Analysis of the Causes of Production Process Failure with the FishBone Diagram Method and TQM Implementation for Product Quality Improvement in the Manufacturing Industry of PT Emsonic Indonesia

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Abstract
PT. Emsonic Indonesia is a company engaged in plastic mold manufacturing, which produces speakers in the form of units, case assemblies, and finished forms based on RPP (Product Delivery Plan). PT. Emsonic Indonesia strives to provide the best for customers, by improving product quality. This study aims to analyze the causes of product defects, use the Fish Bone diagram method to analyze the causes, and apply Total Quality Management (TQM) to improve product quality at PT. Emsonic Indonesia. Based on the results of the fish bone diagram method, it can be seen that product defects come from human, mechanical, method, management, material, and environmental factors. In the human factor, it was found that employees did not receive adequate training regarding the operation of machines and correct work procedures giving rise to NG products because they exceeded the limits of inspection standards. Meanwhile, based on Total Quality Management (TQM), it was able to explain the improvement of product quality by 51.3% while the remaining 48.7% was explained by other factors that were not studied in this study. Meanwhile, the results of the F test show that simultaneously the variables of the production process and Total Quality Management (TQM) simultaneously have a positive and significant effect on the improvement of product quality and the results of the t test show that the variables of the production process and Total Quality Management (TQM) have a positive and significant effect on the improvement of product quality at PT. Emsonic Indonesia.

Keywords: Fish Bone Method, Manufacturing, Total Quality Management (TQM), Production Process, Product Quality Improvement.

Introduction

The manufacturing industry faces increasingly complex challenges in maintaining product quality improvement to meet the needs of a dynamic market. One of the main obstacles is the high failure rate in the production process, which can negatively impact the company's operational efficiency, customer satisfaction, and competitiveness. To overcome this problem, root cause analysis of failures is a critical step in identifying factors that affect product quality improvement. In the manufacturing industry, production process failures have a direct impact on improving product quality, cost efficiency, and customer satisfaction. Therefore, a comprehensive analytical approach is needed to identify and address the root cause.

Product quality is an important concern for companies when making products. Improving product quality is the main criterion for consumers when choosing products offered by companies. The Company has always had the ability to maintain and improve the quality of

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products to meet the desires of consumers, allowing the Company to compete with competitors and dominate the market.

PT. Emsonic Indonesia, a plastic molding manufacturing company located in the MM2100 Cikarang Barat industrial area. PT. Emsonic Indonesia is a foreign investment company (PMA) from Korea, established in 2001 specializing in plastics with LG Vendor speaker products. PT Emsonic was first established in 1972 in South Korea, while PT. Emsonic Indonesia was established in 2011 which is located in the MM2100 Industrial Estate, Jl.Timor, Jatiwangi, Cikarang Bar. District, Bekasi Regency, West Java 17530. With an area of 21,000 M² and a building area of 13,955 M2 with the number of employees per December 2023 is approximately 1,000 people.

PT Emsonic Indonesia is one of the companies in the electronics manufacturing industry that focuses on the production of audio devices, especially speakers. In recent years, the company has faced the problem of production delays which have an impact on increasing operational costs and decreasing customer satisfaction. One of the factors that consumers pay attention to when buying a product is its quality. According to Rosyidi Ririn (2020), the word "product quality" as a whole can include characteristics and traits that can affect the ability of our products to satisfy customers and consumers. Higher product quality allows us to create new variations to attract consumers. Improved product quality is everything that can be offered by producers that can be noticed, used, purchased, and consumed by producers and consumers according to their needs (Astuti, 2020).

A product that can be accepted by consumers is a product that meets the needs and desires of consumers with a minimum level of disability. Companies that do not pay attention to improving the quality of their products will commit suicide or do not care about the future of their company, because improving product quality will have an impact on consumer purchasing decisions.

Companies must always supervise the production process of their products so that the improvement of product quality remains good and in accordance with the standards that have been set by the company. If the supervision and production process are carried out carefully, it will have a positive impact on the company. Among them is that defects or damage to the product can be minimized or even eliminated.

Production delays can lead to supply chain disruptions, increased operational costs, and decreased customer confidence. The factors that cause delays are often multidimensional, involving people, methods, materials, machines, the environment, and management. Production delays are one of the critical problems that the manufacturing industry often faces. These delays can lead to failure to meet delivery schedules, reduce customer satisfaction, and increase production costs. Therefore, it is important to identify the root cause of the delay and implement a systematic approach to address it.

Fishbone Analysis is an analysis tool that helps identify the root cause of a problem by mapping interrelated factors. Meanwhile, Total Quality Management (TQM) is a quality-based management approach that focuses on continuous improvement and customer satisfaction. The combination of these two methods has been widely used in the manufacturing industry to overcome various operational problems, including production delays.

Product quality

According to (Rosyidi, 2020), the word "product quality" as a whole can include characteristics and properties that can affect the ability of our products to satisfy customers and consumers. Higher product quality improvements allow us to create new variations to attract consumers. Improved product quality is everything that can be offered by producers that can be noticed, used, purchased, and consumed by producers and consumers according to their needs (Astuti, 2020).

Based on some of the definitions that have been described above, it can be concluded that product quality is a totality that has the characteristics of a product or service that can show a measure that looks at how high the level of consumer confidence in the product or service they use and how long that trust can last.

Fishbone Diagram

The fishbone diagram, also known as the Fishbone Diagram, is a method first developed by Kaoru Ishikawa. Fishbone diagram is a method used to map the root cause of a problem in a structured way. Fishbone diagrams are effectively used in the manufacturing industry to analyze complex problems involving many departments (Gaspersz, 2002).

Total Management Quality

Quality management or total quality management (TQM) is defined as a way to continuously improve performance at all levels of operations or processes in all functional areas of the organization by using all available human resources and capital (Ahmad, 2020).

TQM is a quality-oriented management approach as a whole by involving all levels of the organization. The main goal of total quality management is so that all parties involved in the production process can be accounted for improving the quality of products or services produced by the company. The application of TQM in companies is usually used as a means to increase the company's competitiveness through improvements in company management. The increase in competitiveness is carried out through improving product output.

In addition, customers are also the main focus so that they can improve the quality of the company. According to Deming (1986), the implementation of TQM is able to increase production efficiency and reduce waste, including time lost due to delays. A study by Singh and Rawat (2016) stated that the application of TQM in the automotive industry increased productivity by up to 30% in a two-year period.

Basically, integrated quality management focuses on continuous improvement to achieve customer satisfaction. Quality management is oriented towards the process of integrating all human resources, suppliers, and customers into the company's environment. This means that quality management is an inherent ability in human resources and processes that can be controlled, not just by chance (Ahmad, 2020).

Method

This study describes the data obtained and analyzes the existing data. The purpose of descriptive research is to describe the facts that exist today. This includes efforts to describe, record, analyze, and interpret the current conditions. The design of this study is a case study that aims to conduct an in-depth investigation of a particular subject to provide a complete

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picture of a particular subject. The type of data used in this study is primary data derived from internal information of PT Emsonic Indonesia and secondary data derived from journals, books, and other documents related to this research.

Type of Research

This study uses a quantitative method in accordance with the research objectives. According to I Made Laut (2020:6), the quantitative method is a type of research that produces several results using other quantification (measurement) techniques. The quantitative approach focuses more on symptoms or phenomena that have certain characteristics in human life. Variables, on the other hand, are analyzed through an objective theory of the relationship between variables.

The quantitative research method emphasizes the aspect of objective measurement and direct data in the field, namely by conducting direct observation, measuring and collecting data based on the data obtained, in 2022 to 2023 there will be an increase in the level of product defects at PT. Emsonic Indonesia due to the high demand for delivery or sales delivery which resulted in over capability of goods produced by PT. Emsonic Indonesia. Delivery demand or sales delivery is divided into 2, namely Domesmtic and Export. The following is attached below comparative data for the last 2 years between sales delivery and disability rate at PT. Emsonic Indonesia. Table 1 is a breakdown of comparative sales and disability data from 2022 to 2023.

Data Collection Techniques

The process of collecting this data with research techniques uses questionnaires. According to Sugiyono (2019:199), Questionnaire is a data collection technique that is carried out by giving a set of questions or written statements to respondents to answer.

No	Bulan	Sales		Kecacatan	Rate
		Domestic	Ekspor		
1	Januari	710.971	2.431.000	27.302	0.9%
2	Februari	503.896	2.901.727	33.363	1.0%
3	Maret	789.252	2.204.886	41.521	1.4%
4	April	610.152	3.405.524	24.137	0.6%
5	Mei	538.313	1.835.336	29.891	1.3%
6	Juni	562.314	3.533.850	34.101	0.8%
7	Juli	648.537	2.684.894	25.097	0.8%
8	Agustus	731.132	2.815.093	48.290	1.4%
9	September	680.370	2.232.852	18.374	0.6%
10	Oktober	600.601	1.513.612	30.925	1.5%
11	November	533.586	1.837.120	25.239	1.1%
12	Desember	593.012	1.564.496	18.513	0.9%

Tahun 2022

Figure 1. 2022 Sales and Defect Comparison Data
Source: PT. Emsonic Indonesia (2022)

Tahun 2023		Sales		Kecacatan	Rate
No	Bulan	Domestic	Ekspor		
1	Januari	927.799	2.129.130	26.557	0.9%
2	Februari	616.345	2.186.307	20.466	0.7%
3	Maret	1.065.254	3.198.976	24.469	0.6%
4	April	585.750	2.771.539	19.088	0.6%
5	Mei	698.411	4.211.437	28.689	0.6%
6	Juni	729.020	4.412.849	24.679	0.5%
7	Juli	592.636	2.692.259	20.586	0.6%
8	Agustus	615.126	2.193.062	33.438	1.2%
9	September	426.389	1.377.123	19.018	1.1%
10	Oktober	469.133	1.758.949	25.727	1.2%
11	November	288.997	2.807.308	48.119	1.6%
12	Desember	197.065	2.037.718	29.494	1.3%

Figure 2. 2022 Sales and Defect Comparison Data
Source: PT. Emsonic Indonesia (2022)

In practice, not all incoming messages were successfully realized by PT Emsonic Indoseia. Apart from the comparative data of sales and defects, we can also see from the data worth issues or the most dominant defects in 2022 - 2023 which will be explained in table 2. And it comes with touching details and AI Conepapper is included with the number of AI Items.

Tahun 2022		Worst Issue		
No	Bulan	Touching	AI Conepapper	AI lem 4 Point
1	Januari	4658	1179	1912
2	Februari	7650	1728	1731
3	Maret	11101	2323	3146
4	April	4097	1646	1397
5	Mei	6515	2707	1181
6	Juni	5636	2098	3092
7	Juli	4044	1614	3506
8	Agustus	7254	4132	6502
9	September	5014	3080	4605
10	Oktober	3956	2957	5279
11	November	3550	2636	5023
12	Desember	4035	2123	2715
	Total	67510	28223	40089

Figure 3. Data Worth Issue / Most Dominant Disability in 2022
Source: PT. Emsonic Indonesia (2022)

Tahun 2023		Worst Issue		
No	Bulan	Touching	AI Conepapper	AI lem 4 Point
1	Januari	6582	3452	3135
2	Februari	3977	2919	2125
3	Maret	3957	2546	3156
4	April	3599	2721	2814
5	Mei	5262	4404	3863
6	Juni	4575	3256	4468
7	Juli	4206	2105	2433
8	Agustus	5031	4167	4328
9	September	2244	2584	3230
10	Oktober	6077	4584	1982
11	November	6629	12309	3646
12	Desember	4644	5911	2502
	Total	56783	50958	37682

Figure 4. Data Worth Issue / Most Dominant Disability in 2023
Source: PT. Emsonic Indonesia (2022)

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Based on the data above, it can be seen that the level of product defects at PT. Emsonic Indonesia is still quite high, the more sales delivery requests there are, the more defective products are produced.

Fishbone Diagram

Fishbone diagrams can be used as a tool to support the implementation of TQM by providing a systematic approach to identifying root problems in the production process. In the context of production delays, the combination of these two methods can result in more targeted improvement measures.

The data obtained was analyzed using the Fish Bone method (Ishikawa Diagram) to identify the root causes of failure based on the main categories: people, methods, materials, machines, and the environment.

Total Quality Management (TQM)

The implementation of TQM principles is evaluated with reference to key dimensions, such as quality-based management, employee training, management engagement, and customer satisfaction. The assessment was carried out using questionnaires and descriptive analysis of the results.

Quality management, also known as integrated quality management, is defined as a way to continuously improve performance at every level of operations or process in every area of an organization's operations by using all available human resources and capital. There are ten characteristics of TQM developed by Goetsch and Davis in Tatang & Rusdiana (2021) where the components of TQM that must be considered in running a good quality management program are as follows:
a. Focus on the customer
b. Obsession with quality
c. Scientific approach
d. Long-term commitmentTeamwork
e. Continuous system improvement
f. Education and training
g. Controlled freedom
h. Unity of purpose
i. Employee involvement and empowerment

Scale and Interpretation Figures

Sugiyono (2019:146) states that the Likert scale is used to assess the opinions, attitudes, and perceptions of a person or a group of people about social phenomena. This study distributed a questionnaire with a Likert scale. To measure the variables to be measured, the Likert scale is used to divide those variables into variable indicators, which are then used as a starting point to create an instrument item, which can be a question or a statement.

The answer to this question or statement will then be processed until it produces a conclusion. To find out the gradation of the respondents' answer results, an interpretation number is needed. In each quantitative study, this interpretation number is used to process the

data to be collected to find out whether the respondents strongly agree, agree, hesitate, disagree, or even strongly disagree with the statement.

Table 1. Interpretation Figures

Interpretation Interval	Category
5,00-4,20	Strongly Agree
4, 21-3,40	Agree
3,41-2,60	Nervous
2,61-1,80	Disagree
1,81-1,00	Strongly disagree

Source: Research, 2024 (Data Processed)

Data Analysis Techniques

The data analysis technique aims to answer the formulation of problems and research hypotheses that have been formulated previously. The data that has been collected will be processed so that conclusions can be drawn according to the type of test that will be used later. At the end of that conclusion, it will be known how the influence between the independent variable and the dependent variable used in this study will be known.

The challenge faced by this company is how to compete so that the company can survive in the midst of existing competition and generate profits in terms of profits for the company and decisions for customers. This has to do with material quality, because the success of an organization in achieving its goals and fulfilling its social responsibilities is largely dependent on managers. Therefore, improving the quality of PT. Emsonic Indonesia still needs to be improved and improved

Result and Discussion

With the most Worst Issue / defect recording over the last 2 years are abnormal sound Touching, Air Leakage Conepapper and Air Leakage glue 4 points. Meanwhile, defective products at PT. Emsonic Indonesia itself is divided into 3 categories based on Quality Assurance inspection standards in order to improve product quality improvement at PT. Emsonic Indonesia, which came into effect in September 2023, the categories include Defective (NG / Not Good) Major 2%, NG (Not Good) Critical, and NG (Not Good) Control. The following is an explanation in figure 1 regarding the criteria for the inspection quality assurance standard.

Figure 5. Standard Criteria for Inspection Quality Assurance

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Thus, the problem here is how the method that should be carried out to reduce the most defects, namely Abnormal Sound Touching, Air Leakage Conepapper and Air Leakage 4 Point in the production process using a combination of Total Quality Management (TQM) methods and fishbone diagrams. The application of a combination of these two methods can result in directed improvement measures as a mechanism to motivate and influence the behavior of managers and employees in various ways to maximize their quality.

Fishbone diagrams can be used as a tool to support the implementation of TQM by providing a systematic approach to identifying root problems in the production process. The challenge faced by this company is how to compete so that the company can survive in the midst of existing competition and generate profits in terms of profits for the company and decisions for customers. This has to do with material quality, because the success of an organization in achieving its goals and fulfilling its social responsibilities is largely dependent on managers. Therefore, improving the quality of PT. Emsonic Indonesia still needs to be improved and improved.

The decrease in defective product rates and increased production efficiency show that a quality-based approach is able to have a real positive impact on operational quality. However, the successful implementation of TQM requires full commitment from all levels of the organization, especially top management. In addition, challenges such as resistance to change among employees need to be addressed through effective communication approaches and employee engagement programs.

Characteristics of Respondents

It is the characteristic of the respondents used in the study. This shows what the demographics of respondents look like in terms of Age, Gender, Last Education, and Employment Period. By knowing the demographics of the respondents, we will know the characteristics of the respondents of Production Operators at PT. Emsonic Indonesia.

Below the researcher presents a complete table of respondent characteristics including their percentages. Hopefully, by knowing this characteristic, it can be known the relationship between respondents' answers to the statements submitted so that it will become clearer later.

KAKTERISTIK	KATEGORI	JUMLAH	PRESENTASE
Jenis Kelamin	Laki – laki	35	39%
	Perempuan	55	61%
Jumlah		**90**	**100%**
Umur	< 20 Tahun	36	40%
	21 - 30 Tahun	54	60%
Jumlah		**90**	**100%**
Riwayat Pendidikan	SMA/SMK	82	91%
	D3	2	2%
	S1	6	7%
Jumlah		**90**	**100%**
Lama Bekerja	< 3 Tahun	62	69%
	4 - 6 Tahun	24	27%
	7 - 10 Tahun	4	4%
	> 10 Tahun	0	0%
Jumlah		**90**	**100%**

Figure 6. Characteristics of Respondents
Source: Research Results, 2024 (Data Processed)

Figure 6 above is the characteristics of respondents based on the gender of production employees at PT. Emsonic Indonesia is dominated by women, which is 61% and 39% is male. This shows that the majority of production employees at PT. Emsonic Indonesia is female.

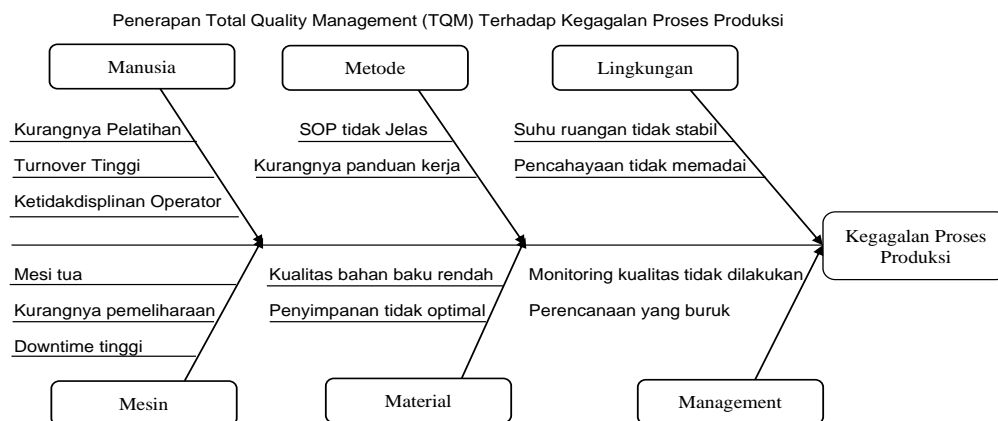**Application of Total Quality Management (TQM) to Production Process Failure**

Figure 7. Fishbone Diagram

The fishbone diagram makes the failure of the production process the head of this diagram. Then the fish bones describe the reasons for the problem seen from the factors of man, machine, method, management, material, and environment.

In the man factor, it was found that employees did not receive adequate training regarding the operation of machines and correct work procedures. The high turnover rate disrupts the stability of the workforce. Employees do not always follow standard procedures or SOPs strictly. PT Emsonic Indonesia's policy for the production process is to assign quality assurance or management employees to supervise the production process. This policy is a preventive measure for production failures that cause NG products to exceed the inspection standard limits. With the supervision carried out regularly at PT Emsonic Indonesia, it can be possible to reduce defective products from increasing anymore.

a) Machine factors, machines that do not meet standards with equipment that is not able to support the desired quality standards, the absence of a routine maintenance plan and old machines that still like to be forced to remain in use can cause sudden engine damage, decreased efficiency and decreased product quality improvement.

b) Material factors, in the use of raw materials that do not meet standards, will affect the production process and the final production result. Storage of raw materials that do not pay attention to temperature and humidity can lead to material degradation, such as deformation which ultimately has an impact on improving product quality.

c) The method factor, this is very important because when the lack of standard work guidelines can cause inconsistencies in the production process, no continuous improvement and structured quality control and the existence of inefficient work processes can slow down production.

d) Environmental factors, such as temperature, humidity, and lighting, can affect the production process, especially the quality of raw materials can cause difficulties in

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controlling the production process. Poor lighting in the production area reduces visibility, which makes it difficult for operators to detect defects or damage to products during the production process, increasing the chances of undetected defects.
e) Management factors, when management does poor planning, then unrealistic production schedules can result in delays. Quality monitoring is not carried out, there is no periodic quality evaluation to detect and prevent problems.

Respondent's Response

In a study, the response response which is the answer to what is in the mind of the respondent is very important. Therefore, the data collection process, especially through questionnaires, must be strictly monitored for validity. The goal is for the data collected to reflect the perception that each respondent has rather than just basic data.

Based on the results of a study involving 90 respondents of production employees at PT. Emsonic Indonesia, the following is a description of the respondents' responses related to each of the independent variables studied.

Pertanyaan		Jawaban Responden					Skor
		SS	S	N	TS	STS	
X1.1	Σ	65	25	0	0	-	425
	%	72%	28%	0%	0%	0%	
X1.2	Σ	68	22	0	-	-	428
	%	76%	24%	0%	0%	0%	
X1.3	Σ	53	35	1	1	-	410
	%	59%	39%	1%	1%	0%	
X1.4	Σ	68	18	4	0	-	424
	%	76%	20%	4%	0%	0%	
X1.5	Σ	63	20	5	2	0	414
	%	70%	22%	6%	2%	0%	
X1.6	Σ	60	28	2	0	-	418
	%	67%	31%	2%	0%	0%	
X1.7	Σ	53	32	5	-	-	408
	%	59%	36%	6%	0%	0%	
X1.8	Σ	52	32	6	0	-	406
	%	58%	36%	7%	0%	0%	
X1.9	Σ	43	36	10	1	-	391
	%	48%	40%	11%	1%	0%	
X1.10	Σ	30	52	8	0	0	382
	%	33%	58%	9%	0%	0%	
X1.11	Σ	45	39	5	1	0	398
	%	50%	43%	6%	1%	0%	
Total Skor							4.504
Rata – Rata							409

Figure 8. Respondents' Response to the Production Process

Figure 8 above shows the respondents' responses to the production process variables consisting of 11 questions. In the first question, the quality of employees at PT. Emsonic Indonesia affects the results of the product process, as many as 65 respondents or 72% stated that they strongly agreed, 25 respondents or 28% expressed agreement. So that the total score on the first question (X1.1) was obtained which was 425 which indicates that the quality of employees at PT. Emsonic Indonesia affects the results of the production process with a range of five (very high).

Table 2. Respondents' Response to Total Quality Management (TQM)

Question		Respondent's Answer					Score
		SS	S	N	TS	STS	
X2.1	∑	73	17	0	0	0	433
	%	81%	19%	0%	0%	0%	
X2.2	∑	69	21	0	-	-	429
	%	77%	23%	0%	0%	0%	
X2.3	∑	66	22	2	0	-	424
	%	73%	24%	2%	0%	0%	
X2.4	∑	72	18	0	0	-	432
	%	80%	20%	0%	0%	0%	
X2.5	∑	64	26	0	0	0	424
	%	71%	29%	0%	0%	0%	
X2.6	∑	52	36	2	0	-	410
	%	58%	40%	2%	0%	0%	
X2.7	∑	44	40	5	1	-	397
	%	49%	44%	6%	1%	0%	
X2.8	∑	36	47	7	0	-	389
	%	40%	52%	8%	0%	0%	
X2.9	∑	62	28	0	0	-	422
	%	69%	31%	0%	0%	0%	
X2.10	∑	67	23	0	0	0	427
	%	74%	26%	0%	0%	0%	
X2.11	∑	68	22	0	0	0	428
	%	76%	24%	0%	0%	0%	
X2.12	∑	68	22	0	0	0	406
	%	57%	39%	3%	1%	0%	
X2.13	∑	60	28	2	-	-	418
	%	%	%	%	%	%	
X2.14	∑	56	31	3	0	-	413
	%	62%	34%	3%	0%	0%	
X2.15	∑	28	45	11	5	1	364
	%	31%	50%	12%	6%	1%	
X2.16	∑	49	34	5	2	0	400
	%	54%	38%	6%	2%	0%	
X2.17	∑	61	29	0	0	-	421
	%	68%	32%	0%	0%	0%	
X2.18	∑	64	26	0	-	-	424
	%	71%	29%	0%	0%	0%	
X2.19	∑	59	31	0	0	-	419
	%	%	%	0%	0%	0%	
X2.20	∑	57	30	3	0	-	414

		63%	33%	3%	0%	0%	
	%	63%	33%	3%	0%	0%	
X2.21	∑	56	31	3	0	0	413
	%	62%	34%	3%	0%	0%	
X2.22	∑	62	28	0	0	0	422
	%	69%	31%	0%	0%	0%	
Total Score							9.129
Average							415

Table 2 above shows the respondents' responses to the Total Quality Management (TQM) variable consisting of 22 questions. In the first question, PT. Emsonic Indonesia prioritizes customer satisfaction, as many as 73 respondents or 81% stated that they strongly agreed, 17 respondents or 19% stated that they agreed. So that the score on the first question (X2.1) was obtained which was 433 which indicates that PT. Emsonic Indonesia prioritizes customer satisfaction in the fifth range (very high).

Pertanyaan		Jawaban Responden					Skor
		SS	S	N	TS	STS	
Y1	∑	47	39	4	0	-	403
	%	52%	43%	4%	0%	0%	
Y2	∑	44	42	4	-	-	400
	%	49%	47%	4%	0%	0%	
Y3	∑	46	39	5	0	-	401
	%	51%	43%	6%	0%	0%	
Y4	∑	50	38	2	0	-	408
	%	56%	42%	2%	0%	0%	
Y5	∑	52	34	4	0	0	408
	%	58%	38%	4%	0%	0%	
Y6	∑	66	23	1	0	-	425
	%	73%	26%	1%	0%	0%	
Y7	∑	66	23	1	-	-	425
	%	73%	26%	1%	0%	0%	
Y8	∑	60	29	1	0	-	419
	%	67%	32%	1%	0%	0%	
Y9	∑	63	26	1	0	-	422
	%	70%	29%	1%	0%	0%	
Y10	∑	55	34	1	0	0	414
	%	61%	38%	1%	0%	0%	
Y11	∑	43	43	4	0	0	399
	%	48%	48%	4%	0%	0%	
Y12	∑	57	31	2	0	0	415
	%	63%	34%	2%	0%	0%	
Y13	∑	52	36	2	0	0	410
	%	58%	40%	2%	0%	0%	
Total Skor							5.349
Rata - Rata							411

Figure 9. Respondents' Response to Product Quality Improvement

Figure 9 above shows the respondents' responses to the variable Product Quality Improvement consisting of 13 questions. In the first question, the quality of production work is in accordance with the standards that have been determined by the company, as many as 47 respondents or 52% stated that they strongly agreed, 39 respondents or 43% stated that they agreed, 4 respondents or 4% stated neutral. So that it gets a score on the first question (Y1), which is 403 which indicates that the quality of production work is in accordance with the standards that have been determined by the company in the fifth range (very high).

Validity Test

After collecting questionnaires from respondents, the next step is to re-test the validity of the data obtained. Validity tests should be carried out on each question item in the validity test. The results of the calculation are compared with the Product Moment table with a sig of 5%. If the calculation > the table, the questionnaire item can be said to be valid. In this study, the table was obtained from a significant value of 0.05 or sig 5% and n = 90, then the degree of freedom is n-2 = 88. The value of the table at df = 88 and α = 0.05 is 0.207. The results of the validity test of the Quality Improvement variable can be seen in figure 10.

No	Item	Total Pearson Correlation	rtabel	Keterangan
1	X1.1	0,655	0,207	Valid
2	X1.2	0,647	0,207	Valid
3	X1.3	0,667	0,207	Valid
4	X1.4	0,633	0,207	Valid
5	X1.5	0,523	0,207	Valid
6	X1.6	0,659	0,207	Valid
7	X1.7	0,648	0,207	Valid
8	X1.8	0,606	0,207	Valid
9	X1.9	0,502	0,207	Valid
10	X1.10	0,606	0,207	Valid
11	X1.11	0,710	0,207	Valid

Figure 10. Production Process Validity Test

It can be concluded that the question item of the Production Process variable in this study is declared "Valid". The question can be said to be valid because from the 11 Quality Improvement questions, the calculation value is greater than the r table.

For the test of the validity of the Total Quality Management variable, the results can be seen in figure 11.

No	Item	Total Pearson Correlation	rtabel	Keterangan
1	X2.1	0,580	0,207	Valid
2	X2.2	0,604	0,207	Valid
3	X2.3	0,656	0,207	Valid
4	X2.4	0,584	0,207	Valid
5	X2.5	0,609	0,207	Valid
6	X2.6	0,670	0,207	Valid
7	X2.7	0,611	0,207	Valid
8	X2.8	0,534	0,207	Valid
9	X2.9	0,731	0,207	Valid
10	X2.10	0,656	0,207	Valid
11	X2.11	0,589	0,207	Valid
12	X2.12	0,739	0,207	Valid
13	X2.13	0,661	0,207	Valid
14	X2.14	0,757	0,207	Valid
15	X2.15	0,476	0,207	Valid
16	X2.16	0,512	0,207	Valid
17	X2.17	0,601	0,207	Valid
18	X2.18	0,730	0,207	Valid
19	X2.19	0,748	0,207	Valid
20	X2.20	0,695	0,207	Valid
21	X2.21	0,587	0,207	Valid
22	X2.22	0,658	0,207	Valid

Figure 11. Total Quality Management Validity Test

It can be concluded that all question items of the Total Quality Management variable in this study are declared "Valid". The question can be said to be valid because of the 22 Total Quality Management questions, the calculation is greater than the r table.

For the results of the variable validity test of product quality improvement, you can see in the following table:

No	Item	Total Pearson Correlation	rtabel	Keterangan
1	Y1	0,799	0,207	**Valid**
2	Y2	0,775	0,207	**Valid**
3	Y3	0,753	0,207	**Valid**
4	Y4	0,787	0,207	**Valid**
5	Y5	0,817	0,207	**Valid**
6	Y6	0,702	0,207	**Valid**
7	Y7	0,750	0,207	**Valid**
8	Y8	0,789	0,207	**Valid**
9	Y9	0,748	0,207	**Valid**
10	Y10	0,801	0,207	**Valid**
11	Y11	0,722	0,207	**Valid**
12	Y12	0,719	0,207	**Valid**
13	Y13	0,761	0,207	**Valid**

Figure 12. Product Quality Improvement Validity Test

It can be concluded that all item of the product quality improvement question in this study is declared "Valid". The question can be said to be valid because of the 13 questions about product quality improvement, the calculation is greater than r table.

Hypothesis Test

The aim is to test whether the variables of Production Process and Total Quality Management (TQM) have an effect on improving product quality at PT. Emsonic Indonesia.

1. Multiple Linear Regression Equations

The results of calculation and data processing using the Statistical Program for Social Science (SPSS), obtained in Coefficients from the table, can be concluded as follows:

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.607	5.941		.439	.662
	Pengendalian	.611	.124	.459	4.927	.000
	TQM	.259	.070	.346	3.709	.000

a. Dependent Variable: Kinerja

Figure 13. Multiple Linear Regression Hypothesis Test

Based on Figure 13 above, the model of the multiple linear regression equation is as follows:

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$$Y = 2.607 + 0.611\ X1 + 0.259\ X2$$

The above regression equation model can be explained as follows:

1. The value of the constant (a) is 2.607, indicating that if the variables of Production Process and Total Quality Management (TQM) are zero, then the improvement of product quality will increase by 2.607.

2. The regression coefficient value for the production process variable shows a positive value of 0.611, this shows that with the increase of the production process variable, the product quality improvement variable will increase by 0.611.

3. The regression coefficient value for the Total Quality Management (TQM) variable shows a positive value of 0.259, this shows that with the increase of the Total Quality Management (TQM) variable, the variable Product Quality Improvement will increase by 0.259.

2. Simultaneous Hypothesis Test (F-Test)

This test aims to test whether the variables of Quality Improvement and Total Quality Management (TQM) have an effect on product quality improvement. The test results are presented in the Anova table below.

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1390.204	2	695.102	47.847	.000^b
	Residual	1263.896	87	14.528		
	Total	2654.100	89			

a. Dependent Variable: Kinerja

b. Predictors: (Constant), TQM, Pengendalian

Figure 14. Test Result – F

Based on table 12 above, it shows a value of 47.847 and a value of 0.207 in the table, with a significant value of $0.000 < 0.05$. So from the results of regression analysis, it can be seen that together the independent variables have a significant influence on the dependent variables, so it can be concluded that the variables of the production process and Total Quality Management (TQM) together have an influence on product quality improvement.

3. Coefficient of Determination (R^2)

This test aims to see the closeness of the relationship of independent (free) variables to dependent (bound) variables by looking at the magnitude of its total determinant coefficient (R^2) or R-Square. To be able to find out the value of the determination coefficient of R^2 can be seen in the following table:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.724^a	.524	.513	3.812

a. Predictors: (Constant), TQM, Pengendalian

Figure 14. Determination Coefficient Test Results

Based on the results of the regression calculation in table 13 above, it can be seen that the value of the determination coefficient (R^2) is 0.513. This means 51.3% Improvement in product quality at PT. Emsonic Indonesia is influenced by the production process and Total Quality Management (TQM), while the remaining 48.7% is influenced by other factors outside this study.

4. Partial hypothesis test (t-test)

This test aims to find out whether the variables of Production Process and Total Quality Management (TQM) partially affect the improvement of product quality, based on the processing results can be seen in the table below.

Variabel	t		Sig.		Kesimpulan
	thitung	ttabel	Hasil	α = 5%	
Peningkatan Kualitas	4,927	0,207	0,000	< 0,05	Hipotesis Diterima
Total Quality Management (TQM)	3,709	0,207	0,000	< 0,05	Hipotesis Diterima

Figure 15. t-Test Results

In figure 15 above, it can be explained that the Quality Improvement variable has a tcount value of 4.927 and a ttable value of 0.207 with a significant value of $0.000 < 0.05$, then it can be concluded that the hypothesis is accepted in other words that the production process variable has a positive and significant effect on product quality improvement.

In the table above, it can be explained that the Total Quality Management (TQM) variable has a tcount value of 3.709 and a ttable value of 0.207 with a significance value of $0.000 < 0.05$, then it can be concluded that the hypothesis is accepted or in other words the Total Quality Management (TQM) variable has a positive and significant effect on product quality improvement.

5. Dominant Influence

In order to find out which independent variable has the most dominant influence on the dependent variable is by looking at the value of Standaridized Coefficients, based on the results of the calculation of the largest value, there is a production process variable which is 0.459, so it can be concluded that the production process variable is the most dominant in influencing product quality improvement.

Based on the results of the descriptive analysis in this study, it shows that the independent variable, namely the production process, has a value or range of 4,504 or an average of 409, Total Quality Management (TQM) has a value or range of 9,129 or an average of 415, and the dependent variable, namely Product Quality Improvement, has a value or range of 5,349 or an average of 411.

In this study, the equation $Y = 2.607 + 0.611 X1 + 0.259 X2$ was obtained, with the results of the multiple linear regression showing that the regression coefficient value for the

variables of Production Process and Total Quality Management (TQM) was positive for the variable of Product Quality Improvement. This shows that with the increase in the production process variable, the product quality improvement variable will increase by 0.611, and with the increase in the Total Quality Management (TQM) variable, the product quality improvement variable will increase by 0.259.

Based on the results of the F test in this study, results were obtained that showed that the Fcal value was 47.847 and the Ftabel value was 0.207. So from the results of regression analysis, it can be seen that together the independent variables (Production process and Total Quality Management (TQM)) have a significant influence on the dependent variable (Product quality improvement). This can be proven from the result of Fcal is 47.847 with a significance (Sig.) of 0.000 which means that the significance value is less than 0.05. Thus, it can be concluded that the variables of the production process and Total Quality Management (TQM) together have an influence on improving product quality at PT. Emsonic Indonesia. So the hypothesis that states that the production process and Total Quality Management (TQM) have a positive and significant effect on improving product quality at PT. Emsonic Indonesia is acceptable.

Meanwhile, based on the results of the T test, the results were obtained that the variables of Production Process (X1) and Total Quality Management (TQM) (X2) have a positive and significant influence on the variable of Product Quality Improvement (Y) at PT. Emsonic Indonesia. In the variable Production Process, a calculation value of 4,927 was obtained, in the Total Quality Management (TQM) variable, a calculation value of 3,709 was obtained. So it can be concluded that the production process variable is the most influential or most dominant variable in this study with a tcal value of 4.927 has a significance value of 0.000. So the hypothesis that states that the production process has the most dominant influence on improving product quality at PT. Emsonic Indonesia is acceptable.

The production process is very important as the spearhead of a company which can be a benchmark for the worthiness of a product produced and marketed by a company. The production process must run and be organized so that it can have an effect on improving product quality improvement at PT. Emsonic Indonesia.

Conclusion

Based on the results of the research and the results of the data analysis that has been carried out, the following conclusions can be obtained There is a significant influence between the Production Process and Total Quality Management (TQM) with the improvement of product quality at PT. Emsonic Indonesia. This is evidenced by the results of multiple linear regression analysis and the F test which shows that the Fcal value is 47.847 with a significance (Sig.) of 0.000 which means that the significance value is less than 0.05. The most influential or dominant variable is the production process. This is evidenced by the results of multiple linear regression analysis and the T test with a calculation result of 4.927 greater than the ttable 0.207 and has a significance value of 0.000.

Based on the results of the calculation, the value of the determinant coefficient (R^2) is 0.513. This means 5.13% Improvement in product quality at PT. Emsonic Indonesia is influenced by the production process and Total Quality Management (TQM), while the remaining 48.7% is influenced by other factors outside this study. The application of a

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combination of Fishbone Diagram and Total Quality Management (TQM) has proven effective in identifying the root cause of production failure at PT Emsonic Indonesia. Some of the factors that are the main causes of production failure are Man Power: lack of employee training, high turnover rate, and undiscipline of production operators. Machine : the machine is old, lack of regular maintenance so that the quality of the machine is not optimal. Raw Materials: low quality standards of raw materials and inappropriate storage. Management : poor planning, inadequate quality monitoring, and unrealistic production schedules. Through the implementation of TQM supported by Fishbone. Diagram, The Company can reduce product defects, lower production costs, improve the efficiency of the product quality improvement process, and improve customer satisfaction and the Company's competitiveness. For more optimal results, PT Emsonic Indonesia is recommended to continue to make continuous improvement with a Plan-Do-Check-Act (PDAC) approach to maintain sustainability and improve product quality consistently.

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