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## Trend Moment Analysis of NTP for Food Crops and Horticulture in East Java Province

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### ABSTRACT

*The existence of food crops and horticultural crops is very important so it is necessary to see the level of welfare of farmers of food crops and horticultural crops. An indicator that is very often used to measure the level of welfare of farmers of food crops and horticultural crops is the farmer exchange rate or more commonly called NTP. This study uses time series data from January 2023 to March 2023. Data obtained from the Central Bureau of Statistics of East Java Province in 2025. Data analysis using the trend moment method. The results obtained show that in April 2023 the NTP for food crops was 97.27 and the NTP for horticultural crops was 139.76.*

**Keywords:** food crops, horticulture, trend moment

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### INTRODUCTION

Agriculture is a very important sector in a region. The agricultural sector not only plays a role in food availability but also has a very vital role for the progress of a region. The contribution of the agricultural sector in the progress of a region can be seen from the gross regional domestic product (GRDP) and employment. In addition, the agricultural sector is a sector that supports the economy of the people in a region.

East Java Province is a province that has potential in the agricultural sector. The growing agricultural sector in East Java includes food crops and horticultural crops. Food crops and horticultural crops in East Java Province are developing well because they are supported by several factors including geographical conditions, fertile soil, land availability and human resource support. Food crops and horticultural crops are commodities that have been widely cultivated in East Java Province.

Food crops and horticultural crops are so important that it is necessary to look at the welfare level of food crop and horticultural crop farmers. An indicator that is very often used to measure the level of welfare of farmers of food crops and horticultural crops is the farmer exchange rate or more commonly called NTP. NTP is the ratio or comparison between the price index received and paid by a farmer (Satriani et al., 2021). The greater the NTP, it can be said that the farmer is more prosperous.

Previous research has used the trend moment method in agriculture. Previous research stated that rice production in Mulawarman Village in 2023 was 181.87 tons with an accuracy of 73.8% (Saipuddin et al., 2024). The rice yield that has been influenced by the harvest index in 2024 is 115.644 tons (Widosari & Septiarini, 2025).

This study aims to analyze the tendency or trend of NTP of food crops and NTP of horticultural crops. It is important to know the trend of NTP of food crops and NTP of horticultural crops. The results obtained can be used as suggestions in the preparation of programs related to the development of food crops and horticultural crops. If the results obtained show an upward trend then the existing policy needs to be maintained and if the results obtained show a downward trend there needs to be anticipatory steps to help food crop farmers and horticultural crop farmers to avoid welfare problems.

### METHOD

This study uses time series data from January 2024 to March 2025. Data obtained from the Central Bureau of Statistics of East Java Province in 2025. Data analysis uses the trend moment method. The advantage of the trend moment method is that there is an X value so that the odd or even number of historical data is not too influential (Wardhani et al., 2022). The trend moment method is expressed in the equation (Heryati, 2022)

$$Y = a + bX$$

With :

Y = Trend

a = Constanta

b = trend line coefficient

X = time indeks

The values of a and b can be found using the equation (Janah et al., 2021):

$$\sum Y = a.n + b. \sum X$$

$$\sum XY = a. \sum X + b. \sum X^2$$

Dengan :

$\sum Y$  = amount of data

$\sum X$  = period

$\sum XY$  = amount data x period

## RESULT AND DISCUSSION

NTP of food crops and NTP of horticultural crops tend to change every month. Changes in NTP are due to various factors that affect NTP such as crop yields, selling prices and others tend to change. Data on NTP of food crops and NTP of horticultural crops are in Table 1.

Table 1. Farmers' Exchange Rate of Food Crops and Horticultural Crops

| Months    | Year | Farmer Exchange Rate for Food Crops (NTPP) | Farmer Exchange Rate for Horticultural Crops (NTPH) |
|-----------|------|--|---|
| January   | 2024 | 122,36                                     | 123,22  |
| Pebruary  | 2024 | 128,53                                     | 126,9   |
| March     | 2024 | 117,65                                     | 125,11  |
| April     | 2024 | 104,69                                     | 130,69  |
| May       | 2024 | 106,23                                     | 130,32  |
| June      | 2024 | 109,49                                     | 131,38  |
| July      | 2024 | 112,21                                     | 131,95  |
| August    | 2024 | 113,25                                     | 125,38  |
| September | 2024 | 114,35                                     | 114,92  |
| October   | 2024 | 113,17                                     | 119,2   |
| November  | 2024 | 110,33                                     | 125,13  |
| December  | 2024 | 111,06                                     | 136,04  |
| January   | 2025 | 109,92                                     | 155,75  |
| Pebruary  | 2025 | 110,27                                     | 133,38  |
| March     | 2025 | 108,52                                     | 147,4   |

Source : statistical center of east java province, 2025

Based on the data obtained, it shows that the NTP of food crops and the NTP of horticultural crops have different patterns. The NTP of food crops tends to decrease from the beginning of 2024 to March 2025. The NTP of horticultural crops tends to increase from the beginning of 2024 to March 2025. In general, both the NTP of food crops and the NTP of horticultural crops are above 100, meaning that both food crop farmers and horticultural crop farmers can be said to be prosperous.

At this time there are various factors that affect the NTP of food crops. Some important factors that have an impact on the NTP of food crops include:

### Selling price of crops

The selling price of crops tends to change from time to time. For example, the price of harvested dry grain (GKP) is not stable in every period. If the price of GKP is high, the income of farmers can increase, on the other hand, if the price of GKP decreases, the income of farmers decreases. The decrease in income experienced by farmers coupled with an increase in farmer expenditure will cause the NTP of food crop farmers to decline.

### Climate

At this time, problems related to climate change are increasingly felt. The El Niño and La Niña phenomena are problems that affect crop yields. El Nino causes extreme drought so that plant growth cannot be maximized while La Nina causes rainfall to tend to increase compared to normal rainfall. Too much rainfall will damage crops. The real impact of these two phenomena is damage to panga crops, especially rice. This has contributed to the low NTP for food crops.

### Land area

Land conversion is currently very massive. The decrease in land owned by farmers has an impact on the income they have. The smaller the land, the less income farmers have. There needs to be protection of productive land so that it does not have a significant impact on farmers' income. The real impact of land conversion is that farmers not only experience a decrease in income but are also threatened with loss of livelihood.

### Trend Moment Analysis of Food Crop NTP

Based on the trend moment analysis, it was found that the NTP for food crops in April 2025 was 97.27. This result, if examined further, shows that in April 2025 the NTP for food crops has decreased (below 100) so that it can be stated that in April 2025 food crop farmers have the potential to experience a decline in welfare. Trend moment analysis of food crop NTP can be seen in Table 2.

Table 2. Trend Moment Analysis of Food Crop NTP

| Months    | Time (X) | Farmer Exchange Rate for Food Crops (NTPP) (Y) | Time x NTPP (XY) | X <sup>2</sup> |
|-----------|----------|--|------------------|----------------|
| January   | 0        | 122,36   | 0                | 0              |
| Pebruary  | 1        | 128,53   | 128,53           | 1              |
| March     | 2        | 117,65   | 235,3            | 4              |
| April     | 3        | 104,69   | 314,07           | 9              |
| May       | 4        | 106,23   | 424,92           | 16             |
| June      | 5        | 109,49   | 547,45           | 25             |
| July      | 6        | 112,21   | 673,26           | 36             |
| August    | 7        | 113,25   | 792,75           | 49             |
| September | 8        | 114,35   | 914,8            | 64             |
| October   | 9        | 113,17   | 1018,53          | 81             |
| November  | 10       | 110,33   | 1103,3           | 100            |
| December  | 11       | 111,06   | 1221,66          | 121            |
| January   | 12       | 109,92   | 1319,04          | 144            |
| Pebruary  | 13       | 110,27   | 1433,51          | 169            |
| March     | 14       | 108,52   | 1519,28          | 196            |
| Total     | 105      | 1.692,03                                       | 1.1646,4         | 1.015          |

Source : Data processed, 2025

$$\sum Y = a.n + b. \sum X$$

$$1692,03 = a.15 + b.105 \quad (1)$$

$$\sum XY = a. \sum X + b. \sum X^2$$

$$11646,4 = a.105 + b.1015 \quad (2)$$

By eliminating equations (1) and (2), the value of  $b = -0.706$  is obtained. Substitute this value into equation 1692.03 to obtain the value:

$$1.692,03 = a.15 + (-0,706).105$$

$$1.692,03 = a.15 - 74,13$$

$$1.617,9 = a.15$$

$$a = 107,86$$

$$Y = a + bX$$

$$Y = 107,86 + (-0,706) 15$$

$$Y = 107,86 - 10,59$$

$$Y = 97,27$$

The decline in NTP is inseparable from the actual data that since the beginning of 2024 until March 2025 the NTP of food crops has tended to decline. The decline in food crop NTP based on predictions with trend moment analysis needs to be watched out for. Anticipatory efforts are needed to anticipate if food crops in April experience a decline in welfare..

### Trend Moment Analysis of NTP for Horticultural Crops

The results of the trend moment analysis showed that the NTP of horticultural crops in April 2025 amounted to 139.76. This means that patani horticultural crops can be said to be prosperous. Policies related to horticultural crops need to be carried out continuously because this policy has provided maximum results. This can be seen from the NTP of horticultural crops from the beginning of 2024 to March 2025 tends to be far above 100. Trend moment analysis of NTP of food crops is in Table 3.

Table 3. Trend Moment Analysis of Horticulture Crop NTP

| Months    | Time (X) | Farmer Exchange Rate for Horticultural Crops (NTPH) (Y) | Time x NTPP (XY) | X <sup>2</sup> |
|-----------|----------|---|------------------|----------------|
| January   | 0        | 123,22  | 0                | 0              |
| Pebruary  | 1        | 126,9   | 126,9            | 1              |
| March     | 2        | 125,11  | 250,22           | 4              |
| April     | 3        | 130,69  | 392,07           | 9              |
| May       | 4        | 130,32  | 521,28           | 16             |
| June      | 5        | 131,38  | 656,9            | 25             |
| July      | 6        | 131,95  | 791,7            | 36             |
| August    | 7        | 125,38  | 877,66           | 49             |
| September | 8        | 114,92  | 919,36           | 64             |
| October   | 9        | 119,2   | 1072,8           | 81             |
| November  | 10       | 125,13  | 1251,3           | 100            |
| December  | 11       | 136,04  | 1496,44          | 121            |
| January   | 12       | 155,75  | 1869             | 144            |
| Pebruary  | 13       | 133,38  | 1733,94          | 169            |
| March     | 14       | 147,4   | 2063,6           | 196            |
| Total     | 105      | 1.956,77  | 1.4023,17        | 1.015          |

Source : Data processed, 2025

$$\sum Y = a.n + b. \sum X$$

$$1956,77 = a.15 + b.105 \quad (1)$$

$$\sum XY = a. \sum X + b. \sum X^2$$

$$14023,17 = a.105 + b.1.015 \quad (2)$$

By eliminating equations (1) and (2), the value of  $b = 1.1635$  is obtained. Substituting this value into the equation  $1956.77 = a.15 + b.105$  gives the value

$$1.956,77 = a.15 + b.105$$

$$1.956,77 = a.15 + (1,1635).105$$

$$1.956,77 = a.15 + 122,22$$

$$1.834,55 = a.15$$

$$a = 122,307$$

$$Y = a + bX$$

$$Y = 122,307 + 1,1635 \quad (15)$$

$$Y = 122,307 + 17,4525$$

$$Y = 139,76$$

The results of the trend moment analysis showed that the NTP of horticultural crops in April 2025 amounted to 139.76. This means that patani horticultural crops can be said to be prosperous. Policies related to horticultural crops need to be carried out continuously because this policy has provided maximum results. This can be seen from the NTP of horticultural crops from the beginning of 2024 to March 2025 tends to be far above 100.

## CONCLUSIONS

Based on the results obtained with the trend moment method, it shows that the NTP of food crops is predicted to decrease to 97.27. NTP of horticultural crops in April 2025 is predicted to increase to 139.76.

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