Journal of Business and Management Studies
ISSN: 2709-0876
DOI: 10.32996/jbms
Journal Homepage: www.al-kindipublisher.com/index.php/jbms

JBMS
AL-KINDI CENTER FOR RESEARCH AND DEVELOPMENT

| RESEARCH ARTICLE

Improving the Quality of People's Salt Using the Blue Economy Concept in East Java Province, Indonesia

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| ABSTRACT

Assessment of the quality of people's salt in East Java Province is only seen based on color and shape, even though the NaCl level determines whether or not the quality of the salt is good. Implementing the production process is often counterproductive, with reusing "bittern" for production affecting quality. Still, some also throw away "bittern" which can cause ecosystem pollution, contrary to the blue economy concept. This study aims to determine the quality control of people's salt, the implementation of blue economy principles in the salt sector, and solutions to improve the quality of people's salt in East Java Province by considering the blue economy principles. The research approach uses mixed methods with quantitative descriptive and qualitative descriptive. Data is collected through interviews, observation, documentation, and audio and visual materials. Quantitative descriptive data analysis techniques used statistical process control and capability analysis, while qualitative descriptive data analysis used the Interactive Model, including data condensation, data display, and conclusion drawing/verification. The results of this study indicate that it must improve people's salt quality control in East Java Province because the average is still in the K3 quality category. NaCl levels < 85% and 85%-89.99% and Mg levels 0.080%-0.099% are a top priority for quality control. Analysis of process capability shows that production is inadequate, and the people's salt in East Java Province has not been able to meet the quality standards for iodized consumption salt and industrial salt for various foods due to personnel, measurements, methods, materials, and environmental factors. Solutions to improve the quality of people's salt by referring to the blue economy principle through increasing the competence of farmers, preparing production SOPs, applying semi-modern production technologies, improving techniques for transferring water and raw materials, washing and recrystallization, providing assistance with production facilities, technical guidance, and having a policy for determining salt as a basic need and salt commodity reference price.

| KEYWORDS

Quality Control, Statistical Process Control, Process Capability, Blue Economy, People's Salt

| ARTICLE INFORMATION

ACCEPTED: 28 January 2023 **PUBLISHED:** 04 February 2023 **DOI:** 10.32996/jbms.2023.5.1.12

1. Introduction

The vast Indonesian sea with a very long coastline provides excellent potential for the cultivation and marine products and the main potential for the production and development of its salt. Even so, Indonesia is not the largest salt producer in the world. Even today, salt production in Indonesia can still not meet domestic demand in quantity and quality. The national salt problem is related to the production sector, namely the quality of national salt production is partly still at the KP 2 quality level, the quantity of national salt production has not been able to meet industrial needs, and imports of industrial salt are increasing every year (Amalyos, 2020). In addition, based on the presentation of DJPRL Performance Achievement Semester I of 2022, it is explained that in the sea space management business process, there are 8 (eight) strategic issues being handled at this time, one of which is increasing the production and quality of people's salt, where the expected conditions related to these issues are the fulfillment of

consumption salt and salt of various foods. The need for salt in Indonesia from year to year continues to increase. However, this has not been matched by the rise in domestic salt production, so we must resolve the gap between salt demand and production by forcing Indonesia to import salt to meet Indonesia's salt needs. In practice, the industrial sector requires salt of a higher quality than the quality of salt for household consumption.

East Java Province is one of the provinces that have the most significant salt production contribution in Indonesia. It noted that East Java Province supported 70 per cent of national salt production during its journey. Even though it is the province with the most significant salt production, for the last two years, salt production in East Java Province has decreased. The total production of people's salt in East Java Province in 2020 has reduced very drastically by almost 50% from the previous year, namely from a total production of 856,449.45 tons to 471,370.85 tons to 471,370.85 tons (Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia, 2021, 2022). On the other hand, in terms of the quality of people's salt production in East Java Province is as follows:

Table 1. Quality of People's Salt in East Java Province in 2018-2021

Salt Quality Category	Total Production (Tons)			
	2018	**2019**	**2020**	**2021**
KP 1	190.457,22	1.142.359,02	266.723,77	584.472,87
KP 2	761.828,86	422.166,97	113.918,87	140.956,31
KP 3		12.146,43	15.673,90	14.984,90
Total Production	**952.286,08**	**1.576.672,42**	**396.316,54**	**740.414,08**

Source: Maritime Affairs and Fisheries Office of East Java Province (2022)

Based on Table 1, it can be seen that in terms of the quality of people's salt production in East Java, the last four years have not been consistent, as can be seen from the amount of salt production in each quality category, the quality of which has fluctuated. In 2018 the quality of people's salt in East Java was dominated by KP2-KP3 quality salt. Meanwhile, people's salt production in East Java in 2019-2021 is dominated by KP 1 quality salt. From the quality data recorded at the Maritime Affairs and Fisheries Service of East Java Province, it can be seen that there has been an increase in the quality of people's salt production in East Java Province, which is getting better. However, based on the results of interviews and preliminary observations conducted with salt farmers in several regencies/cities in East Java Province, determining quality (KP1, KP2, and KP3) is based on the shape, size and colour of the salt produced. In fact, compared with the quality standard SNI 4435:2017 Raw Material Salt for Consumption Iodized Salt, the quality grouping criteria are only based on the conditional test parameters and there are still several other test parameters being ignored. Of the several test parameters, the most noticeable difference is in the sodium chloride (NaCl) test parameter. The difference in the value of the NaCl content will also distinguish the quality of the salt produced. Arwiyah et al. (2015) also revealed that the quality of the salt depends on the NaCl content of the salt. It cannot detect NaCl levels by simply looking at the physicality of the salt and must be tested in a laboratory (Adiraga & Setiawan, 2014).

The description of this explanation indicates that the quality control system monitoring standards, measurements, and corrective actions for people's salt production in East Java Province are still not optimal. Heizer et al. (2020) argued that besides being an essential element in operations, quality also has other implications for reputation, product liability, and global importance. Quality control is evaluating output relative to standards and taking corrective action when the output does not meet standards (Stevenson, 2021). Quality control is significant for companies and needs to be realized so that companies can find irregularities in production processes so that companies can minimize the occurrence of as minor damage as possible due to production irregularities which will cause significant losses both in terms of quality and quantity (Tenny et al., 2018). Quality control efforts during production are referred to as statistical process control. Statistical Process Control (SPC) is a technique for testing random samples of the output of a process to determine whether the process produces items within the specified range (Jacobs & Chase, 2018). The advantage of Statistical Process Control (SPC) compared to other methods is that this method focuses on the early detection and prevention of problems rather than repairs after issues have occurred (Yuan et al., 2020).

The application of Statistical Process Control (SPC) in Indonesia has been widely applied in various industrial fields such as construction (Wardah & H.S., 2018), beverages (Fitriani & Purwanggono, 2022), batik (Handayani et al., 2021), fish canning (Masniar et al., 2018), furniture (Elyas & Handayani, 2020), cocoa plantations (Suryaningrat et al., 2015), and many more are applied in other fields. Based on some of these studies, we can conclude that Statistical Process Control (SPC) is widely used for quality control using several tools, namely, flow charts, check sheets, histograms, control charts, pareto diagrams, and fishbone diagrams. In addition, most of the research objectives are only sufficient to use SPC tools without further analysis. Because statistical process control aims to minimize variability, further investigation is needed, namely capability analysis. According to Assauri (2016), capability analysis is a measure to determine whether variability is inherent in the output of a process.

On the other hand, in the implementation of the stages of salt production, salt farming communities often do counter-productive things. In the salt production process, in addition to producing salt, it also makes liquid waste, which is called "Bittern". The mineral content in macro ions in "bittern" includes magnesium (Mg^{2+}), potassium (K^{+}), sodium (Na^{+}), chloride (Cl^{-}), sulfate (SO_4^{2-}), and other minor compounds (Pratiwi et al., 2021). According to Wibowo et al. (2014), high concentrations of Magnesium (Mg) in waters can affect the growth of aquatic organisms and cause environmental problems indirectly. The high or low hardness of magnesium will have an impact on biota and marine ecosystems. However, based on the results of interviews, it is true that most salt farmers reuse it for the ageing process of young water if it is still possible to reuse it, while the rest still have salt farmers who will throw the "bittern" back into the sea. This is, of course, contrary to the blue economy concept, which has become the direction of Indonesia's Marine Policy contained in the Law of the Republic of Indonesia Number 32 of 2014 concerning Maritime Affairs Article 12 Paragraph (1), which reads that the Government and Regional Governments following their authority carry out Marine Management for the greatest possible the great prosperity of the people through the utilization and exploitation of Marine Resources by using blue economy principles. In addition, putting "bittern water" (above 30 oBe) back into the production process, which is done to speed up the screening process, can produce less good-quality salt (Widjaja et al., 2021).

The blue economy policy is a breakthrough considered more efficient in utilizing Indonesia's existing marine resources because Indonesia is rich in biological and non-biological potential contained in Indonesia's oceans. The Blue Economy is a concept that is increasingly popular as a strategy followed by several countries in the world to sustainably support and protect the oceans and water resources related to two areas, namely on the one hand development and economic growth and the other hand protection of marine resources (Grazianoa et al., 2019; Lee et al., 2020). The Blue Economy will improve the long-term benefits of using marine resources in a way that doesn't harm them. It will do this by finding profitable ocean-related sectors and activities. These benefits are worth trillions of dollars each year around the world, keep hundreds of millions of jobs going, and help all countries where half of the world's people live in the coastal zone (Vega-Muñoz et al., 2021).

Based on the description previously described, the objectives to be achieved in this study are (1) to determine the quality control of people's salt in East Java Province; and (2) to provide solutions to improve the quality of people's salt in East Java Province by taking into account the principles of the blue economy.

2. Literature Review

2.1 Total Quality Management (TQM)

Total Quality Management (TQM) is a holistic concept for improving the quality of products and services by involving all processes and activities in the company to ensure quality management (Khalil & Muneenam, 2021). TQM aims to make customers happier by improving the quality of goods and services while using as few resources as possible (Qasrawi et al., 2017). According to Heizer et al. (2020), seven tools that are very helpful in TQM efforts include a check sheet, scatter diagram, cause-and-effect diagram, pareto chart, flowchart, and statistical process control.

2.2 Statistical Process Control (SPC)

Statistical Process Control (SPC) is a statistical approach to monitoring and controlling a process to ensure it produces the right product (Madanhire & Mbohwa, 2016). Process quality control is divided into SPC based on variables and SPC based on attributes (Haming & Nurnajamuddin, 2017). According to Jacobs & Chase (2018), variables are quality characteristics measured in actual weight, volume, inches, centimeters, or other sizes. Process control with variable measurements can use $\bar{X}-$ and *R-Charts*. Attributes are quality characteristics classified as conforming or not conforming to specifications. According to Haming & Nurnajamuddin (2017), this model is used if the quality of the product to be evaluated can be distinguished into good or bad categories. Suppose the bad units can be expressed as a proportion of the samples withdrawn. In that case, quality control can be carried out using the p-Chart, but if the defects are described in a certain amount on the surface of each product unit inspected, then the c-Chart can be used.

2.3 Process Capability

Process capability is meeting design specifications (Heizer et al., 2020). The variability of a process can significantly impact quality. According to Stevenson (2021), three terms are often used to indicate the variability of the process output, namely (a) Specifications or tolerances are set by engineering designs or customer requirements which indicate the range of values in which each output unit must fall to be accepted; (b) Control limits are statistical limits that reflect the extent to which sample statistics such as the mean and range can vary due to randomness alone; and (c) Process variability reflects natural or inherent (i.e., random) variability in a process as measured in terms of the standard deviation of the process. Two quantitative measures are very well known for determining if a process has the capability, namely the process capability ratio (Cp) and the process capability index (Cpk) (Heizer et al., 2020).

2.4 Blue Economy

The Blue Economy is defined as the sustainable use of marine resources to reduce ecological scarcity and environmental risks, improve food security, human well-being, quality jobs, poverty alleviation, and economic growth, and ensure sustainable production and consumption that includes all stakeholders in the maritime sector (Akhir et al., 2021). According to the World Bank (2017), the blue economy is the sustainable use of marine resources for economic growth and increased livelihoods and jobs by maintaining the health of marine ecosystems. The legal basis in Indonesia for developing a blue economy is written in the Law of the Republic of Indonesia Number 32 of 2014 concerning Maritime Affairs and Presidential Regulation of the Republic of Indonesia Number 16 of 2017 concerning Indonesian Maritime Policy. The blue economy principle, according to Pauli (2010) and Zamroni et al. (2018), includes zero waste, social inclusion, innovation and adaptation, and economic multiplier effect.

3. Methodology

3.1 Types and Research Design

A mixed methods research approach with quantitative descriptive and qualitative descriptive was used to achieve the objectives of this study. In the first stage of this study, collected and analyzed data using a quantitative descriptive approach to accomplish the first goal, namely controlling the quality of people's salt in East Java Province. Then in the second stage, deepening the results of the previous analysis was carried out by collecting and analyzing data to achieve the second goal, namely to formulate solutions to improve the quality of people's salt in East Java Province by taking into account the principles of the blue economy. Research at this stage uses descriptive qualitative research.

3.2 Operational Definition and Variable Measurement

The operational definitions of the variables to be discussed in this study are as follows:

a. Quality control is a process for measuring people's salt production results in East Java Province relative to a standard and taking corrective action if people's salt production results cannot meet standards. The salt quality standard used in this study refers to the Regulation of the Minister of Industry of the Republic of Indonesia Number 88/M-IND/PER/10/2014 concerning Amendments to the Regulation of the Minister of Industry Number 134/M-IND/PER/10/2009 concerning Guide Map (Road Map) Salt Industry Cluster Development, SNI 4435:2017 Raw Material Salt for Iodized Salt Consumption, SNI 3556:2010 Iodized Salt Consumption, dan SNI 8207:2016 Salt for Various Food Industries. The salt quality test parameters used in this study were as carried out by Supriyo et al. (2022), namely Sodium Chloride (NaCl) and Magnesium (Mg) Impurity Levels.
b. Statistical Process Control (SPC) is a process used to monitor standards by measuring and taking corrective action on the people's salt products that are being produced. The tools used in this study include check sheets, pareto analysis, control charts, and cause and effect analysis (Oakland & Oakland, 2019).
c. The blue economy is a concept that encourages the sustainable use of marine resources, especially the salt sector, for economic growth and increased livelihoods and jobs by maintaining the health of the marine ecosystem in East Java Province. The blue economy principles used in this study are adopted by Pauli (2010) and Zamroni et al. (2018), including zero waste, social inclusion, innovation and adaptation, and multiplier economic effects.

3.3 Data Collection Technique

Data collection techniques for quantitative descriptive methods are observation and documentation. Observation is used to obtain data describing the production process of making people's salt and collecting documents used related to people's salt issues both at the national and provincial levels in East Java, including the amount of people's salt production, the performance of people's salt production, the quality of people's salt, and the production process people's salt. At the same time, data collection in qualitative research involves four strategies: qualitative observation, qualitative interviews, qualitative documents, and audio and visual materials. Qualitative observations in this study were to obtain data on the quality of salt based on physique (salt production) and salt production process techniques. Data collection through interviews is used to obtain information in developing solutions to improve the quality of people's salt in East Java Province by taking into account the blue economy principles obtained from the Head of the Coastal and Small Islands Utilization Section for the Office of Maritime Affairs and Fisheries of East Java Province, Salt Team Trainer at Banyuwangi Fisheries Training and Counseling Center, Marine Science Lecturer at Trunojoyo Madura University, and Salt Farmers in East Java Province. The collection of documents used in this qualitative descriptive method relates to data on the quality of people's salt in East Java. As well as the form of data collection used is also the form of photos of salt production, the salt production process, and in the form of YouTube videos from the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia, BPPP Banyuwangi, and LINGKAR JATIM related to salt.

3.4 Data Analysis Technique

The data analysis technique used in this research is quality measurement using Statistical Process Control (SPC) used for quantitative descriptive data analysis techniques and preparing solutions to improve the quality of people's salt by considering the blue economy using descriptive qualitative data analysis procedures with the Interactive Model from Miles et al. (2014).

Processing of quantitative descriptive data for quality control uses the tools found in Statistical Process Control (SPC), namely check sheets, Pareto charts, control charts, and cause and effect diagrams, which are then followed by process capability analysis. Statistical Process Control (SPC) data analysis and capability analysis were assisted by Minitab 19 software. Meanwhile, the qualitative descriptive data analysis steps used the Interactive Model, including data condensation, data display, and conclusion drawing/verification.

4. Results and Discussion

4.1 Analysis of People's Salt Quality Control in East Java Province

4.1.1 Statistical Process Control (SPC

Controlling the quality of people's salt in East Java Province in this study used the Statistical Process Control (SPC) method, which consisted of check sheets, pareto analysis, control charts, and cause and effect analysis. The use of these statistical tools is considered to be able to fulfil the objectives of the first study, namely to determine quality control in the people's salt production process as well as the factors that influence the quality of people's salt in East Java Province.

a. Check sheet

Check sheets are data collection and analysis tools that use tools to simplify the process of collecting data for specific purposes and present it in a communicative form so that it can be converted into information (Murjana & Handayani, 2022). Data on the quality of people's salt collected on the check sheet of this study are as follows:

Table 2. Check Sheet of People's Salt Quality in East Java Province

No	Area Origin	Harvest Age	Production Method	Salt Quality Parameters	
				NaCl (%)	Mg (%)
1	Lamongan Regency	7 days	Geomembrane Technology	94,9400	0,081
2	Lamongan Regency	15 days	Prism Technology	96,7788	0,080
3	Sampang Regency	7 days	Traditional	65,3979	0,052
4	Sampang Regency	5 days	Geomembrane Technology	89,5385	0,090
5	Sidoarjo Regency	7 days	Geomembrane Technology	82,4582	0,097
6	Bangkalan Regency	3-4 days	Geomembrane Technology	87,1670	0,086
7	Gresik Regency	10 days	Geomembrane Technology	83,7619	0,093
8	Tuban Regency	4 days	Geomembrane Technology	94,5676	0,082
9	Probolinggo Regency	7 days	Traditional	86,3091	0,084
10	Probolinggo Regency	2-3 days	Geomembrane Technology	77,3735	0,085
11	Pamekasan Regency	7 days	Geomembrane Technology	95,3152	0,083
12	Pamekasan Regency	8 days	Traditional	80,3969	0,079
13	Pasuruan Regency	5 days	Geomembrane Technology	87,1670	0,102
14	Surabaya City	5 days	Geomembrane Technology	81,9797	0,088
15	Pasuruan City	6 days	Geomembrane Technology	89,5939	0,092
16	Sumenep Regency	4-5 days	Geomembrane Technology	88,1449	0,083
Average				**86,3056**	**0,085**

Source: Laboratory Testing Results (2022)

The quality of salt in this study used test parameters for Sodium Chloride (NaCl) and magnesium (Mg) levels. Based on the check sheet in Table 2, shows that the Sodium Chloride (NaCl) content in people's salt production in East Java Province is in the range of 65% to 96% where the highest NaCl content is produced using prism technology from Lamongan Regency. In contrast, the lowest NaCl content is produced traditionally from Sampang Regency. When viewed based on the grouping of salt contained in the Regulation of the Minister of Industry of the Republic of Indonesia Number 88/M-IND/PER/10/2014 concerning Amendments to the Regulation of the Minister of Industry Number 134/M-IND/PER/10/2009 concerning the Guide Map (Road Map) Development of the Salt Industry Cluster, the salt NaCl content of the people in East Java Province can meet the quality standards of consumption salt (household) and industrial salt (chemical industry, petroleum industry, water treatment, and leather tanning industry). So that the people's salt in East Java has not been able to meet the quality standards for salt for the various food industries and the pharmaceutical industry because these two types of salt have quality requirements with high NaCl levels. Apart from that, the consumption of dietary salt is also not sufficient because the salt NaCl level of the people in East Java exceeds the quality standards of dietary salt. Overall, the average NaCl content of people's salt in East Java is 86.3056, which is based on SNI 4435:2017 Raw Material Salt for Iodized Consumption Salt, indicating that people's salt in East Java is included in the K3 quality salt category. As for the content of levels of Magnesium (Mg) in people's salt in East Java Province, which is in the range of 0.05% to 0.10%, with an overall average of 0.085% where the highest Mg content is produced with geomembrane technology from Pasuruan Regency and

The lowest Mg is produced traditionally from Sampang Regency. When compared with the quality standards in SNI 8207:2016 Various Food Industry Salt and the Regulation of the Minister of Industry of the Republic of Indonesia Number 88/M-IND/PER/10/2014 concerning Amendments to the Regulation of the Minister of Industry Number 134/M-IND/PER/10/2009 Concerning the Guide Map (Road Map) for the Development of the Salt Industry Cluster, the maximum magnesium (Mg) content for various food industry salts is 0.06%. This shows that the levels of magnesium (Mg) in people's salt in East Java Province still do not meet the salt standards for the various food industries and are only able to meet the salt quality standards for the petroleum industry with a maximum magnesium (Mg) content of 0.3%.

b. Pareto analysis

The grouping of sodium chloride (NaCl) content categories in this pareto diagram are based on the grouping of quality standards for K1, K2, and K3 salts contained in SNI 4435:2017 Raw Material Salt for Iodized Salt Consumption. With this pareto diagram, it can be seen that the quality of people's salt in East Java Province is based on the categories of Sodium Chloride (NaCl) and Magnesium (Mg) levels which must be prioritized first, which can be seen as follows:

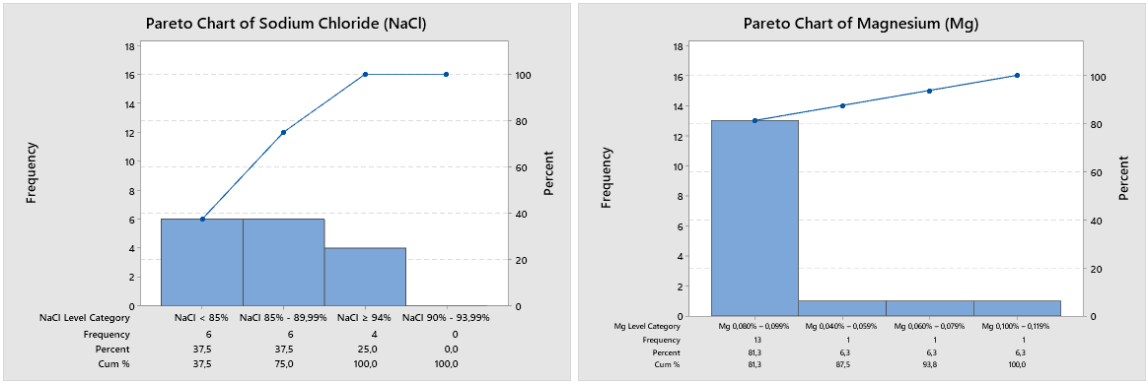

Figure 1. Pareto Diagram of Sodium Chloride (NaCl) and Magnesium (Mg) Salt of the People in East Java Province

Source: Data Processing Results (2022)

Based on Figure 1 of the pareto diagram, it can be seen that the levels of Sodium Chloride (NaCl) in people's salt in East Java Province, the category of NaCl <85% and NaCl 85% - 89.99% is the most dominant with a percentage of 37.5% respectively, ranking first and second quality control priority, while the third rank quality control priority is the category of NaCl ≥ 94% with a percentage of 25%. So it can be concluded that the category of NaCl <85% and NaCl 85% - 89.99% in people's salt in East Java Province is a top priority for improvement. The NaCl category of people's salt < 85% is still below the minimum standard for both SNI 4435:2017 Raw Material Salt for Consumption Iodized Salt and SNI 8207:2016 Salt for Various Food Industries. Meanwhile, the 85% - 89.99% NaCl category, when compared to the existing standards, is included in the K3 salt quality category and is still below the minimum standard of SNI 8207:2016 Industrial Salt of Various Foods. From the pareto diagram of the levels of magnesium (Mg) in the salt of the people in East Java Province, it can be seen that the Mg category of 0.080% - 0.099% is the most dominant with a percentage of 81.25%, which ranks first as a priority for quality control, while for the second, third, and fourth for priority control quality is the category of 0.040% – 0.059%; 0.060% – 0.079%; and 0.100% - 0.119% with each percentage of 6.25%. So it can be concluded that the Mg category 0.080% - 0.099% in people's salt in East Java Province is a top priority for improvement. The category of Magnesium (Mg) in people's salt is still above the maximum standard of SNI 8207:2016 Assorted Food Industry Salt. These results are following what Das H (2019) revealed with the pareto chart helping to deal with problems or analyze deficiencies based on focusing on vital and more critical issues to prioritize problems or defects that must be addressed.

c. Control chart

The control chart used in this study is the control chart for variable data with individual observations (I-MR). The I-MR control chart was chosen in this study due to time constraints and laboratory testing, which is quite expensive, so the sample testing data obtained is individual. The IMR control chart illustrates the variations in the people's salt production process in East Java Province. A control chart was made for the levels of Sodium Chloride (NaCl) and Magnesium (Mg) in people's salt in East Java Province which can be seen as follows:

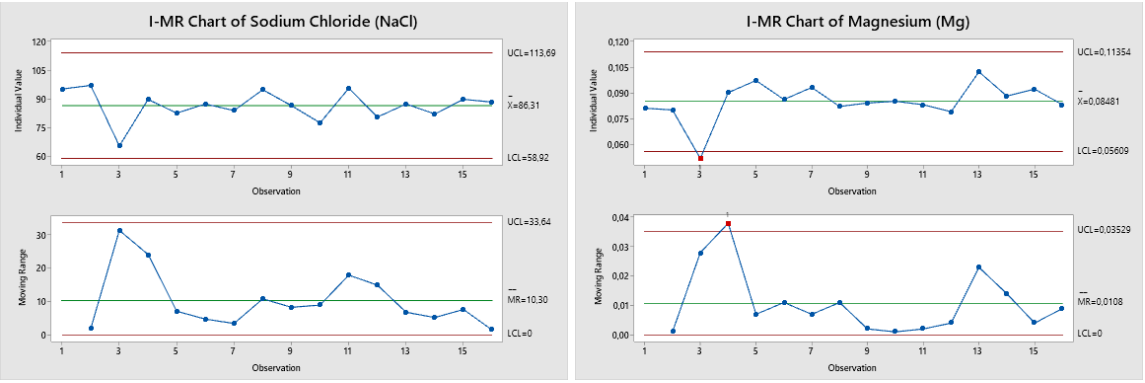

Figure 2. Control Chart of Sodium Chloride (NaCl) and Magnesium (Mg) Salt of the People in East Java Province
Source: Data Processing Results (2022)

Based on data on levels of Sodium Chloride (NaCl) salt of the people in East Java Province in the control chart I shown in Figure 2, it can be seen that the upper control limit (UCL) is 113.69%, the lower control limit or LCL) of 58.92%, the average sample content of Sodium Chloride (NaCl) is 86.31%. Meanwhile, the R/MR control chart shows that the upper control limit (UCL) is 33.64%, the lower control limit (LCL) is 0%, and the average is 10.30%. The I-MR control chart shows that all samples of Sodium Chloride (NaCl) levels in people's salt in East Java Province are within the upper and lower control limits. This means that the levels of Sodium Chloride (NaCl) in people's salt in East Java Province show no process variations that are out of control or under controlled conditions (in control) statistically, so because there are no process variations that are outside the control limits; therefore no revision is needed. Thus the process is under control and is considered to have met the standards. However, the average sample content of Sodium Chloride (NaCl) in people's salt in East Java Province (86.31%) is compared to the standard SNI 4435:2017 Raw Material Salt For Consumption Iodized Salt (Quality K1 = min 94%; Quality K2 = min 90%; and K3 = min 85%), SNI 3556:2010 Consumption Iodized Salt (min 94%) and standard SNI 8207:2016 Various Food Industry Salt (min 97%) it can be said that the people's salt sample in East Java Province is only met K3 salt quality standards and has not been able to meet quality standards for iodized consumption salt or industrial salt for various foods. The results of this study follow those of Riyanthi et al. (2014), which explain that the production process is at the control limit; still, the production process is not yet perfect because the points between the UCL and LCL are not parallel to the center or center line. When compared with data on the quality of people's salt obtained from the Office of Marine Affairs and Fisheries of East Java Province, it shows that most of the quality of people's salt in East Java Province is dominated by K1 quality salt. This is contrary to the results of this study which shows the average quality of people's salt in East Java Province is K3 quality. The Office of Maritime Affairs and Fisheries of East Java Province visually evaluates the quality of people's salt and that of salt farmers, from the color and shape. Still, in this study, the salt quality assessment was based on laboratory testing results. From this research, it can be explained that to see the good quality of salt visually is clear white and in the form of lump crystals which are not easily brittle when held.

As for the data on the levels of Magnesium (Mg) salt of the people in East Java Province on control chart I, it can be seen that the upper control limit (UCL) is 0.11354%, the lower control limit (LCL) is 0. .05609%, the average sample content of Magnesium (Mg) is 0.05609%. Meanwhile, the R/MR control chart shows that the upper control limit (UCL) is 0.03529%, the lower control limit (LCL) is 0%, and the average is 0.0108%. As for the I-MR control chart, it shows that there is 1 sample data point for the level of Magnesium (Mg) in people's salt in East Java Province which is outside the upper and lower control limits. This can be seen from the 3rd sample (0.052%) on the control chart I, which is outside the lower control limit, and on the R/MR control chart, it can be seen that the 4th sample (MR=0.038%) is outside the upper control limit. This means that the level of Magnesium (Mg) in the salt of the people in East Java Province shows that there are process variations that are statistically out of control or out of control. Even though it is outside the control limits, the sample does not require corrective action (not considered deviant) because it is the only sample that has a Magnesium (Mg) level according to SNI 8207:2016 Assorted Food Industrial Salt (max 0.06%). This can happen because most salt farmers in East Java Province reuse "bittern" for the production process it can cause the levels of Magnesium (Mg) in the salt produced to be high, and the taste of the salt will also be bitter. However, salt farmers suspect the bitter taste in salt is caused by the geomembrane. This could happen, but until now, no scientific study has examined the impact of using geomembranes on the taste of salt produced. If only one or two points are outside the control limits, this will not create significant deviations from the resulting control chart (Maimury & Tannady, 2015). The results of this study are in line with the results of research conducted by Rahayu et al. (2016), which shows the weight of type four box sheets originating from supplier B is outside the control limit, which means that supplier B's box weight exceeds the control limit of 3σ, so it is necessary to consider stricter quality management for supplier B. Even though the weight of type four boxes is outside the control limits, the average weight of all types of boxes exceeds company specifications, so it can be concluded that box packaging is not a significant source of product weight variability.

d. Cause and Effect Diagram

The cause and effect diagram identifies what causes low levels of Sodium Chloride (NaCl) and high levels of Magnesium (Mg) in people's salt production in East Java Province as follows:

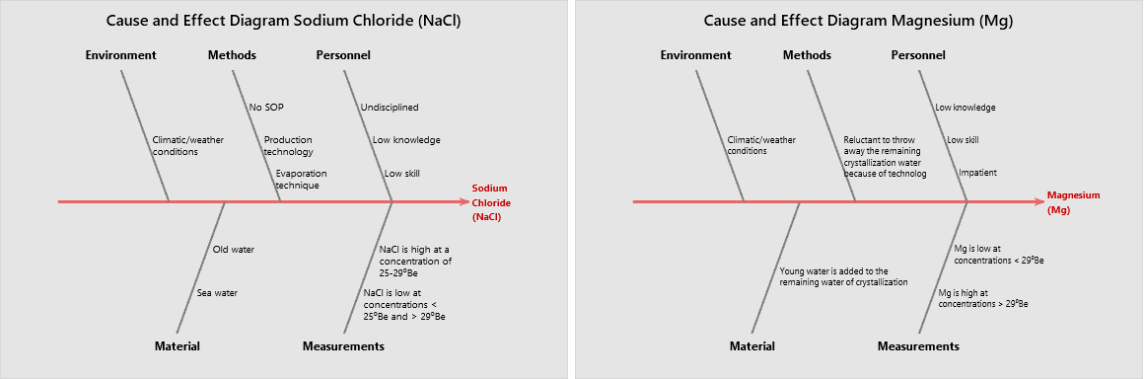

Figure 3. Cause and Effect Diagram of Sodium Chloride (NaCl) and Magnesium (Mg) Salt of the People in East Java Province

Sumber: Hasil Pengolahan Data (2022)

Based on Figure 3 above, it can be seen the causes of high and low levels of Sodium Chloride (NaCl) and Magnesium (Mg) in people's salt in East Java Province can be explained as follows:

- Personnel factors include knowledge, expertise, tenacity, and patience of salt farmers who are still low where they only use knowledge/skill that has been passed down from generation to generation or experience.
- Measurement factor, the concentration of old water is not correct so it will result in the quality of production. To obtain high levels of NaCl, harvesting can be done when the concentration level is between 25-29^{0}Be, and if it is less or more than this limit, the resulting NaCl level will be low. Meanwhile, to obtain low levels of Magnesium (Mg), harvesting can be done when the level of concentration is <29^{0}Be, and if it is more than that, the Mg salt content produced will be high.
- Method factors, including production technology (traditional, geomembrane, prism housing), the absence of standard SOPs, and improper evaporation techniques. With the development of production technology, salt farmers are reluctant to dispose of the remaining crystallization water, so they reuse it for the production process even though this will affect the quality of the salt produced, namely the Mg level will be higher, and the NaCl level will be low.
- Materials factors include seawater quality, old water, and bittern added to young water, which will also impact NaCl and Mg salt levels. For most salt farmers in East Java Province in the salt production process, the old water is the water left over from the crystallization process on the crystal table (bittern) mixed with young water. Even though “bittern” water still contains NaCl, its composition is only small, sot the use of this water causes the levels of Magnesium (Mg) in people's salt in East Java Province to be still high, and the resulting salt has a bitter taste. In addition, salt farmers do not reuse "bittern" for the production process to get better quality salt. Still, until now the resulting "bittern" waste is thrown away without further processing.
- Environmental factors, of course, can be influenced by climate/weather conditions because, in the salt production process, the people are very dependent on the existing climatic/weather conditions, which include wind speed and direction, air temperature, solar radiation, air humidity, and rainfall which will affect the quality of the salt produced because it is not uncommon for salt farmers whose production process is traditional or geomembrane to carry out harvesting activities earlier before the time for harvesting.

This is also in line with research conducted by Liu (2016), which shows that personnel, machines, materials, methods, environment, and measurements cause the problem of low quality.

4.1.2 Process Capability Analysis

Process capability helps compare the performance of a process against specifications (Kumara & Wagha, 2018). Before carrying out a process capability analysis, the data is tested for normality first. If the P-Value > 0.05, the data can be said to be normally distributed; if the p-value < 0.05, the data is not normally distributed (Putra et al., 2017). The results of examining the distribution of data on levels of Sodium Chloride (NaCl) in people's salt in East Java Province using Minitab are presented as follows:

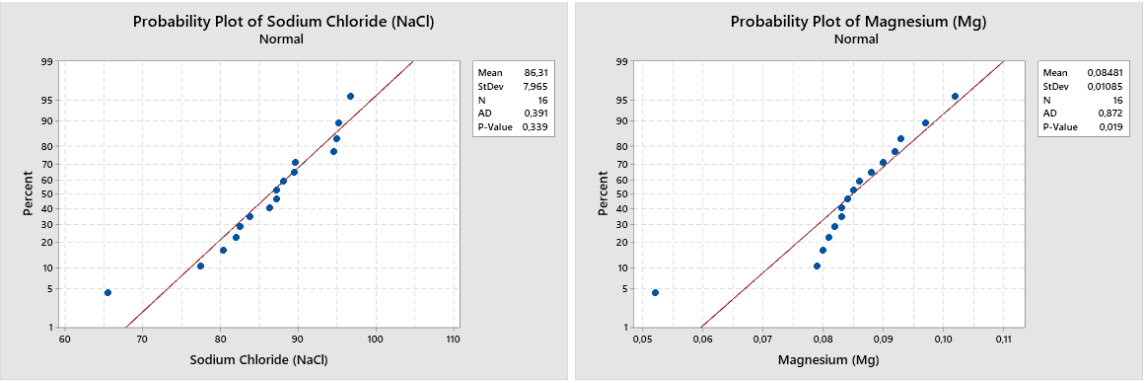

Figure 4. Probability Plot of Sodium Chloride (NaCl) and Magnesium (Mg) Salt of the People in East Java Province
Source: Data Processing Results (2022)

Figure 4 shows that the data on the Sodium Chloride (NaCl) levels in people's salt in East Java Province are normally distributed. This is demonstrated by the Anderson-Darling value of 0.391 and the P-Value of 0.339 (greater than the significance level, α = 0.05). Meanwhile, data on magnesium (Mg) levels in people's salt in East Java Province are not normally distributed. This is shown by the Anderson-Darling value of 0.872 and the P-Value of 0.019 (smaller than the significance level, α = 0.05). Because the data is not normally distributed, it is necessary to find which normal distribution is most suitable for process capability analysis by looking for plots. The results of the probability plot modeling that has been carried out on all possible distributions with the highest P-Value are as follows:

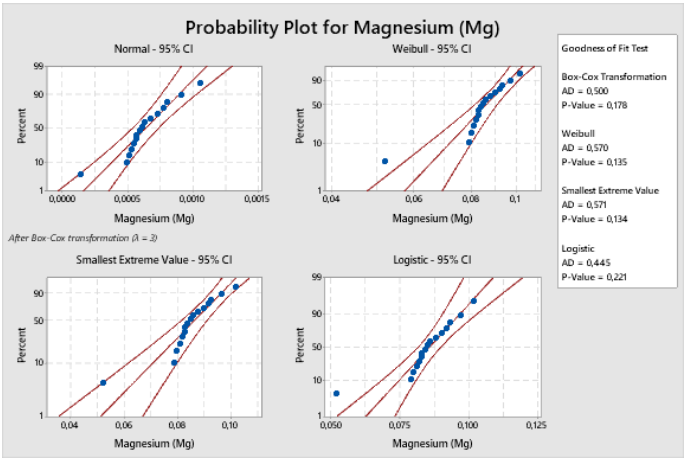

Figure 5. Modeling the Probability Plot of Magnesium (Mg) for People's Salt in East Java Province
Source: Data Processing Results (2022)

Based on Figure 5 above, it can be seen that the highest P-Value value is found in the Logistics distribution with a P-Value of 0.221, so this distribution is used to perform process capability analysis for Magnesium (Mg) content in people's salt in East Java Province. The next stage is to determine the process capability analysis of data on Sodium Chloride (NaCl) salt levels of the people in East Java Province using the normal distribution. The specifications set for the lower specification limit (LSL) are based on the Regulation of the Minister of Industry of the Republic of Indonesia Number 88/M-IND/PER/10/2014 concerning Amendments to the Regulation of the Minister of Industry Number 134/M-IND/PER/10/2009 concerning Guide Map (Road Map) Development of Salt Industry Clusters, SNI 3556:2010 Iodized Salt for Consumption, dan SNI 8207:2016 Salt for Various Food Industries where it can be explained that consumption salt, especially household salt, is iodized consumption salt with a minimum NaCl content of 94% on a dry basis (adbk), while for industrial salt, precisely the specifications for industrial salt for various foods, are iodized or non-iodized salt with food grade standards and have been processed to a certain level of fineness with a minimum NaCl content of 97% on a dry basis (adbk). The results of capability analysis for the levels of Sodium Chloride (NaCl) in people's salt in East Java Province based on SNI 3556:2010 Iodized Consumption Salt dan SNI 8207:2016 Various Food Industry Salt obtained after processing data using Minitab can be seen as follows:

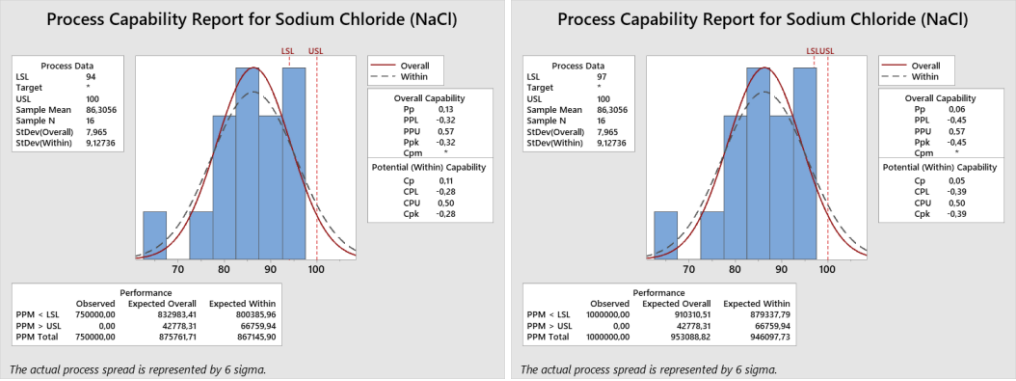

Figure 6. Process Capability of Sodium Chloride (NaCl) for People's Salt in East Java Province with Standards for Iodized Salt Consumption and Industrial Salt for Various Foods

Source: Data Processing Results (2022)

Based on the results in Figure 6, a Cp value of 0.11 and a Cpk of -0.28 is obtained for process capability based on SNI 3556:2010 Iodized Salt Consumption. Cp value 0.11 < 1.00 and Cpk value = -0.28 < 1.00 means that the people's salt production process in East Java Province is not appropriate or inadequate because much of the people's salt produced as sodium chloride (NaCl) levels outside the minimum standard limit for consumption of iodized salt (upper specification limit (USL) = 100% and lower specification limit (LSL) = 94%) and the possibility of the system producing an out of specification process of 750000 ppm. At the same time, process capability based on the SNI 8207:2016 Standard for Various Food Industry Salt obtained a Cp value of 0.05 and a Cpk of -0.39. Cp value 0.05 < 1.00 and Cpk value = -0.39 < 1.00 means that the people's salt production process in East Java Province is not appropriate or inadequate because much of the people's salt produced has high levels of Sodium Chloride (NaCl). Beyond the minimum standard limits for various food industry salts (upper specification limit (USL) = 100% and lower specification limit (LSL) = 97%) and the possibility of the system producing an out-of-specification process of 1000000 ppm. So, process analysis requires serious modifications to achieve satisfactory quality (Sambrani, 2016).

Process capability analysis for Magnesium (Mg) levels in people's salt in East Java Province uses a non-normal distribution. The specifications set for the upper specification limit (USL) are based on the Regulation of the Minister of Industry of the Republic of Indonesia Number 88/M-IND/PER/10/2014 concerning Amendments to the Regulation of the Minister of Industry Number 134/M-IND/PER/10/2009 concerning Guide Map (Road Map) Development of Industrial Salt Cluster and SNI 8207:2016 Industrial Salt of Various Foods where it can be explained that the specifications for industrial salt of various pangas are iodized or non-iodized with food grade standards and have been processed to a certain fineness level with a maximum magnesium (Mg) level of 0,06%. The results of the process capability analysis for the content of Magnesium (Mg) are presented in the following figure:

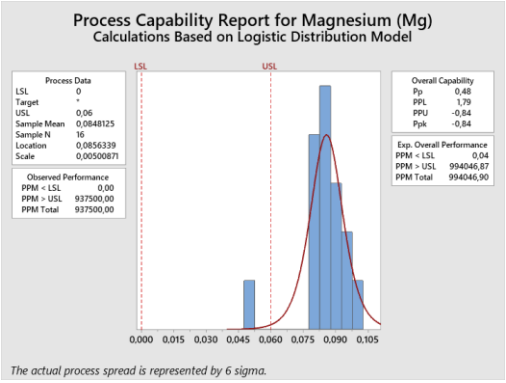

Figure 7. Process Capability of Magnesium (Mg) People's Salt in East Java Province with Various Food Industry Salt

Source: Data Processing Results (2022)

Based on the results shown in Figure 7, the Pp value is 0.48, and Ppk is -0.84. A Pp value of 0.48 < 1.00 means that the people's salt production process in East Java Province can be said to be not good because a lot of the people's salt produced has a level of Magnesium (Mg) that is outside the maximum standard limit for various food industrial salts (upper specification limit (USL) = 0.06% and the lower specification limit (LSL) = 0%) so that process improvement is needed to achieve the set quality standards and the minimum Pp value is greater than 1 (Ratnaningsih & Lestari, 2020). At the same time, the Ppk value = -0.84 <0, which

means that the people's salt production process in East Java Province is still outside the maximum standard limit for various food industry salts that have been set and the possibility of the system producing an out of specification process of 937500 ppm.

Based on all the previous descriptions, the results of the process capability analysis show both in terms of Sodium Chloride (NaCl) and Magnesium (Mg) levels that the people's salt production process in East Java Province is inadequate or not good because a lot of people's salt is produced by salt farmers in Java Province East which is outside the standard limits specified for both the standard SNI 3556:2010 Iodized Consumable Salt and the standard SNI 8207:2016 Assorted Food Industry Salt so that process analysis is needed and requires serious modification to achieve satisfactory quality. These results align with Rimantho & Athiyah's (2019) so process analysis is needed and requires serious modification to achieve satisfactory quality. These results align with those (Arif, 2022).

Overall the results of this study are in line with the research conducted by Shiyamy et al. (2021), which shows that product quality control in the production process at MSMEs Mustika Bunda can still be said to be not fully controlled because, during the production process, there are points that are out of control as a whole and graphic fluctuations show significant movement, meaning that MSMEs needs to improve and review Product quality control activities carried out to reduce the level of irregularities that occur. Thus, controlling the quality of people's salt in East Java Province must continue to be improved in a better direction so that proposed solutions for improvements can be made to improve the quality of people's salt so that it can meet quality standards for iodized consumption salt and industrial salt for various foods.

4.2 Solutions to Improve the Quality of People's Salt in East Java Province by Considering the Blue Economy Principles

Based on the results of data processing and analysis that has been carried out, several solutions can be developed to improve the quality of good people's salt in East Java Province by considering the blue economy principles as follows:

4.2.1 Proposed Solutions to Improve the Quality of Personnel Factors

Actions that can be taken to improve the quality of people's salt in East Java Province from the personnel factor, namely by increasing the competence of salt farmers through salt farmer competency certification for both owners and workers of salt ponds. Certification for salt farmers is planned to be carried out by the Office of Maritime Affairs and Fisheries of East Java Province to improve the quality of the salt produced. This salt farmer competency certification is in the form of training to increase the knowledge and skills of salt farmers when producing salt. This certification scheme includes salt production using the geomembrane method, prism housing, valve system, or tunnel to have high-quality salt. Materials obtained during the training include competence in the basic knowledge of salt production following each production method scheme, occupational safety competencies, and salt production operational practices. The benefits of certification obtained for salt farmers are that they will get a certificate of expertise in producing salt with good quality following their respective production method schemes, which will have advantages including recognition and professional protection for salt farmers, ensuring employers or customers that salt farmers have worked according to standards; as well as increasing the competitiveness and bargaining position of salt farmers. Salt farmers support the certification program in the hope that there will be price improvements following the quality of the salt produced due to recognition of competence with the products produced. Competency-based training and professional certification are part of the efforts to implement Human Resources (HR) development (Achmadi, 2020). According to Badi'ah et al. (2021), training can increase or add new knowledge in the same field or outside the field of work. Meanwhile, competency certification for the owner of the certificate is essential for his existence because it is recognized by the State so that it can be a plus for the owner of the certificate, and through certification, a person will experience an increase in the quality of work and can provide better performance at work (Rosani, 2022).

4.2.2 Proposed Solutions for Quality Improvement of Measurement and Methods Factors

Actions that can be taken to improve the quality of people's salt in East Java Province from measurement and methods factors are as follows:

a. It is necessary to formulate SOP recommendations for people's salt production to guarantee the quality of the salt produced because, in practice today, there are still frequent inconsistencies in the production process implementation. Hence, productivity and quality are still very diverse.
b. Semi-modern production technology, which includes geomembrane technology, prism housing, valve systems, and tunnels, can be applied to improve the quality of people's salt. Each technology has its advantages and disadvantages, as shown in Table 3. However, prism house technology is a production technology which can produce the best quality compared to other technologies. But of course, it needs to be considered because, with higher technology, production costs will also increase. The quality of salt produced traditionally based on the results of laboratory tests obtained NaCl levels between 65.3979% to 86.3091% and Mg levels between 0.052% to 0.084%. This traditional salt production method is undoubtedly contrary to the blue economy principle of innovation and adaptation because, according to Zamroni et al. (2018), innovation is formed from

an adaptation when wanting to do efficiency. The people's salt production process with this traditional method will require longer. Apart from that, in terms of productivity, salt production is only around 40-60 tons/hectare/per season when the weather is normal. While the explanation of each semi-modern people's salt technology method in East Java Province is as follows:

Table 3. Comparison of People's Salt Production Technology in East Java Province

Production Technology	Salt Quality		Production Quantity (tons)	Advantages	Deficiency
	NaCl (%)	Mg (%)			
Geomembrane	77,3735-95,3152	0,081-0,102	80-120	- Speed up the production process time - Lighter work - The resulting salt is more white	- Weather dependent - There is an additional fee for the geomembrane
Prism House	96,7788	0,080	240-260	- Best quality - Not weather dependent - Production all year round	- There is an additional fee for making prisms - The prism construction is quite difficult - Requires special skills
Valve System	96,4	-	> 300	- Not weather dependent - Cover can be opened and closed - Production all year round	- There are additional costs for construction - Application can only be small scale
Tunnel	-	-	-	- Not weather dependent - Production all year round - Faster production time	- Heat is out of focus - Skeleton less strong - Less suitable for expanse with solid winds

Source: Data Processing Results (2022)

With the application of several semi-modern technologies to the people's salt production methods in East Java Province, salt farmers can increase the quantity and quality of the people's salt produced by implementing the principles of innovation and adaptation. Technological innovations that are continuously encouraged and applied to the community can become the engine of the economy and will create added value because, with a touch of innovation, the products produced will have competitiveness and have a pretty good price-quality to provide an increase in the community's economy (Prayuda & Sary, 2019). Thus, this is in line with the principles of innovation and adaptation in implementing the blue economy concept, where this principle uses technology based on the laws of physics to adapt to natural conditions and available local resources (Fahrurrozi, 2020). The blue economy emphasizes applying the basic principles of physics, especially the law of gravity, in the sense that energy is distributed efficiently and evenly without extraction from outside energy (Prasutiyon, 2018).

c. The technique of moving water so that the evaporation process is maximized to improve the quality of the old water produced can be carried out through: (1) When the concentration of water concentration is at the level of 3-16^{0}Be, it is usually the sludge that settles the most; (2) When the water concentration is < 25^{0}Be, it is usually the calcium sulfate gypsum that precipitates the most; (3) The requirement to transfer old water from the refinery to the crystal table or what is called Release Old Water (LAT) when the concentration of water concentration is at the level of 25-29^{0}Be and a good time when Release Old Water (LAT) to the crystal table is done at 10:00 to 13:00. If before the 25^{0}Be level has been transferred to the crystal table, the gypsum will also precipitate on the crystal table. The salt crystallization process in the crystal table preferably old water, which has a concentration of 25-29^{0}Be; and (4) When the water concentration is at a level > 29^{0}Be, the most precipitated is magnesium, and the remaining old water is called bittern, so the maximum harvesting time is when the water concentration is 29^{0}Be if it is more than that, the salt will crystallize will be mixed with magnesium and the resulting salt also the NaCl level will be lower and in terms of taste it will also be bitter.

4.2.3 Proposed Material Factor Quality Improvement Solutions

Actions that can be taken to improve the quality of people's salt in East Java Province from material factors are as follows:

a. They are improving raw materials or the quality of young water into old water to minimize impurities, which can be done through (1) Filterization. Filters can be made to improve the quality of old water. This filter has many components, including palm fibre, charcoal, solid, etc. Filters can be used either from the beginning of the young water that from the sea enters the

young water bunker, refinement, up to the old water; and (2) Salt Fertilizer. Salt fertilizer can improve the quality of old water, which functions to separate dirt/impurities where light impurities will float, and heavy ones will settle. Salt fertilizers that can be used include the Soleran brand from Madura and the Ramsol brand from West Java.

b. Management of "bittern water" waste is based on the recommendations given by the Banyuwangi Fisheries Training and Extension Center to salt farmers. Suppose "bittern" is managed or reused for the production process. In that case, this "bittern" must be moved back to the beginning of the young water in the first screening and continue to flow, following the process again so that the content in the water will settle down by itself. Meanwhile, if the "bittern" is added to the young water on the crystal table, the salt will taste bitter later. Meanwhile, bittern waste thrown away without further utilization contradicts the blue economy's concept of zero waste. This "bittern" is the remains of old water on the crystallization table with a concentration level of > 29^0Be, where this bittern contains high minerals Mg, Ca, and SO4. Most of the people's salt farmers in East Java Province reuse "bittern" for the production process mixed with young water. This is in line with the principle of zero waste but impacts the quality of the salt produced, which will be bitter, and the NaCl content will be low. Widjaja et al. (2021) also explained that putting "bittern water" back into the production process can speed up the cleaning process but can cause low-quality salt production. In addition, salt farmers do not reuse it for production but throw it away without any further management. Doing this continuously and in large quantities can also damage nature because this bittern has a high magnesium content. Waste that has the potential to affect the environment is old water left over from washing salt (Dewanti et al., 2021). According to Wang et al. (2015), improper treatment of concentrated salt discharge will inevitably cause severe environmental problems, and the most widely used approach is direct discharge into the sea, which causes a series of problems to the surrounding seawater bodies due to their effects on salinity, temperature, turbidity, dissolved oxygen and metal concentrations. The release of concentrated salts with high salt levels, usually twice that of seawater, will result in dramatic ecological degradation, such as substantial damage to seaweed, plankton, invertebrates, and fish. If directed to technology and basic scientific knowledge, bittern water waste can still be utilized and reprocessed into raw materials for other products. Even the selling price of the waste generated from the production of this salt will also be far higher than the selling price of the salt. This "bittern" can be extracted into MgSO4, MgCl2, and CaCl2 for chemicals, extracted into lithium for raw materials for electric car batteries, and processed to be used as fertilizer, isotonic drinks, beauty products, materials for making tofu, and many more. Using waste from the people's salt production process in East Java Province for raw materials for other products can increase the potential for salt production. It can be an alternative for additional income for salt farmers. Zero waste means that nothing is wasted, waste for one is food for another, and waste from one process is a source of energy for another (Tegar & Gurning, 2018). This zero-waste principle emphasizes the cyclical system in the production process to create clean production where waste can become raw materials or energy sources for further production, which is expected to have economic value(Ervianto, 2018).

4.2.4 Proposed Solutions to Improve the Quality of Environmental Factors

Actions that can be taken to improve the quality of people's salt in East Java Province from environmental factors, namely in the production process of people's salt, can use production technology methods that can be carried out throughout the year, not depending on the weather. This salt production method includes prism house technology, valve systems, and tunnels because this technology is designed in a closed form so that it can overcome the problems of environmental factors, especially rain. Okcavia et al. (2022) also explained that technology is essential for developing a blue economy in Indonesia because, with adequate and more sophisticated technological innovation, salt farmers can produce more salt in a short time without being disturbed by weather changes and without the risk of failure, because if salt processing is done conventionally, it will take a long time and process and also produce salt with not very good quality.

4.2.5 Proposed Solutions to Improve the Quality of People's Salt in Order to Meet Industrial Salt Standards

Industrial salt has a high NaCl content, so the krosok salt from the salt farmers in East Java Province can be increased and meet industrial needs. Further processing is needed either chemically, mechanically, or a combination of both chemical-mechanical. This effort can be made through (1) Laundering. Washing can be done in salt, but the water used must be of good quality, do not use dirty washing water; and (2) Recrystallization. This recrystallization is carried out by melting the resulting krosok salt where this recrystallization process can be dried again to become salt by using a filter or boiling it. The recrystallization process without old water treatment can be good, but with old water treatment using filters or salt fertilizer, the results will be even better.

In addition, the main product of krosok salt, or what can be referred to as raw material salt, which is the salt commonly produced by salt farmers in general, also has the opportunity for further processing to be able to make food salt, non-food salt, and derived salt. Food salt is raw material salt as basic salt, which is processed into food salt. This food salt consists of iodized consumption salt and healthy salt (low NaCl salt). Non-food salt is used for industrial purposes in the pharmaceutical and beauty industries. In the pharmaceutical industry, this salt can be used as an ingredient in making infusions; in the beauty industry, this salt can be used as bomb salt, spa salt, and scrub products. Meanwhile, derived salt is the raw material that is further extracted or purified to become derived salt products which are usually used to manufacture fertilizers or paper-bleaching agents. In East Java Province

itself, the people's processed salt products produced by salt farmers are in the form of iodized consumption salt and spa salt, and that is only limited to groups of salt farmers who have formed a cooperative and are advanced. However, academics, students, and lecturers from the Maritime Studies Program at Universitas Trunojoyo Madura are developing many innovations in processed salt products. The development of processed salt products is expected to empower the community and increase the selling price of the salt itself.

The existence of further processing of krosok salt (raw material salt) produced by salt farmers in East Java Province into processed food salt, non-food salt, and derived salt is a form of implementation of the blue economy concept from the principle of the economic multiplier effect. According to Ervianto (2018), this economic multiplier effect means that every extraction of natural raw materials should have a multiplier effect which means that an economy can generate further economic activities that are in chains and have wide-reaching impacts. The multiplier economic effect has a market that is relatively safe and not vulnerable to market price fluctuations. The blue economy is more oriented toward multiple products, so it doesn't depend on a single product. As such, it can help stimulate local business opportunities and job creation, ultimately driving a long-term positive economic multiplier effect (Jones & Navarro, 2018).

4.2.6 Government Efforts in Improving the Quality of People's Salt

Several efforts have been made by the Office of Maritime Affairs and Fisheries of East Java Province so far to strengthen the production carrying capacity, continuity, and quality of people's salt, namely by distributing geomembrane grants, tunnel houses, production equipment (water pumps, wheelbarrows, cylinders, suction pumps, hoses, windmills), as well as providing technical training guidance. These aids were given to the People's Salt Business Group (KUGAR). To obtain grant assistance, these groups must make a proposal which is addressed to the Governor and will be approved by the Department of Marine Affairs and Fisheries of East Java Province. Apart from that, the government is still fighting to stipulate that salt can be included in staple goods and essential goods and the reference price for salt commodities. This policy is also awaited by salt farmers because, with the determination of salt as a basic need and related to the reference price, it is hoped that there will be differences in selling prices for each quality category. Through the difference in selling prices, it is expected that the quality of the salt produced will also be maintained because the selling price has been generalized for salt with good or low quality having the same selling price.

The research findings related to several solutions to improve the quality of people's salt in East Java Province can be used as a reference for formulating policies following the Presidential Regulation of the Republic of Indonesia Number 126 of 2022 concerning the Acceleration of National Salt Development, especially for activities utilizing salt production technology; improving water quality in the production process through re-filtering old water; salt processing to achieve standardization of raw material salt quality; certification of competence of salt farmers, strengthening the ability of salt farmers in production management through training, mentoring and facilitation; diversification of salt commodities produced by salt farmers; as well as the stipulation of salt as staple goods and/or essential goods and the reference price for salt.

5. Conclusion

Based on the results of data analysis and discussion that has been carried out, it can be concluded that the analysis using the Statistical Process Control (SPC) method can be explained that controlling the quality of people's salt in East Java Province must be improved in a better direction. The results of the control chart I-MR levels of Sodium Chloride (NaCl) show controlled conditions. Still, on average, the NaCl content of people's salt in East Java is 86.3056%, included in the category of K3 quality salt. It cannot meet the quality standards of iodized or industrial salt consumption for various foods. Whereas the levels of Magnesium (Mg) indicate uncontrolled conditions, the samples that are out of control limits meet the standards, and the average Mg content of people's salt in East Java Province is 0.085%, so they are not yet able to meet the standards of the various food industries. NaCl content is less than 85% and between 85% - 89.99% and Mg content between 0.080% - 0.099% is a top priority in quality control. Process capability analysis regarding sodium chloride (NaCl) and magnesium (Mg) levels shows that people's salt production in East Java Province is inadequate or not good enough. Personnel, measurements, methods, materials, and environmental factors cause this.

The solution to improving the quality of people's salt in East Java Province by taking into account the principles of the blue economy is through increasing the competence of salt farmers, preparing SOPs for salt production, applying semi-modern production technology (geomembrane technology, prism housings, valve systems, tunnels), improving water transfer techniques so that maximum evaporation process, improving the quality of raw materials by filtering and salt fertilizer, bittern must be transferred to the initial refinement to follow the process if it is reused for the production process, can apply prism house technology, valve systems, and tunnels to overcome weather problems, improve the quality of people's salt to be industrial salt through washing and recrystallization, the government must continue to provide infrastructure assistance for the production process, technical training guidance, as well as a policy that regulates the stipulation of salt as a basic need and/or essential item and a reference price for salt commodities.

Meanwhile, suggestions that researchers can convey to the relevant government are that the government should further improve the ability to control the quality of people's salt in East Java Province based on the results of Statistical Process Control (SPC) and capability analysis by solutions that have been prepared by researchers or other policies from the government based on causal factors that affect the quality of the people's salt so that in the future the quality of the people's salt produced is much better.

Funding: This research received no external funding.
Conflicts of Interest: The authors declare no conflict of interest.
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