

Forecasting The Price Of Broiler Chicken In Ambon City-Maluku Province And The Risks That Increase On The Purchase Power Of The Community (Application of Linear Trend Forecasting Method)

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Abstract- The price of broiler meat in Ambon City, Maluku Province, Indonesia has recently continued to increase due to limited supply and strong demand pull. The increase in prices causes people's purchasing power to decrease and results in various risks that the consumer community must face. It is necessary to forecast future prices and find out how big the risk of a decline in consumer purchasing power is. This study aims to predict the upward trend in chicken meat prices in Ambon City, Maluku Province in the next year and analyze the risk of such price increases on the decline in people's purchasing power. Forecasting uses the linear trend method, starting with regression model analysis and following by forecasting the price of broiler meat for the next year's period (October 2022 to September 2023). Data for analysis is sourced from the National Strategic Food Price Information Center (PIHPS NASIONAL). The results showed that the average price of broiler meat in Ambon City, Maluku Province for 21 periods before forecasting was Rp. 37,476.19 per kg or grew 0.94%. The average price per kg in the forecasting period from October 2022 to September 2023 is Rp. 41,976.18 or a growth of 0.65%. The increase in the average price before the forecast and after the forecast is 12.01% or the price increases by Rp. 4,500,- per kg. This price increase indicates a decrease in consumer purchasing power by an average of 12.01% or equivalent to a decrease in the amount of consumption from 1 kg or 1000 g to the remaining 0.88 kg or 880 g. The decrease in purchasing power and the amount of consumption of broiler meat is categorized as a significant risk figure. Mitigation is carried out by encouraging the development of broiler meat production at the local producer level, although the effect of reducing risk is quite slow.

Index Terms- Broiler meat price, forecasting, decreasing purchasing power, risk and mitigation, Ambon City-Maluku Province-Indonesia.

I. INTRODUCTION

The development of prices for various foodstuffs has recently tended to increase. Many factors have contributed to the price increase, including internal factors such as limited supplies, rising prices for production factors and raw materials, and production failures at the producer level. The causes of external factors include over-consumer demand, major holiday events, hampered food imports, rising regional inflation, distribution and trade disruptions, and even effects such as rising prices for fuel oil (BBM). All of these factors can lead to a rapid increase in the price of basic food needs of the community.

The market price is defined as the value expressed in monetary units or money that must be paid by buyers to traders or sellers for goods or services (Chang & Su, 2022; Gaca, 2019). The market price includes the tax charged on the product. From time to time the price of a product can move up and down depending on the conditions that affect it. The first condition that can affect changes in the price of

a product is the inventory or stock available in the market. Panda, et al., (2013) stated that reduced inventory in the market will directly push up the price per unit of product. On the other hand, excess market inventory will push product prices down. If the product is perishable or perishable, then the excess inventory pushes the price down to speed up the product being bought by consumers and consumed.

On the producer side, a product that is produced requires a certain number of inputs or raw materials to produce the product. If the required number of inputs is not available, it will hamper the smooth production process for the desired number of products. The role of input is the main thing in the production process of output. The unavailability of the main input needed causes production to not be produced and causes the availability of products that are distributed to the market to decrease in number. As a result, it pushes up the price of the product in question in the market. The efforts of product-producing producers in providing the necessary inputs, also applying more

advanced production processes, and even large production expansions can be called innovations that ensure product availability (Diéguez-Soto, et al., 2018).

The development of input prices, which are always moving fast and rising, is another determining factor for rising product prices in the market. The increase in input prices is the main factor causing changes in product prices in the market. The rising prices of inputs and factors of production stemmed from various factors, ranging from the availability of the inputs themselves, and the increase in input prices, to the effects of trade and market transactions. The increase in input prices has the consequence of increasing production costs so to cover the increase in costs, producers are encouraged to increase the selling price of their products in the market. The results of the analysis of Srivastava, et al., (2017) show that the increase in production costs is mostly contributed by the increase in input prices and causes an increase in inflation.

External factors that have contributed to the increase in food prices include the pull of demand. The large and continuous demand-pull causes the need for food commodities to continue to increase and cause product prices in the market to move up. This pull in demand can be caused by various events that encourage people to ask for more. Often the demand-pull is caused by changes in weather or seasons, as well as increases in people's incomes, and even changes in people's tastes (Abbott, et al., 2011).

In particular, growth in people's incomes and improvements in dietary habit has encouraged rapid growth in food imports. This also affects changes in food prices in the market. Another thing that cannot be denied is that the price of products in the market will also increase when the price of fuel oil (BBM) increases. The increase in fuel prices due to the reduction in subsidies will have an effect on the increase in transportation costs which will push up prices for various products, including food prices. In general, the increase in fuel prices causes inflation to creep up (Harun, et al., 2018).

Inflation has consequences for the decline in people's purchasing power. The general increase in prices or inflation reduces the purchasing power of the people from a certain number of previously owned monetary units. This means that with a fixed and unchanged income level, people have lower purchasing power. With the same amount of money when prices have increased, consumers can only buy the same good in less quantity. This will be in line with the amount of consumption. Consumption of lesser amounts indicates declining consumer spending and is an indication of declining consumer preferences. Thus, rising prices or inflation risk reducing purchasing power, reducing public consumption, and increasing consumer spending just to maintain a certain amount of consumption. All of these things are indications that people's welfare is moving downwards (Agha, 2019; Aklin, et al., 2022).

In connection with the development of food prices that continue to increase and cause various consequences as mentioned above, it is necessary to predict future price developments in question. Food price volatility can occur due to an imbalance between supply and demand. Therefore, to identify the movement of food prices, a forecasting method is needed. Forecasting food prices play

an important role in knowing the trend of future price movements. Price forecasting can help provide consumers with information to regulate their consumption. Also is important information for producers in making sales decisions (Menculini, et al., 2021; Rosyid, et al., 2019; and Zulfiqar and Hussain, 2014).

In the last few years, broiler meat is a favourite food ingredient in Ambon City, Maluku Province, Indonesia. The price per kilogram is relatively lower and affordable than beef, and even quite competitive with the price of fresh fish which is relatively more expensive. Because it is relatively affordable, the demand for broiler meat continues to increase from time to time. This demand-pull encourages broiler producers to increase production. Local production is insufficient and does not keep pace with demand, causing importers to bring in frozen broiler meat from outside the region. Until now, the import of broiler meat continues to increase and the price continues to increase (<https://rri.co.id/ambon/Ekonomi>).

As a food commodity that is in demand by the public and its demand continues to increase, the price per kilogram of broiler meat continues to move up. This price increase has the opportunity to become uncontrollable in the future and can suppress public consumption. Also, the increase in the price of chicken meat can encourage other food prices to increase and cause inflation in the Ambon City area. Given the movement in the price of broiler meat, it is important if the current development of chicken meat prices can be predicted to increase in the future. This study aims to predict the trend of increasing chicken meat prices in Ambon City, Maluku Province in the next year. It is also followed by an analysis of the risk of increasing the price of broiler meat on people's purchasing power.

II. MATERIALS AND METHODS

Location and Data

This research took place in Ambon City, the Capital of Maluku Province, Indonesia. The data used is secondary data per month about the development of broiler meat prices. The data selected for analysis needs is the data period from January 2021 to September 2022 and produces a total of 21 data items (months). The consideration of using 21 periods of data for future forecasting needs is that this amount of data is sufficient to analyze the trend of subsequent price developments. Published data on the development of broiler meat prices were recorded in two locations, namely Gotong Royong Market and Mardika Market Ambon. Therefore, the said data is transformed into market averages for analysis purposes. The data was obtained from the NATIONAL STRATEGIC FOOD PRICE INFORMATION CENTER (PIHPS NASIONAL) through the website <https://hargapangan.id/table-harga/pasar-tradisional/regional>.

Analysis Stage

1. Data Tabulation and Regression Analysis

The data collected were tabulated and used for the needs of regression analysis with Linear Trend forecasting techniques. The linear trend formula is written as follows:

$$HDA_t = HDA_0 + bT \dots\dots\dots (1)$$

Information:

- HDA_t = Price of broiler meat that will be forecasted in month t.
- HDA_0 = Estimated time-series value (regression constant) in the base period (month t= 0)
- b = The absolute amount of growth each month.
- T = Time period (months) to be forecasted.

2. Forecasting the price of broiler meat in Ambon City

After obtaining the results of the regression analysis using a linear trend estimation technique, forecasting is then carried out to determine the trend of increasing broiler meat prices in Ambon City over the next year's period (12 months).

3. Analysis of Consumer Purchasing Power per Kilogram of Broilers and the Risks It Incurs

Based on the results of forecasting the price of chicken meat obtained, then an analysis of purchasing power is carried out based on the comparison of the consumer's purchasing ability per kilogram of chicken meat before the forecasting period and after the forecasting period.

III. RESULTS AND DISCUSSION

1. Data Tabulation and Results of Linear Trend Regression Analysis

The results of the tabulation of data on the development of broiler meat prices in Ambon City are shown in Table 1 below.

The data in Table 1 shows that the price per kilogram of broiler meat in Ambon City has continued to increase from January 2021 to September 2022. The average growth of chicken meat prices over the past 21 periods was 0.94%. According to information from the data provider source, the price of chicken meat is the price at the producer level which is applied in the Gotong Royong Market and Mardika Market. The reported price per kilogram of broiler meat may be much lower than the price per kilogram that occurs at the retail level in various locations in Ambon City and its surroundings.

The price development data for the initial period above is used to estimate the Linear Trend model and gives the following results:

$$HDA_t = 34,476.190 + 272,727 T \dots\dots\dots (2)$$

R² = 0.627; Prob. F test = 0.0001; r = 0.792; Prob.t-Test = 0.0001

Table 1. Data on the Development of Broiler Meat Prices in Ambon City in the Early Period

Data Period (T)	Month - Year	Chicken Meat Price (IDR/kg)	Chicken Meat Price Growth (%)
1	January 2021	33,250.0	-
2	February 2021	35,250.0	6.01
3	March 2021	36,000.0	2.13
4	April 2021	36,500.0	1.39
5	May 2021	37,000.0	1.37
6	June 2021	37,000.0	0.00
7	July 2021	38,000.0	2.70
8	August 2021	36,750.0	-3.29
9	September 2021	36,000.0	-2.04
10	October 2021	34,500.0	-4.17
11	November 2021	35,000.0	1.45
12	December 2021	35,500.0	1.43
13	January 2022	38,000.0	7.04
14	February 2022	40,250.0	5.92
15	March 2022	39,500.0	-1.86
16	April 2022	39,750.0	0.63
17	May 2022	39,750.0	0.00
18	June 2022	39,750.0	0.00
19	July 2022	39,750.0	0.00
20	August 2022	39,750.0	0.00
21	September 2022	39,750.0	0.00
Average		37,476.19	0.94

Source: PIHPS data, processed

The estimation results in equation (2) along with the statistical criteria values displayed show the price of broiler meat in Ambon City in December 2020, namely HDA₀

before the month data for forecasting is estimated at Rp. 34,476.19 per kg. The price will increase at an average rate of Rp. 272,727 per kg every month.

Statistically, the coefficient of determination (R²) is 0.627, which means that the development of broiler prices in Ambon City can be explained by changes in time (monthly) of 62.70%. The remaining percentage can be explained by other factors. Statistical proof (F test) on the value of the coefficient of determination shows a probability value of 0.0001, which means that the use of the T variable (month) significantly affects the price of broiler meat in Ambon City. The results of the test of the relationship between the price of broiler meat and the monthly time period indicated by the value of the correlation coefficient (r) are 0.792. The value of this correlation coefficient shows that the relationship between the price of broiler meat and the time period (months) is strong. The results of the significance test (t-test) of the monthly variable (T) on the price of broiler meat is 0.0001 which indicates that the monthly time period significantly influences the development of broiler meat prices in Ambon City. The results of the analysis of various statistical indicators above show that the regression estimation results of the linear trend model are valid enough to be used in forecasting analysis. The results of the regression estimation above explain that the price of broiler meat in Ambon City will continue to increase every month.

2. Forecasting Broiler Meat Prices in Ambon City, Maluku Province

Based on the results of the linear trend estimation above, forecasting is carried out to determine the value of the increase in the price of broiler meat in Ambon City over the next year's period (12 months). The results of forecasting the price of broiler meat in Ambon City for the next 12 months are shown in Table 2 below.

The forecasting period T (22) in the table above follows the data period used in the analysis, starting from January 2021 as period (1) to September 2022 (period 21). Therefore, the forecasting of chicken meat prices begins in the 22nd period from October 2022 to September 2023 (for the next 12 months). From the results of the linear trend forecasting, the price per kilogram of broiler meat continues to increase from October 2022 to September 2023. The achievement of average forecast price per kilogram of broiler meat for the next year is Rp. 41,976.18 with growth in the forecast period of 0.65%. Although the average price growth per kilogram of broiler meat in the forecasting period is smaller than the average growth in the initial period, physically the price per kilogram of broiler meat in Ambon City continues to increase. This is in line with the research results of Nurhabibah, et al., (2022) that the price of broiler meat continues to move up due to increasing consumer demand.

Table 2. Forecasting Results of Broiler Meat Prices in Ambon City One Year Ahead

Data Period (T)	Month - Year	Chicken Meat Price (IDR/kg)	Chicken Meat Price Growth (%)
22	October 2022	40,476.18	-
23	November 2022	40,748.91	0.67
24	December 2022	41,021.64	0.67
25	January 2023	41,294.36	0.66
26	February 2023	41,567.09	0.66
27	March 2023	41,839.83	0.66
28	April 2023	42,112.55	0.65
29	May 2023	42,385.27	0.65
30	June 2023	42,658.00	0.64
31	July 2023	42,930.73	0.64
32	August 2023	43,203.45	0.63
33	September 2023	43,476.18	0.63
Average		41,976.18	0.65

3. Analysis of Consumer Purchasing Power per Kilogram of Broiler in Ambon City and the Risks posed

Purchasing power is defined as the inherent wealth (basic) in the units of money used in exchange. Money has value or wealth because it can be exchanged for goods and services for human needs. The level of wealth in money depends on the quantity and quality of goods and services that it can buy (Polman, et al., 2018). According to this understanding, if one unit or unit of goods can be exchanged for a smaller amount of money, it is said that money has increased value or wealth. On the other hand, if the same number of units of goods must now be exchanged for more money, the money is said to have decreased value or wealth.

Based on the understanding of purchasing power of money above, can be calculated the value of money's purchasing power per kilogram of broiler meat purchased by people in Ambon City. The results of these calculations are presented in Table 3 below.

Based on the results of the analysis of purchasing power per kg of broiler meat in Table 3, it is known that in the next 12 months, consumers who consume broiler meat will experience a decrease in purchasing power by an average of 12.01% or Rp. 4.500,- per kg (rounded up). This decrease in purchasing power shows that the people's ability to maintain their purchasing power against the consumption of one kilogram of chicken meat has decreased by 12.01%. In other words, with the original broiler price of Rp. 37,476.18 per kg, people can consume

as much as 1 kg (= 1000 g), but after the price increase, in the same consumption value, people can only consume as much as 0.88 kg (= 880 g). These results indicate that reducing purchasing power has the risk of reducing the amount of physical consumption of chicken meat. As stated by Ayaviri-Nina, et al., (2022) that the decrease in purchasing power reduces/reduces the number of units of food that can be consumed by the community. This has the potential to lead the community toward micronutrient deficiencies. Also in terms of consumption, the decline in purchasing power gives an indication of a measure of the inability of individual households and communities to access food as a source of nutrition.

Furthermore, the decline in purchasing power associated with a reduction in the amount of consumption indicates that there is a reduction in the amount of

individual consumption expenditure of the community if there is no support in terms of the amount of people's income. On the other hand, if the individual community wants to maintain the amount of basic consumption as in the initial conditions and does not want a decrease in the amount of consumption, then the consequence is that consumption expenditure must be increased. If public consumption expenditure will also increase as a result of wanting to maintain the amount of initial consumption, then this will increase the burden of spending on overall consumption. The burden of higher consumption expenditures on the one hand followed by the amount of people's income not moving up on the other hand will indicate the level of individual welfare of the community is decreasing (Witt, 2016; Ayaviri-Nina, et al., 2022).

Table 3. Results of Analysis of Average Purchasing Power per Kilogram of Chicken Meat in Ambon City

Period (T)	Value of Money or Wealth per kg of Chicken Meat (IDR/kg)	Growth (Decrease) Purchasing Power (%)
Before Forecasting (Initial)	37,476.18	-
Forecasting (12 months Period)	41,976.18	12,01
Average price increase/kg	4,499.99	-

Source: analysis results, processed

In accordance with the decline in purchasing power which has consequences on various related matters, will be discussed related to the concept of risk. Risk is defined as an event or consequence of an event in which the event and its consequences are subject to uncertainty. In this state of uncertainty, something of human value is at stake (Aven, et al., 2011). According to this risk definition, it can be defined as the risk related to the increase in the price of broiler meat and the decrease in purchasing power as a consequence of the upward trend in the price of chicken meat which causes a decrease in purchasing power, a decrease in consumption, an increase in expenditure, and a decrease in people's welfare. All of these conditions constitute uncertainty considering that actual changes in the price of chicken meat may increase or even decrease.

According to the results of forecasting data on the price of broiler meat in Ambon City, the risk of an increase in the price of chicken meat causes the purchasing power of the people to decrease by 12.01%. This decrease in purchasing power resulted in the amount of special consumption expenditure for broiler meat which also increased by 12.01% if individuals in the community tried to maintain their total consumption. In terms of the number of units/units of consumption of broiler meat, the price increase which was followed by a decrease in purchasing power resulted in a decrease in the amount of chicken meat consumption by 0.88 kg from the original 1 kg unit. The risk faced by the consumer community in Ambon City is that the decrease in purchasing power is 12.01% or proportional to the burden of increasing the price per kg of chicken meat by Rp. 4.500, - and also physically the amount of consumption decreased to 0.88 kg indicating a number that is categorized as a big risk. This is quite reasonable considering the intensity of the decline in purchasing power that occurs in a relatively short time, namely 1 year (12 months) ahead, purchasing power and total consumption has the potential to decline to reach 2 digits. If this continues and is not controlled, it is conceivable that the potential decline in the welfare of the people who consume broiler meat in Ambon City may increase, even more, something that is not desired by both the consumer community and the local government.

Checking the above risk conditions for the purpose of overcoming various existing consequences and or reducing unwanted conditions, mitigation is carried out as follows. To maintain and maintain the purchasing ability of the consumer community, it is expected that the measure of consumer income needs to be increased. Mitigating this is admittedly quite difficult considering the number of consumers of broiler meat is not detected and may vary at various levels of consumer society. For example, in the case of the government providing direct cash assistance (BLT) for fuel subsidies, it might be used to increase people's purchasing power. However, the real practice of the community in using BLT is not specifically allocated to the consumption of broiler meat, but to all needs that are free and uncontrolled.

If the local government takes part in controlling the price of broiler meat in the market in order to suppress the rate of increase, this too will be difficult to control. This is due to the growing public preference on the one hand and on the other hand insufficient local production, followed by an increasing trend in imports of frozen chicken meat from outside the region. The way that can be done, may be enough to help overcome the risks that

exist but is quite slow in effect and can be built for the long-term goal is to encourage the development of broiler meat production at the local producer level.

IV. CONCLUSION

From the results and discussion above, the following conclusions are drawn:

1. The average price of broiler meat in Ambon City for 21 periods before forecasting is Rp. 37,476.19 per kg or grew by 0.94%. While the average price per kg in the forecasting period from October 2022 to September 2023 is Rp. 41,976.18 or grew by 0.65%. The results of the analysis using the linear trend regression model are statistically valid and can be used for forecasting the price of broiler meat in the future.
2. Comparison of the increase in the average price of broiler meat before forecasting with after forecasting by 12.01% or the price increasing by Rp. 4.500,- per. In the next 12 months, consumers who consume broiler meat will experience a decrease in purchasing power by an average of 12.01%.
3. The decrease in people's purchasing power of 12.01% is equivalent to the number of units of consumption of chicken meat which decreased from 1 kg or 1000 g to only 0.88 kg or 880 g remaining. The magnitude of the decline in purchasing power and the amount of consumption of broiler meat is categorized as a fairly large risk figure.
4. Mitigation can be done to maintain and maintain the purchasing ability of the consumer community through increasing consumer income, although this method is admittedly quite difficult considering the number of consumers of broiler meat is not detected and with varying levels.
5. Direct Cash Assistance (BLT) for fuel subsidies to the public may be used to increase people's purchasing power. However, this cannot be guaranteed in overcoming the decline in purchasing power of broiler meat consumption.
6. If the local government takes part in controlling the price of broiler meat in the market, this too will be difficult to achieve, given the people's growing preferences. The way that can be done although the effect is slow but can be built for long-term goals is to encourage the development of broiler meat production at the local producer level.

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