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Identification of Productivity Factors in Salt Production Among the Madura People,s Salt Using the Murvin E. Mundel Method

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ABSTRACT

Sumenep Regency is the district that produces the highest amount of salt on the island of Madura. The salt produced is traded to various regions, creating a trading network. The issue at hand is that salt farmers in the Sumenep district are striving to enhance their salt productivity, which is currently considered inefficient. Therefore, it is necessary to measure salt productivity among the Madurese population. The aim of this study is to assess salt productivity among the people to achieve maximum quality in community salt production. Additionally, the study seeks to identify the factors influencing increases or decreases in salt productivity, particularly in the Sumenep district. This study commenced by identifying the criteria for Madurese salt productivity, determining input and output variables using the Murvin E. Mundel method, measuring productivity values for each productivity index, and subsequently analyzing salt production productivity among the Madurese. Based on the analysis, proposals for improvements will be formulated to address the existing challenges. It is noteworthy that the total productivity index has increased by 4%. so, it can be concluded that Madurese salt farmers' businesses have started to operate effectively and efficiently.

Keywords: Murvin E. Mundel, Efficiency, Productivity, Salt

1. INTRODUCTION

Indonesia boasts the largest salt-producing land area, with 60% of it located in East Java. The largest expanse of salt fields can be found on the island of Madura, covering 15,347 hectares. Sumenep is the district with the highest salt production on the island of Madura. The salt production in the Sumenep district encompasses several sub-districts, totaling 27 sub-districts, with 11 of them being significant contributors to salt production (Agustina, 2020). The average resident in the district works as a salt farmer by producing people's salt in one harvest (Ruslan, 2017). Salt is an important factor for life in basic needs. Salt is also an important need for industries, such as the chemical industry, the drug industry and so on. The existence of salt which is considered important makes the Ministry of Marine Affairs carry out programs in increasing salt productivity in Indonesia (Agustina, 2020).

The existence of salt found in seawater affects its physical properties, for example in density, compressibility, freezing point, and temperature. Viscosity and light absorption do not have a significant effect on salinity, two properties that greatly determine the amount of salt in the sea (salinity) are electrical conductivity (conductivity) and osmotic pressure. The greater the amount of salt in the water, the higher the salinity and osmolar concentration of the solution and the greater the pressure of the osmotic media (Agustina, 2020).

Based on data from the Sumenep Fisheries Service, salt production in 2015 produced 236,117.96 tons, in 2016 it was 17,109 tons, in 2017 it was 232,393.29 tons and in 2020 it was 236,368 tons (Huda, 2021). People's salt production has a weakness in its productivity, namely at a low level of purity (<95%). The level of purity produced by people's salt in Sampang regency is between 88 – 91%, Pamekasan district has a NaCl content of 91.34% and Sumenep district has a

NaCl content of 91.20%. The low level of salt purity and productivity levels that experience large differences between locations, making it an economic challenge for salt farmers. Moreover, salt farmers generally sell crosok salt or only rough forms (Putri, 2020).

Many things can be evaluated in supporting people's salt production which is still low. Evaluation of production factors is carried out to increase the efficiency of people's salt production productivity. Factors related to salt production such as land area, labor, supporting equipment, and experience from salt farmers (Ministry of Industry, 2018).

Sumenep Regency in producing people's salt, on average, still uses simple and traditional methods. The success factor of people's salt production depends on natural conditions, for example on weather intensity. When the dry season, Salt farmers maximize salt production by harvesting heavily in that season. The quality of salt that is still unable to compete causes the process of people's salt absorption to be uneven, salt prices become unstable, the production process is still traditional, and competition from salt products between regions is a problem that occurs in salt production in Sumenep district. In addition, the income of farmers is relatively low because they can only produce salt in the dry season while the income of these farmers is not comparable to the needs when the rainy season arrives. The area of salt land and the availability of human resources included in it, it is necessary to review the advantages and disadvantages when producing salt people. This study was conducted to determine the factors that affect people's salt productivity (Agustina, 2020).

2. LITERATURE REVIEW AND HYPOTHESIS

Salt is an ionic compound applied with the chemical formula NaCl, where the content of sodium and chloride ions is 1: 1. Salt is also called "white gold" because most of the time in human history, salt was included in a valuable commodity and the price of salt was the same as gold at the time of ancient civilization (Karabulut, 2020). Salt is a complement to the needs of food and a source of electrolytes in the human body. Salt is also included in solid objects that have white and crystalline color characteristics in the content of NaCl compounds as much as >80% and the composition of other compounds such as CaSO4, MgSO4, MgCl2, and others (Hoiriyah, 2019).

The following is an explanation of the three types of salt quality (Hoiriyah, 2019).

1. Quality One Salt (K - 1)

Salt with quality one (K – 1) is the best quality salt that has met the requirements for industrial materials or for consumption with the following composition.

- NaCl : 97,46 %
- CaCl2 : 0,723 %
- CaSO4 : 0,409 %
- MgSO4 : 0,04 %
- H2O : 0,63 %
- Impurities : 0,65 %

2. Two Quality Salt (K – 2)

Salt with quality two (K – 2) is salt whose quality is below K-1. K-2 salt must be reduced to levels of various substances in order to meet standards for industrial raw materials. The salt content in quality (K-2) is between 90 – 94%.

3. Three Quality Salt (K – 3)

Quality Three (K-3) salt is the type of salt that has the lowest quality in people's production. The content of quality type three (K – 3) is usually between 80 – 90%, sometimes mixed with soil so that it

is slightly brownish in color.

Productivity is a benchmark for the success of a company in empowering its resources to produce targeted products. Productivity has a relationship with production efficiency in the form of a ratio between the products produced and the resources used. This ratio shows the level of the Company's productivity and for evaluation materials on ongoing operational processes in order to create an effective and efficient company activity (Supriyadi, 2020).

The Marvin E. Mundel method is a measurement of productivity based on the concept of industrial engineering forms and the definition of costs in cost accounting. Marvin E.Mundel's model requires companies in productivity measurement to have current time standards, which are also still difficult to meet for most companies in Indonesia (Lukmandono, 2021). The following is a formula from mathematical calculations (Suparto, 2020).

$$\text{IP Parsial} = \frac{\text{AOMP} / \text{AOBP}}{\text{RIMP} / \text{RIBP}} \text{ x } 100$$

$$\text{IP Total} = \frac{\text{AOMP} / \text{AOBP}}{\text{RIMP} / \text{RIBP}} \text{ x } 100$$

Information:

AOMP = Output in the measured period.

AOBP = Output at base period.

RIMP = Input – input in the period to be measured.

RIBP = Input at base period.

Efficiency is a comparison between output and input. Efficiency is based on how the resources used can produce an output. Efficiency is also a saving that is used in resources in organizational activities, more precisely on efficiency of usability. This efficiency aims to use smaller resources to achieve the same results. One of the methods used in measuring efficiency is to use a frontier approach (Erliana, 2020).

3. RESEARCH AND METHOD

This research was conducted with the aim of achieving the level of efficiency of people's salt productivity in Sumenep. This research was conducted on community salt farming in Tega village, Sumenep. The choice of location is because the village has a large enough land in producing people's salt. The object of the research conducted is the productivity of salt farming of the Madurese. The initial stage that will be carried out in this study is by collecting data which includes primary data and secondary data. Primary data is obtained by conducting interviews with salt owners and farmers conducted directly. Secondary data are obtained from historical data on people's salt production as well as data needed in processing Murvin E. Mundel's data.

Data analysis method

The data analysis technique carried out is by determining input and output variables. Output is the sales value of the product (salt), while the output value becomes a supporting resource in creating a product. Inputs are several variables that include labor, capital, transportation, depreciation costs. The steps to be taken in the data analysis technique are to calculate partial productivity and total productivity from 2020 to 2023 by dividing the sum of output by each of the input variables. Furthermore, an analysis will be carried out to determine how influential salt production factors are on people's salt productivity and make proposals for improvements.

4. RESULT AND DISCUSSION

The following is input and output data that affects the production efficiency of Sumenep people's salt farmers for the period 2020 to 2023.

Tabel 1 Data on the output and input of people's salt farming 2020 to 2023

Items	Period 1 (2020)	Period 2 (2021)	Period 3 (2022)	Period 4 (2023)
Output				
Cost of Sales	Rp550.000	Rp600.000	Rp1.700.000	Rp1.800.000
Input				
Cost of Labour	Rp75.000	Rp75.000	Rp75.000	Rp75.000
Capital	Rp1.500.000	Rp1.800.000	Rp2.930.000	Rp3.062.000
Cost of Transportation	Rp1.200.000	Rp1.800.000	Rp1.800.000	Rp1.800.000
Depreciation Cost	Rp1.600.000	Rp1.600.000	Rp1.600.000	Rp1.600.000

Table 1 shows data on the output and input of smallholder salt farming from 2020 to 2023. The table consists of items and many items in each period 1 (2020) to period 4 (2023). The output variable consists of cost of sales and input variables consisting of cost of labour, capital, cost of transportation, and depreciation cost.

The Marvin E. Mundel method has two forms of mathematical calculations on measuring the productivity index are as follows:

IP = (AOMP or RIMP)/(AOMB or RIBP) X 100

Or

IP = (AOMP or AOMB)/(RIMP or RIBP) X 100

Partial productivity calculation

Labour Productivity Index

IP = (1.800.000 / 75.000)/(1.700.000 / 75.000) X 100 = 106%

Capital Productivity Index

IP = (1.800.000 / 3.062.000)/(1.700.000 / 2.930.000) X 100 = 101%

Transport Productivity Index

IP = (1.800.000 / 1.800.000)/(1.700.000 / 1.800.000) X 100 = 106%

Depreciation Cost Productivity Index

IP = (1.800.000 / 1.600.000)/(1.500.000 / 1.600.000) X 100 = 106%

Partial productivity calculation

IP = (1.800.000 / 6.537.000)/(1.500.000 / 6.405.000) X 100 = 104%

The results of the productivity analysis are as follows.

1. Partial productivity measurement:

a. The productivity index in the workforce increased by 6% from the previous period, this shows that the labour owned has been effective in working.

b. The productivity index in capital decreased by 1% from the previous period. This shows that salt farmers have made an advantage in salt production.

c. The productivity index in transportation has increased by 6%. This shows that the use of transportation facilities supports production activities on people's salt.

d. Depreciation cost productivity index of 6%. This shows that there are some depreciation costs in the improvement of people's salt production facilities have been carried out periodically.

2. Total productivity measurement:

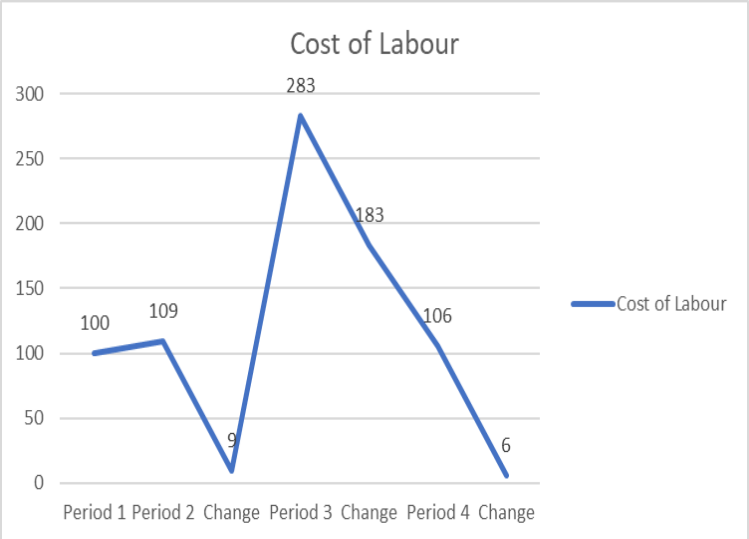
The total productivity index increased by 4%. So it can be concluded that the salt farmer business has begin to run effectively and efficiently.

Tabel 2 Index Calculation Recapitulation Results

Description	Period 1	Period 2	Change	Period 3	Change	Period 4	Change
Cost of Labour	**100**	109	9	283	183	106	6
Capital	100	91	-9	174	74	101	1
Cost of Transportation	**100**	73	-27	283	183	106	6
Depreciation Cost	100	109	9	283	183	106	6

Table 2 shows the results of the recapitulation of the index calculation. There is a description table consisting of cost of labour, capital, cost of transportation, depreciation cost. In the cost of labor period 1 is 100, period 2 is 109 so that a change of 9 is obtained.

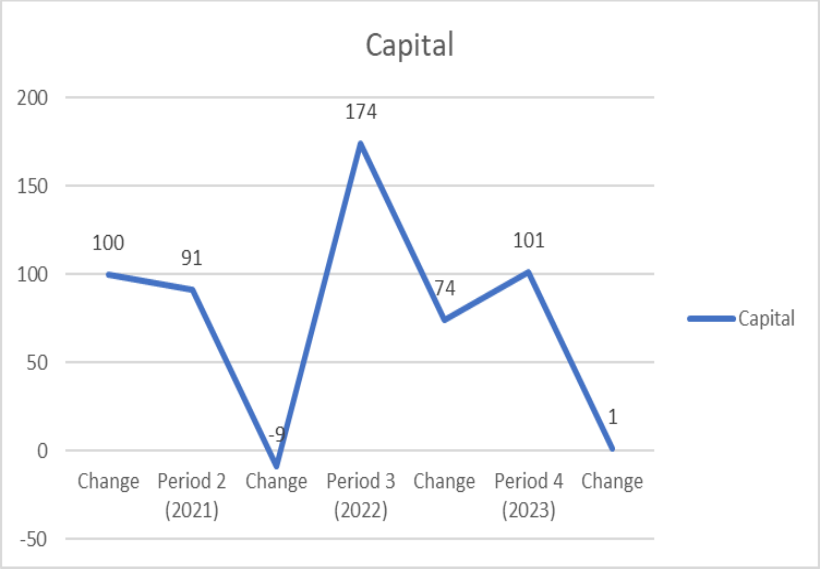
The following is a graph of the results of the calculation of labour cost productivity.



Gambar 1 Graph of changes in labour costs

From the graph above, it can be seen that the highest productivity decline in labor costs is in period 4 (2023) of 6%.

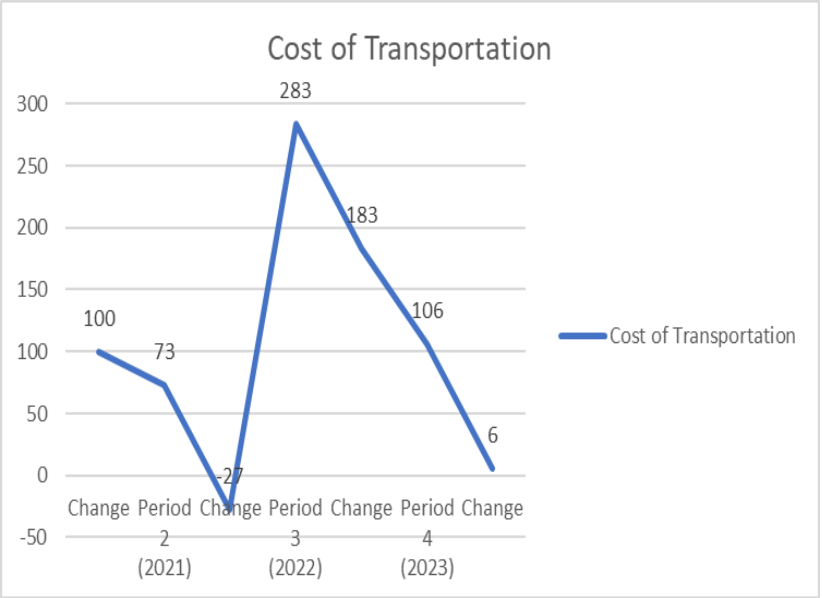
The following is a graph of the results of the calculation of capital productivity.



Gambar 2 Graph of changes in capital

From the graph above, it can be seen that the highest decrease in productivity for capital was in period 2 (2021) of – 9%.

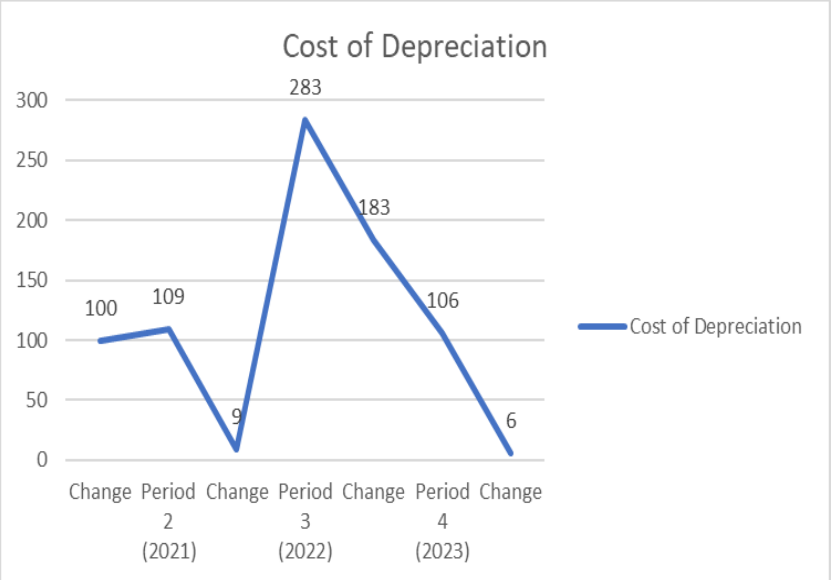
The following is a graph of the results of the calculation of transportation cost productivity.



Gambar 3 Graph of changes in transportation costs

From the graph above, it can be seen that the highest productivity decline for transportation costs was in period 2 (2021) of – 27%.

The following is a graph of the results of the calculation of depreciation cost productivity.



Gambar 4 Graph of changes in depreciation costs

From the graph above, it can be seen that the highest productivity decline for depreciation costs is in period 4 (2023) of – 6%

5. CONCLUSSION

Following the results of the study, it can be concluded that each criterion on the productivity index of people's salt farming has increased and decreased or fluctuated. Where each variable experienced an increase in productivity in the previous period and measurements were carried out by measuring two types, namely partial productivity and total productivity. For the lowest change in labor costs, it is in period 4 (2023) at 6%, for the lowest change in capital productivity it is in period 2 (2021) at 9%, and for the lowest transportation cost productivity index it is in period 2 (2021) at 27%, for the lowest depreciation cost productivity index it is in period 4 (2023) at 6%. Measurement in productivity analysis should be done by measuring various variables in more detail in order to find out the extent of the increase or decrease in the level of productivity of the business that has been running. The recommendation to increase competitiveness among salt farmers is to use plastic geomembrane (HDPE) so that the quality produced from salt has a better selling value and productivity in salt production can increase.

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7. REFERENCES

Cengiz, M., & Karabulut, S. (2020). *Salt In the Earth.* London: IntechOpen.

Hoiriyah, Y. U. (2019). Peningkatan Kualitas Produksi Garam Menggunakan Teknologi Geomembran. *Jurnal Studi Manajemen dan Bisnis*, 35 - 42.

Ismawati, Putri, R. D., & Agustina, N. M. (2020). Identifikasi Penyebab Perbedaan Produktivitas Garam Rakyat di Kabupaten Sumenep. *Jurnal of Food Technology and Agroindustry*, *2*(2), 64 - 69.

Maulana, M. R., & Lukmandono. (2021). Analisa Produktivitas dengan Metode American Productivity Center (APC) dan Murvin E. Mundel (Studi Kasus: UD. Sido Lancar). *Seminar Nasional Teknologi Industri Berkelanjutan I (SENASTITAN I).* Surabaya.

Muhartono, A., Basuki HM, G., & Suparto. (2020). Pengukuran Produktivitas di PT.XYZ dengan Metode APC (American Productivity Center) dan Marvin E. Mundel. *Seminar Nasional Sains dan Teknologi Terapan.* Surabaya.

Mukhlishi, Cholil, U., Fadli, M., Huda, N., & Huda, Z. (2021). Analisis Sosial Masyarakat Sumenep dalam Meningkatkan Kualitas Garam Rakyat. *Jurnal Pembangunan Sumenep*, 175 - 180.

Putri, R. D., Destryana, R. A., & Santosa, R. (2020). Pemanfaatan Garam Krosok Sebagai Kreatif Bisnis Masyarakat Pesisir. *Journal of Food Technology and Agroindustry*, *II*(2), 15 - 19.

Wiraningtyas, A., Sandi, A., Sowanto, & Ruslan. (2017). Peningkatan Kualitas Garam Menjadi Garam Industri di Desa Sanolo Kecamatan Bolo Kabupaten Bima. *Jurnal Karya Abdi Masyarakat*, 138 - 145.