

Factors Affecting The Demand for Hydroponic Vegetables in Pekanbaru City

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ABSTRACT

Hydroponics is one of the cultivation technologies that is able to produce products with good quality. The specialty of hydroponic vegetables has attracted consumers to consume these products so that demand arises. This study aims to (1) analyze the factors that affect the demand for hydroponic vegetables in Pekanbaru City, and (2) analyze the elasticity of hydroponic vegetable demand in Pekanbaru City. The study was conducted in 4 modern markets spread across Pekanbaru City with a total sample of 40 respondents with *purposive sampling* method. The analysis used in the study was multiple linear log regression analysis. The results showed that (1) factors that significantly affect the demand for hydroponic vegetables are the price of hydroponic vegetables, household income, consumer knowledge, and lifestyle with a coefficient of determination (R²) value of 86.60 percent. (2) The demand for hydroponic vegetables is inelastic to the price of the goods themselves, the price of other goods, and income so that hydroponic vegetables include normal goods and substitutions.

Keywords: vegetable, hydroponics, demand, multiple linear log regression

INTRODUCTION

The development of knowledge and technology in the world of agriculture has resulted in various farming innovations, one of which is the hydroponic system. Hydroponics is a farming system using water medium and nutrient and mineral solutions to nourish plants in water. The hydroponic farming system is one solution for the development of vegetable crops with various advantages over conventional systems. According to Barbosa *et al.* (2015), cultivation with hydroponics is more efficient than conventional farming so as to save production costs

The quality of vegetables produced from hydroponic systems is fresher and cleaner than conventional vegetables because the cultivation site is not in contact with the soil and the growing medium used is sterile. Hydroponic vegetables also have a different taste than conventional vegetables, which are sweeter, crispier, and fresher for consumption. The crunchy taste in hydroponic vegetables is caused by the levels of nutrients given to plants controlled according to the type of plant so as to make plants grow optimally and produce a crispy vegetable texture. The taste of hydroponic vegetables that are different from conventional vegetables is one of the attractions for consumers (Febrianti *et al.*, 2019). The advantages and qualities of hydroponic vegetables are the initial considerations for consumers in making decisions to buy hydroponic vegetables.

The development of demand for hydroponic vegetables in Pekanbaru City always increases which can be seen from the increase in hydroponic vegetable production every year. In 2019, hydroponic vegetable production increased by 17.60 percent compared to the previous year. The increase in production is caused by consumer demand in Pekanbaru City which continues to increase. However, the increase in production is not supported by the availability of hydroponic vegetables on the market, so farmers must increase production in order to meet market demand.

Demand becomes an important thing in the economy to be able to understand something that is happening in the market. Demand is the amount of goods or services consumed in a particular market that consumers will buy at a certain price and time. Every individual always makes requests to meet the needs

of daily life. Consumer demand is determined by prevailing prices, prices of other goods, family income levels, community taste, population and future forecasts (Sukirno, 2017).

Trends in vegetable consumption show a relationship between income level and population diet. Low-income people consume very small amounts of vegetables and consumption will increase as income increases. In addition, high or low prices that apply are very dominant influence on decisions on consumer attitudes in buying hydroponic vegetables in certain quantities and adjusted to needs. Consumers will limit the purchase of the desired amount of goods if the price is too high, there is even a possibility that consumers will move consumption and purchases to substitute goods that have cheaper prices. The number of family members will also affect the amount of demand for an item. The more family members, the more the number of requests will increase. This relates to efforts to meet the adequacy of the needs of each individual in the family.

The problem is how much influence the price of hydroponic vegetables and lettuce, the price of non-hydroponic vegetables and lettuce, consumer income, number of family members, education level, consumer knowledge, and lifestyle on the size of hydroponic vegetable demand and the factors that become the most dominant influence on the demand for hydroponic vegetables. Based on this background, the purpose of this study is to identify the consumer characteristics of hydroponic vegetables, analyze the factors that affect the demand for hydroponic vegetables, and analyze the elasticity of demand for hydroponic vegetables in Pekanbaru City.

RESEARCH METHODS

This research was conducted in four modern markets in Pekanbaru City, namely Pekanbaru Fruit Market, 88 Fruit Market, Hawaii Swalayan, and Pomegranate Jumbo Mart. The sampling method used in this study was a technique *purposive sampling* and the number of respondents taken in the study amounted to 40 people. The research data were analyzed using multiple linear log regression models. Factors that affect demand such as the price of hydroponic vegetables, the price of non-organic vegetables. household income, number of family members, education level, consumer knowledge, and lifestyle. Consumer knowledge is a qualitative variable measured using the Likert scale which includes very knowing, knowing, knowing enough, not knowing, and very ignorant. Systematically, the models used are as follows.

$$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_7 D_1 + \mu$$

Keterangan :

Y = The number of inquiries for hydroponic veggies has increased. (Kg/month)

β_0 = Intersep

$\beta_1 - \beta_7$ = Regresi Coefision

X_1 = Price of hydroponic vegetable (vegetable/Selada) (IDR/Kg)

X_2 = Proce of non hydroponic vegetable (vegetable/Selada) (IDR/Kg)

X_3 = Household Income (IDR/month)

X_4 = Number of family members (person/soul)

X_5 = Education

X_6 = Consumer Knowledge

D_1 = *Dummy* life style
D = 1; Healty Lifestyle
D = 0; Follow-up Healty (tren)

μ = *Standard Error*

To see the level of elasticity of demand hydroponic vegetables are analyzed by looking at the coefficients of each variable. In the log-linear model, each coefficient measures the elasticity of the non-free variable to the dependent variable pertinent. The linear log model has the same slope coefficient as the elasticity coefficient, hence for this model the elasticity is constant along the regression line (Gujarati, 2007). If the value is $\beta > 1$ then demand is elastic, if the value is $\beta < 1$ then demand is inelastic.

RESULTS AND DISCUSSION

Factors Affecting the Demand for Hydroponic Vegetables in Pekanbaru City

Demand is the quantity of goods demanded at a certain level and time. Consumer demand for a good is not only closely related to the price of the item, but also closely related to other factors such as the price of other goods, income, number of family members, education level, consumer knowledge, and lifestyle. To analyze the factors affecting the demand are analyzed using multiple linear log regression models. Based on the results of multiple linear log regression analysis, the resulting regression model equation for variables bound to hydroponic vegetable demand can be seen in Table 1.

Table 1. Results of the analysis of factors affecting the demand for hydroponic vegetables

Free Variable	Koefisien Regresi	T hitung	Sig
(Constant)	-0,445	-0,251	0,803
Price of hydroponic vegetable (X1)	-0,940	-2,432	0,021*
Price of non hydroponic vegetable (X2)	0,164	1,240	0,224
Income (X3)	0,466	2,266	0,030*
Number of family members (X4)	0,145	0,829	0,413
Education (X5)	0,202	1,627	0,114
Consumer Experience (X6)	0,876	2,736	0,010*
Lifestyle (D1)	0,491	3,928	0,000*
R ²	0,866		
R ² (Adj)	0,837		
Uji F	29.589		
Sig F	0,000 ^b		

Description: * Significant at the level of 5 %

$$\ln Y = -0,445 - 0,940 \ln X1 + 0,164 \ln X2 + 0,466 \ln X3 + 0,145 \ln X4 + 0,202 \ln X5 + 0,876 \ln X6 + 0,491D1 + e$$

The value of the coefficient of determination is 0.866. This shows that the independent variable used in the model can explain the total diversity of the hydroponic vegetable demand variable by 86.60 percent and the remaining 13.40 percent is explained by other variables not contained in the model.

The F test results show a calculated F value of 29.589 \geq F table 2.30 means that the price of hydroponic vegetables, the price of non-hydroponic vegetables, consumer income, the number of family members, education level, consumer knowledge, and overall lifestyle have a significant influence on the demand for hydroponic vegetables.

1. Hydroponic Vegetable Price (X1)

Based on the results of multiple regression analysis, it is known that the value of the regression coefficient of the hydroponic vegetable price variable (X1) of -0.940 shows that if the price of hydroponic vegetables increases by 1 percent, the demand for hydroponic vegetables will decrease by 0.940 percent. This is in line with research by Timisela, *et al* (2021) which states that vegetable prices are negative for vegetable demand.

The resulting calculated t value is 2.432 with a table t value of 2.036 and the resulting significance value is 0.021 compared to a significance level of 0.05, so that the calculated $t \geq$ table and Sig. < 0.05 . Based on the hypothesis, H0 is rejected and H1 is accepted, which means that the variable price of hydroponic vegetables partially has a significant effect on the demand for hydroponic vegetables. The results showed that the higher the price of hydroponic vegetables, the demand for hydroponic vegetables decreases and the increase in price will have a significant effect on decreasing the demand for hydroponic vegetables. Cheaper vegetable prices will attract consumers to buy these products compared to buying similar goods at higher prices.

2. Price of Non Hydroponic Vegetables (X2)

Based on the results of multiple regression analysis, it is known that the value of the regression coefficient of the non-hydroponic vegetable price variable (X1) of 0.164 shows that if the price of non-hydroponic vegetables increases by 1 percent, the demand for hydroponic vegetables will increase by 0.164 percent. The price of non-hydroponic vegetables has a positive influence on the amount of demand for hydroponic vegetables, namely the increasing price of non-hydroponic vegetables, the amount of hydroponic vegetables demanded will increase. This is in line with the opinion of Rahardja and Manurung (2019) that if the price of a substituted item increases, then the demand for the substituted item increases because consumers will continue to use the original item.

The resulting calculated t value is 1.240 with a table t value of 2.036 and the resulting significance value of 0.224 compared to a significance level of 0.05 percent, so that $t <$ table and Sig. > 0.05 . Based on the hypothesis that H0 is accepted and H1 is rejected, it means that a partial increase in the variable price of non-hydroponic vegetables does not have a significant effect on the demand for hydroponic vegetables. This shows that the increase in the price of non-hydroponic vegetables does not necessarily affect the increase in the amount of demand for hydroponic vegetables. Vegetable vegetables sold in modern markets consist of hydroponic vegetables, organic vegetables, and conventional vegetables. Hydroponic and organic vegetables have almost the same price level of around Rp. 10,000 per pack, while conventional vegetables have a cheaper price level of around Rp. 5,000 per pack. In physical appearance, hydroponic vegetables have better quality because they are larger and cleaner, while organic and conventional vegetables are smaller. This difference in price and quality is a consideration for consumers to buy the product. In addition, the availability of hydroponic vegetables in the modern market is more than non-hydroponic vegetables so that consumers are easier to buy hydroponic vegetables.

3. Revenue (X3)

Based on the results of regression analysis, it is known that the value of the regression coefficient of income variable (X3) is 0.466, meaning that if household income increases by 1 percent per month, the amount of demand for hydroponic vegetables will increase by 0.446 percent. This is in accordance with the theory of Sukirno (2017), namely income has a positive effect on demand for goods. The greater the household income, the increase in the amount of demand for hydroponic vegetables at each prevailing price level.

The resulting calculated t value is 2.266 with a table t value of 2.036 and the resulting significance value is 0.030 compared to a significance level of 0.05, so that the calculated $t >$ table and Sig. < 0.05 . Based on the hypothesis, H0 is rejected and H1 is accepted, which means that the income variable partially has a significant effect on the demand for hydroponic vegetables, at a significance level of 5 percent, the increase in household income will affect the increase in the amount of demand for

hydroponic vegetables. Food consumption expenditure is closely related to household income level. Households that have a high income level have great purchasing power because the ability to buy an item also increases. Consumers in this study have considerable purchasing power, it can be seen from the income level that the majority have an income level of > Rp.3,500,000 so that consumers can make purchases even though the price of hydroponic vegetables is more expensive than the price of conventional vegetables.

4. Number of Family Members (X4)

Based on the results of regression analysis, it is known that the value of the regression coefficient of the variable number of family members (X4) is 0.145, meaning that if the number of family members increases by 1 percent, it will increase the demand for hydroponic vegetables by 0.145 percent. This is in accordance with the results of the research of Achmad *et al.* (2018), namely the number of family members has a positive influence on the number of product purchases.

The resulting calculated t value is 0.829 with a table t value of 2.036 and the resulting significance value is 0.413 compared to a significance level of 0.05, so that the t-count is < table and Sig. > 0.05. Based on the hypothesis, H0 is accepted and H1 is rejected, which means that the variable number of family members partially has no significant effect on the demand for hydroponic vegetables at a significance level of 5 percent. This shows that the increase in the number of family members does not necessarily affect the increase in the demand for hydroponic vegetables because not all consumers who have a large number of family members will make purchases in large quantities. The price of hydroponic vegetables that are more expensive will be a consideration for consumers so that it affects the amount of food expenditure that will be spent. In addition, the majority of consumers in this study also have a small number of family members, < 6 people reaching 85 percent.

5. Education (X5)

Based on the results of regression analysis, it is known that the value of the regression coefficient of the educational variable (X5) is 0.202. This shows that if the level of education increases by 1 percent, the amount of demand for hydroponic vegetables will increase by 0.202 percent. The increasing level of consumer education will increase consumer knowledge about ingredients that are safe for consumption.

The resulting calculated t value is 1.627 with a table t value of 2.036 and the resulting significance value of 0.114 compared to a significance level of 0.05, so that the calculated t < table and Sig. > 0.05. Based on the hypothesis, H0 is accepted and H1 is rejected, which means that the educational variable partially has no significant effect on the demand for hydroponic vegetables at a significance level of 5 percent. This shows that the increasing level of education does not necessarily affect the demand for hydroponic vegetables because consumer knowledge about hydroponic vegetables is not only obtained through formal education. Based on the results of the study, 42.50 percent of information sources to obtain information about hydroponic vegetables came from print or online media, 35 percent from friends, 20 percent came from sellers, and 2.50 percent came from family.

6. Consumer Knowledge (X6)

Based on the results of multiple regression analysis, it is known that the value of the regression coefficient of the consumer knowledge variable (X6) of 0.876 shows that if consumer knowledge increases by 1 percent, the demand for hydroponic vegetables will increase by 0.876 percent. This is in line with the results of Indinasari's research (2020), namely consumer knowledge, especially about products, has a positive and significant effect on consumer attitudes in purchasing vegetables, causing a strong desire to choose and buy these products.

The resulting calculated t value is 2.736 with a table t value of 2.034 and the resulting significance value is 0.010 compared to a significance level of 0.05, so that t counts the table t > and Sig. < 0.05. Based on the hypothesis, H0 is rejected and H1 is accepted, which means that the variable of consumer knowledge partially has a significant effect on the demand for hydroponic vegetables at a significance level of 5 percent. Consumer knowledge affects the demand for hydroponic vegetables in accordance

with the explanation that consumers in general already know information about hydroponic vegetable products very well. This is in accordance with Park and Leig's opinion in Lin and Lin (2007) which states that consumers with higher product knowledge have memory recognition, analysis, and logical ability so that consumers will rely on intellectual clues in considering product quality because consumers are aware of information about a product.

7. *Dummy Lifestyle (D1)*

Based on the results of regression analysis, it is known that the value of the lifestyle dummy *regression coefficient* (D7) of 0.491 means that consumers who have a healthy lifestyle demand more hydroponic vegetables than consumers who buy hydroponic vegetables for the reason of wanting to try (trend), which is 0.491.

The resulting calculated t value is 3.928 with a table t value of 2.036 and the resulting significance value of 0.000 compared to an error rate of 0.05, so that the calculated $t \geq$ table and Sig. < 0.05. Based on the hypothesis, H0 is rejected and H1 is accepted, which means that the *dummy* lifestyle variable partially has a significant effect on the demand for hydroponic vegetables at an error level of 5 percent. This is in line with Cahyarani's (2018) research, namely a healthy lifestyle can result in a large number of requests.

Elasticity of Demand for Hydroponic Vegetables

Elasticity *is* the magnitude of the change in the quantity of goods desired or the quantity of goods supplied in the market as a result of certain factors that influence it. Elasticity can be interpreted as the level of sensitivity to changes in the quantity of an item caused by changes in other factors. According to Sukirno (2017), demand elasticity is divided into three concepts, namely price demand elasticity, income demand elasticity, and cross demand elasticity.

1. Price Elasticity

The value of the price elasticity of hydroponic vegetables is -0.940. The elasticity value marked negative indicates that the variable price of hydroponic vegetables has a relationship in the opposite direction with the demand for hydroponic vegetables, meaning that if the price of hydroponic vegetables increases by 1 percent, demand will decrease by 0.904 percent. The demand for hydroponic vegetables is inelastic because of the $E < 1$ value which indicates that the amount of hydroponic vegetables demanded changes by a smaller percentage than the price of non-hydroponic vegetables.

2. Income Elasticity

The value of price elasticity of non-hydroponic vegetables is 0.164. The elasticity value marked positive indicates that if the variable price of non-hydroponic vegetables increases by 1 percent, then the demand for hydroponic vegetables will increase by 0.164 percent. A positive sign also indicates that hydroponic vegetables and non-hydroponic vegetables are substitute goods so that an increase in the price of non-hydroponic vegetables will result in an increase in the quantity of demand for hydroponic vegetables because the demand for one of the goods depends on the price of substitute goods. The demand for hydroponic vegetables is inelastic because the value of the elasticity coefficient is $E < 1$ which indicates that the amount of hydroponic vegetables demanded changes by a smaller percentage than the price of non-hydroponic vegetables.

3. Cross Elasticity

The value of income elasticity is 0.466. The positive elasticity value shows that if income increases by 1 percent, the demand for hydroponic vegetables will increase by 0.466 percent. The value of income elasticity is inelastic because the value of the elasticity coefficient is $E < 1$, meaning that changes in increasing household income will give a smaller response to the increase in the amount of demand for hydroponic vegetables. A positive value shows that hydroponic vegetables are normal goods because an increase in income results in an increase in purchases of these goods. The demand for hydroponic

vegetables will increase if people's income increases, namely the increase in income increases the ability to buy more goods and the increase in income allows people to exchange consumption from goods that are not good quality to better quality goods, namely changing the consumption of conventional vegetables into hydroponic vegetables that have better quality. A small elasticity value of 1 also shows that the goods consumed are basic necessities.

CONCLUSION

Multiple linear log regression analysis was used to examine the factors influencing demand for hydroponic crops. Hydroponic vegetable prices, household income, consumer awareness, and lifestyle all have a considerable impact on vegetable demand, with a coefficient of determination (R²) value of 86.60 percent. The price elasticity of demand for hydroponic vegetables is inelastic, the cross-elasticity results suggest that hydroponic vegetables are inelastic and replacement products, and the income elasticity results show that hydroponic vegetables are inelastic and normal commodities.

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