and obtained (capture area)
Receipt of fish raw materials	No coding provided	No information on the raw materials of the processed fish	Break in the chain of traceability to the origin of fish raw materials when fish are mixed up
	No microbiological testing done	Unknown microbiological quality of fish	Unable to ensure food safety of fish received
Temporary storage	Each fish received is not differentiated as to where it is stored	Mixed fish between suppliers, so the supplier of each processed fish is unknown	Break the chain of traceability due to not knowing the origin of the processed fish
Thawing	The occurrence of errors in recording the unloading control data of frozen fish raw materials	Inaccurate information on fish raw material utilisation	Unable to trace the product back to the raw material of the fish being processed
Cutting	No coding provided	Lack of specific information on the raw materials of the fish being processed	The company loses information about raw materials
	Mixing is done at the cutting table	Mixed fish between suppliers, so the supplier of each processed fish is unknown	The company loses information about raw materials
Washing	No coding provided	Lack of specific information on the raw materials of the fish being processed	It is difficult to trace the origin of fish raw materials
Filling fish in cans	No coding provided	Lack of specific information on the raw materials of the fish being processed	It is difficult to trace the origin of fish raw materials
	Foreign body ingress	Contamination of the product occurs	Trigger product recall from the market
	Error in inputting can usage time	Difficulty in tracking products	Lower time efficiency in the traceability process
	Mistakes in recording the identity of the can	Inaccurate record keeping	Traceability does not work well
Pre-cooking	No coding provided	Lack of specific information on the raw materials of the fish being processed	It is difficult to trace the origin of fish raw materials
Draining	No coding provided	Lack of specific information on the raw materials of the fish being processed	It is difficult to trace the origin of fish raw materials
	No special recording is done	No information is known about the processed products	The company does not have specific recording documents during the draining process
Cooking media	Error in writing the date of receipt of ingredients	Difficulty in identifying ingredients	Difficult to trace problematic media
	Error in writing the quantity of ingredients used	Difficulty in identifying the amount of ingredients used	Traceability does not work well
Filling media	No labelling of the batch number of cooking media contained in the can	Absence of specific information on the origin of the processed product units	Difficult to trace the origin of processed products

Process Stages	Possible Failure/Cause	Local Effect	Global Effect
Seaming	Errors in media content control (less or more media)	Difficulty in tracking information about the cans of processed products	Reducing time efficiency in the traceability process
	Mismatch of seamer evaluation records and visual double seaming with processed cans	Loss of machine downtime information	Lower time efficiency in the traceability process
	Negligence in data entry when the seamer is jammed / downtime	Difficulty in getting the right information about the problems experienced by a product unit	Lowering the efficiency of product traceability implementation
Can washing at can washer	Errors in the use of can lids with processed cans	Absence of specific information on the origin of the processed product units	It is difficult to trace the origin of fish raw materials
Washing cans in the shelter (*holding*)	No coding provided	Absence of specific information on the origin of the processed product units	It is difficult to trace the origin of fish raw materials
	No coding provided	No information is known about the exact holding time of a product unit	Implementation of product traceability will be disrupted
Sterilisation and cooling	Human error (mixing of products between baskets)	Unknown information on the sterilisation process during real conditions	Product traceability is hampered due to lack of data accuracy level
	Error inputting time, temperature, and retort pressure data	Inaccurate record keeping	Lower time efficiency in the traceability process
	Error in recording the type of product processed	The occurrence of uncertainty in the production footprint of a unit of product	Loss of information due to absence of product information/traceability failure
	Occurrence of errors in coding	Not getting information on the exact cooking time of a product unit	Cannot guarantee the cooking time of processed products
Mopping	Mixing of large and small size products	The occurrence of uncertainty in the production footprint of a unit of product	Loss of information due to absence of product information/traceability failure
	Occurrence of errors in coding	Lack of accuracy of data on the number of products produced	Errors and difficulties in product traceability
Encoding	Errors in the calculation of good and defective products	The occurrence of uncertainty in the production footprint of a unit of product	Loss of information due to absence of product information/traceability failure
Finished product testing	Occurrence of errors in coding	The real condition of the product is unknown	There is bias and difficulty in product tracking
Incubation	Errors in recording product test results	Difficulty in identifying products	Lower time efficiency in the traceability process
Packing	Product identity label damaged or missing	Reduced time efficiency at work	Disrupt the data collection system
	Error in calculating the number of products packed	Inaccurate record keeping	Traceability does not work well
	Error in recording carton identity	Inaccurate record keeping	There is bias and difficulty in tracking products
Shipping	The small quantity of leftover product is included in the coding of the largest product in a carton.	Reduced time efficiency at work	Disrupt the data collection system
	Error in calculating the number of products to be shipped on the road letter	Missing information about the delivered product	The company has difficulty in tracing in the event of a product recall
	Error in inputting the data of the delivered product	Decreased time efficiency at work/weak inventory management	Disrupt the data collection system
Receipt of packaging materials (cans and cartons)	Errors in the application of the FIFO system when shipping products	Difficulty in identifying packaging materials	Lower time efficiency in the traceability process
	Errors in recording the supplier's name, COA number, and date of receipt of cans	Lower work efficiency	Triggering product recalls, the company suffers losses
Receiving ingredients	Not identifying production process errors from suppliers	Difficulty in identifying the receipt history of ingredients	Lower time efficiency in the traceability process

3.2. Critical analysis (CA)

Critical analysis is conducted to evaluate the critical risk of failure modes, as well as assess the probability of occurrence and severity based on previously identified failure modes (Hadiwiyanti & Yuliawati, 2022). A commonly used approach in assessing each failure mode is through the use of Risk Priority Number (RPN), which is obtained from multiplying the severity, occurrence, and detection values involving experts in providing an assessment of these three aspects. The purpose of this analysis is to identify the most important failure modes, so that action can be taken to reduce or eliminate them from the system, improve or reduce their impact, and ignore or allow them to occur (Supriyadi & Nabilla, 2020). The results of the analysis of the four Experts are presented in Table 2.

Table 2 Results of FMECA analysis of the four experts

Func ID	**Process Stages**	**Possible Failure**	***Fail ID***	**S**		**O**		**D**	**RPN**	**Level**
1	Procurement of fish raw materials	No information on the origin of the fish	1.1	8	II	8	A	10	627	Unacceptable
2	Receipt of fish raw materials	No coding provided	2.1	7	II	6	C	8	337	Undesirable
		No microbiological testing done	2.2	9	I	7	B	9	550	Unacceptable
3	Temporary storage	Each fish received is not differentiated as to where it is stored	3.1	8	II	6	C	8	375	Undesirable
4	*Thawing*	The occurrence of errors in recording the unloading control data of frozen fish raw materials	4.1	3	IV	3	D	5	38	Acceptable without Revision
5	Cutting	No coding provided	5.1	3	IV	3	D	4	40	Acceptable without Revision
		Mixing is done at the cutting table	5.2	8	III	4	C	5	131	Acceptable with Revision
6	Washing	No coding provided	6.1	3	IV	4	C	3	37	Acceptable without Revision
7	Filling fish in cans	No coding provided	7.1	3	IV	4	C	3	37	Acceptable without Revision
		Foreign body ingress	7.2	7	II	3	D	6	116	Acceptable without Revision
		Error in inputting can usage time	7.3	7	II	3	D	4	79	Acceptable with Revision
		Mistakes in recording the identity of the can	7.4	3	IV	2	D	3	15	Acceptable Without Revision
8	Pre-cooking	No coding provided	8.1	3	IV	4	C	3	37	Acceptable Without Revision
9	Draining	No coding provided	9.1	3	IV	4	C	3	37	Acceptable Without Revision
		No special recording is done	9.2	7	II	6	C	8	374	Undesirable
10	Cooking media	Error in writing the date of receipt of ingredients	10.1	3	IV	3	D	5	38	Acceptable Without Revision
		Error in writing the quantity of ingredients used	10.2	3	IV	4	C	5	58	Acceptable Without Revision
11	Filling media	No labelling of the batch number of cooking media contained in the can	11.1	3	IV	3	D	4	36	Acceptable Without Revision
		Errors in media content control (less or more media)	11.2	3	IV	3	D	4	22	Acceptable Without Revision
12	Seaming	Mismatch of seamer evaluation records and visual double seaming with processed cans	12.1	6	III	3	D	4	66	Acceptable With Revision
		Negligence in data entry when the seamer is jammed / downtime	12.2	6	III	5	C	4	119	Acceptable With Revision
		Errors in the use of can lids with processed cans	12.3	3	IV	4	C	5	51	Acceptable Without Revision
13	Can washing at can washer	No coding provided	13.1	3	IV	4	C	3	37	Acceptable Without Revision
14	Washing cans in the shelter (*holding*)	No coding provided	14.1	3	IV	4	C	3	37	Acceptable Without Revision

Func ID	Process Stages	Possible Failure	*Fail ID*	S		O		D	RPN	Level
		Human error (mixing of products between baskets)	14.2	5	III	3	D	5	81	Acceptable With Revision
15	Sterilisation and cooling	Error inputting time, temperature, and retort pressure data	15.1	3	IV	2	D	3	19	Acceptable Without Revision
		Error in recording the type of product processed	15.2	3	IV	4	C	4	45	Acceptable Without Revision
		Occurrence of errors in coding	15.3	6	III	4	C	4	82	Acceptable With Revision
		Mixing of large and small size products	15.4	3	IV	5	C	4	64	Acceptable Without Revision
16	Mopping	Occurrence of errors in coding	16.1	3	IV	3	D	4	5	Acceptable Without Revision
		Errors in the calculation of good and defective products	16.2	2	IV	3	D	3	22	Acceptable Without Revision
17	Encoding	Occurrence of errors in coding	17.1	4	III	3	D	4	45	Acceptable With Revision
18	Finished product testing	Errors in recording product test results	18.1	3	IV	4	C	4	49	Acceptable Without Revision
19	Incubation	Product identity label damaged or missing	19.1	5	III	3	D	4	39	Acceptable With Revision
20	Packing	Error in calculating the number of products packed	20.1	3	IV	5	C	5	68	Acceptable Without Revision
		Error in recording carton identity	20.2	3	IV	4	C	3	41	Acceptable Without Revision
		The small quantity of leftover product is included in the coding of the largest product in a carton.	20.3	6	III	4	C	5	117	Acceptable With Revision
21	Shipping	Error in calculating the number of products to be shipped on the road letter	21.1	3	IV	3	D	6	58	Acceptable Without Revision
		Error in inputting the data of the delivered product	21.2	4	III	4	C	5	71	Acceptable With Revision
		Errors in the application of the FIFO system when shipping products	21.3	3	IV	4	C	4	54	Acceptable Without Revision
22	Receipt of packaging materials (cans and cartons)	Errors in recording the supplier's name, COA number, and date of receipt of cans	22.1	3	IV	3	D	4	42	Acceptable Without Revision
		Not identifying production process errors from suppliers	22.2	8	II	3	D	6	152	Acceptable With Revision
23	Receiving ingredients	No information on the origin of the fish	23.1	3	IV	4	C	3	37	Acceptable Without Revision

The higher RPN value indicates that the possibility of failure has a higher risk, so that it can be prioritised for immediate corrective action (Kartika, 2022). Based on the results of the analysis that has been carried out, it shows that the failure mode with the highest RPN value comes from failure ID 1.1, namely in the form of no information on the origin of the fish imported into the Company with an RPN value of 627 and is at the unacceptable matrix level. If this failure continues to occur, there will be a break in the product traceability chain due to the unknown identity of the fish being processed. Conversely, failure ID 15.1, which is an error in entering data on time, temperature, and retort pressure during the sterilisation period, has the lowest RPN value of 19 and is in the acceptable without revision area in the critical matrix. This shows the existence of a good work system supported by dual documentation in the form of manual data written by employees and retort recording, so that information about the condition of the retort is well documented.

The results of the critical analysis in the critical matrix show that failure IDs 4.1; 6.1; 7.1; 7.2; 8.1; 9.1; 10.1; 10.2; 11.2; 12.3; 13.1; 14.1; 15.1; 15.2; 15.3; 16.1; 16.2; 18.1; 20.2; 21.1; 21.3; 22.1; and 23.1 fall into the acceptable without revision category. This indicates that the implementation of traceability in all functions with these failure codes has been done well without requiring revisions or corrective actions. Failure ID 1.1 and 2.2 are in the

unacceptable area in the critical matrix. If at this point a failure occurs, it can result in loss of information about the identity of the processed fish raw materials and doubts about the quality and safety of the fish raw materials received and processed, thus leading to a break in the product traceability chain. Microbiological testing of fresh fish is important to ensure product quality and safety, and to prevent food poisoning due to contamination with pathogenic bacteria or diseases caused by microbes (Mailoa *et al.*, 2019). The unacceptable area in the critical matrix indicates that the failure code, if allowed to occur, can have a serious and unacceptable impact on product traceability. Maulana *et al* (2021) state that the unacceptable area is the level for unacceptable failure points and must be eliminated.

In the critical matrix, it can be seen that failure IDs 2.1, 3.1, and 9.2 are in the undesirable area. In failure ID 2.1, coding each fish received is a crucial step to differentiate fish between different suppliers, where the code plays a role in efficiently identifying and tracking each processed fish, thus facilitating the product traceback process through labels. In failure ID 3.1, fish from each different supplier must be differentiated in storage. This action aims to improve the operational efficiency of the traceability system. Thus, if there is a problem with a product, traceback can be done more accurately and quickly because each product can be traced back directly to the storage area that comes

Table 3 Corrective actions on the traceability system in the company

***Failure* ID**	**Possible Failure**	**Matrix position**		**Critical Level**	**Corrective Action**
1.1	No information on the origin of the fish	II	A	Unacceptable	Requiring suppliers to carry information documents regarding the identity of the fish they are carrying
2.2	No microbiological testing done	I	B	Unacceptable	Conduct microbiological testing for each fish arrival at the factory
2.1	No special coding provided	II	C	Undesirable	Implement a special coding system for each fish received from suppliers
3.1	Each fish received is not differentiated as to where it is stored	II	C	Undesirable	Differentiate fish storage or provide a barrier between each supplier
9.2	No special recording is done	II	C	Undesirable	Provided with a special logging form to provide information on the product while in the decanter
5.2	Mixing is done at the cutting table	III	B	Acceptable with revision	Distinguish each processed fish based on the fish receiving code
7.2	Foreign object ingress (fishing nets, clothing/gloves thread)	II	D	Acceptable with revision	Conduct more routine supervision and control, and ensure that the fish on the filling table is clean without foreign objects
7.3	Error in inputting can usage time	II	D	Acceptable with revision	Provide training to employees
12.1	Mismatch of seamer evaluation records and visual double seaming with processed cans (by supplier)	III	D	Acceptable with revision	Regularly check the work results and promptly correct the data by comparing it with the empty can usage form
12.2	Employee negligence in data entry when the seamer is jammed / temporarily stopped (downtime)	III	C	Acceptable with revision	Checking the results of work regularly and working in an orderly manner in accordance with established SOPs
14.2	Human error (mixing of products between baskets)	III	D	Acceptable with revision	Perform work in an orderly manner in accordance with established SOPs
15.3	Occurrence of errors in coding	III	C	Acceptable with revision	Perform work in an orderly manner in accordance with established SOPs
17.1	Occurrence of errors in coding	III	D	Acceptable with Revision	Always ensure that the printed production code is correct
19.1	Product identity label damaged or missing	III	D	Acceptable with revision	Ensure that the identity label is perfectly affixed, and create a special form as an archive or backup
20.3	The small quantity of leftover product is included in the coding of the largest product in a carton.	III	C	Acceptable with revision	Product coding on cartons is adjusted to the production date of each unit of packaged product
21.2	Error in inputting the data of the delivered product	III	C	Acceptable with revision	Checking the results of work regularly by comparing the data inputted in the recording document with the real conditions in the field
22.2	Not identifying production process errors from suppliers	II	D	Acceptable with revision	Ensure that the test results are in accordance with the standards and COA provided by the supplier

from a particular supplier. In failure ID 9.1, each stage of the production process requires a special record that contains information about the product being processed, which is done so that all stages of the process can be identified and traced properly based on existing recording documents.

For failure ID 5.2; 7.2; 7.3; 12.1; 12.2; 14.2; 15.3; 17.1; 19.1; 20.3; 21.2; 22.2 are in the acceptable with revision area. This shows that in the failure code, traceability has been running well but requires a little revision in the implementation. Both failure points in the unacceptable, undesirable, and acceptable with revision areas are given corrective actions as listed in Table 3. With this, there are 5 critical points of product traceability at PT XYZ that occupy the unacceptable and undesirable areas, including failure ID 1.1; 2.1; 2.2; 3.1; and 9.2.

The implementation of the traceability system in the Company is not only to improve product quality, but also indirectly to demonstrate the quality of the Company to the general public. Besides that, traceability not only aims to reduce the likelihood of a food crisis, but also to reduce the impact (Masengi *et al*., 2018).

4. CONCLUSION

The product traceability system run at the fish canning company has been well implemented by implementing a paper base system at all stages in the production process chain. In the system that runs in the company, it is divided into 23 functions with a total of 43 possible causes of system failure, where there are 2 points in the unacceptable area, 3 points in the undesirable area, 12 points in the acceptable area with revision, and 26 points in the acceptable area without revision. With this, it is determined that the traceability of canned fish products in the fish canning company has 5 critical points of traceability, namely the absence of information on the origin of the fish, no special coding is given to each fish received, no microbiological testing is carried out on the fish received, each fish received is not differentiated in storage between each supplier, and no special recording is made at the draining stage. The corrective actions that can be taken by the Company are by requiring raw material suppliers to pocket the identifying information of the fish they carry, conducting microbiological testing, distinguishing fish storage, carrying out work in accordance with the Standard Operational Procedure (SOP), checking document records regularly, and correcting them if necessary, and implementing a documentation and coding system at each stage of the process being carried out.

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