

## A look at the things that affect modern farmers' income

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### ABSTRACT

*This study aims to analyze the effect, capital, land area, labor on the income of modern farmers (Hydroponics) in Palangkaraya City. The research method used in this study is a quantitative approach method and uses primary data sourced from hydroponic farmers in the research location obtained by interviewing respondents, Palangkaraya City. Data were analyzed using multiple linear regression analysis methods. The results of this study indicate that capital and land area have a positive and significant effect on the income of modern farmers (Hydroponics) in Palangkaraya City, labor has a positive and insignificant effect on the income of modern farmers (Hydroponics) in Palangkaraya City. From the results of this analysis, it can be suggested that the Palangkaraya City government helps hydroponic farmers who want to start modern hydroponic agriculture in Palangkaraya City by lending capital to farmers who want to start hydroponic farming but lack capital, for small land areas, farmers can plant hydroponic crops in stages so that the harvest yields more, workers should use the family so that income does not decrease.*

*Keywords: capital, land area, labor, income, farmer, modern*

### I. INTRODUCTION

A significant portion of Indonesia's people earns their livelihood through agricultural pursuits. Indonesian agriculture is one of the top 5 industries that significantly contribute to the country's economic growth (Suwignyo et al., 2023). The agricultural industry encompasses diverse subsectors, including horticulture, food crops, plantations, fisheries, animal husbandry, and forestry. Horticulture is a prominent subsector that forms the foundation of agriculture. These encompass horticulture items such as food plants, fruit plants, medicinal plants, and ornamental plants, which play a significant role in benefiting both humans and the environment. Vegetables, among the various horticultural products, offer significant advantages to human existence, serving as a vital source of sustenance and nourishment, as well as contributing to both individual and national economic prosperity (Sarna et al., 2020).

The practice of organic farming gained popularity in Indonesia throughout the 1980s. The government's initiation of the green revolution movement in the late 1970s resulted in severe consequences (Tamtomo, 2021). Specifically, the usage of chemical fertilizers and pharmaceuticals was accused of causing harm to the agricultural environment and human health, hence hurting the environment. Hydroponic technology encompasses organic growing practices. Hydroponic technology is currently regarded as the future of agriculture due to its significant environmental, economic, and social benefits. Its adaptability allows it to be utilized in various settings (Susilowati et al., 2020).

Hydroponic technology offers a solution for urban communities to combat pollution and the scarcity of fresh air in cities. Additionally, it addresses the limited availability of land for traditional agriculture, while also providing a means to ensure food security and generate social income.

Hydroponic technology was introduced in Indonesia around 1980 and quickly gained popularity. Bob Sadino was responsible for introducing this hydroponic technology to the broader population (Son et al., 2020). Bob Sadino is credited with popularizing hydroponic technology in Indonesia and is widely recognized as an authority in the field of agribusiness. Originally, this planting method was solely motivated by a person's passion for plants and their desire to experiment with soilless plant cultivation. Hydroponic technology is an agricultural technique that involves cultivating plants without the use of soil, instead relying on nutrient solutions as a primary source of nourishment (Susilowati et al., 2020). Hydroponic technology offers numerous advantages over traditional planting methods. Hydroponically grown vegetables are healthier because to their lack of heavy metal contamination from soil, as well as their freshness, extended shelf life, and ease of digestion.

Another benefit of environmentally sustainable hydroponic technology is the production of sanitary products, accelerated plant development, the ability to preserve plant quality, and the potential for greater quantity (Maucieri et al., 2019). These hydroponic veggies are priced higher than normal vegetables. Hence, the target market segment predominantly comprises individuals from the moderate to upper socioeconomic strata. Assuming a mere 10% of the Indonesian population prioritizes items with hygienic standards, this implies that around 25 million individuals use hydroponic technology products on a daily basis (Setiawan, 2019). According to the Boston Consulting Group (BCG), the upper middle economic class in Indonesia consisted of around 74 million individuals in 2014.

In addition, the hydroponics industry specifically targets the well-educated demographic within the age range of 19 to 25 years. This is because individuals in the school-age demographic has a comprehension of a wholesome way of life and possess the capacity to partake in the consumption of hydroponically grown veggies. The advancement of hydroponic technology is progressing alongside the diminishing availability of planting space in metropolitan areas, so restricting people's ability to cultivate plants as desired. Hydroponic technology enables the cultivation of plants in various locations, utilizing diverse growing mediums to get optimal plant outcomes. This method is particularly beneficial for individuals residing in metropolitan areas with limited land availability. Hydroponic technology enables individuals residing in apartments or flats to engage in plant cultivation. This hydroponic planting technology simplifies all tasks, making it an ideal solution for urban or modern culture.

Due to the evolving era and growing public awareness regarding the significance of health and the environment, there is a rising preference for consuming vegetables that are cultivated without the use of chemical pesticides. The surge in population, along with a heightened consciousness regarding clean and hygienic products, has created a significant business opportunity. In addition to examining the health and environmental knowledge of hydroponic farmers, the author also aims to analyze it from a socio-economic standpoint.

Socioeconomic status refers to a socially regulated situation or place inside the societal framework. The conferral of this position entails a series of entitlements and responsibilities that can only be discharged by the individual holding the status. Consequently, land ownership is among the determinants of an individual's socio-economic standing within society (Astrawan et al., 2014). Social conditions encompass the satisfaction of familial needs and the establishment of a respectable community that adheres to societal norms. These conditions are influenced by factors such as educational attainment, income level, asset ownership, and access to amenities.

The Central Kalimantan Province has a significant amount of agricultural land available. However, the people of Palangkaraya City are currently focusing on utilizing small areas of land, like home gardens, to cultivate horticultural crops such as vegetables and medicinal plants for their own consumption. The city of Palangkaraya is home to a community that engages in the production of hydroponic vegetables. This community was established in 2017, with individuals involved in this activity

as both a pastime and a primary business. The revenue generated by hydroponic growers in Palangkaraya City utilizing hydroponic technology is presented in table 1:

Table 1. Palangkaraya City Hydroponic Technology Farmer Income, and Land Area

No.	Name	Land Area (m <sup>2</sup> )	Income Before Hydroponics Income	After Hydroponics
1.	Hadis Ali	300m <sup>2</sup>	Rp. 500.000	Rp. 4.000.000
2.	Supriyanto	500m <sup>2</sup>	Rp. 4.000.000	Rp. 8.500.000
3.	Binti Kholifa	300m <sup>2</sup>	Rp. 200.000	Rp. 3.300.000
4.	Peterson	120m <sup>2</sup>	Rp. 300.000	Rp. 900.000

Based on the provided chart, it is evident that the revenue of hydroponic farmers in Palangkaraya City has experienced a notable increase subsequent to the adoption of hydroponic technology in farming. The hydroponic vegetable plants commonly cultivated utilizing hydroponic technology in Palangkaraya City include green mustard greens, broccoli, celery, spinach, lettuce, cucumber, kale, pak choy, green beans, and eggplant. Income statistics collected from preliminary observations conducted prior to and subsequent to farmers' implementation of the hydroponic system. The introduction of hydroponic vegetable cultivators is expected to enable Palangkaraya City to meet its vegetable demands.

## II. LITERATURE REVIEW

Income refers to the total earnings generated by all commercial operations within a specific area during a designated period, also referred to as community data gathering (Hortas-Rico & Rios, 2019). Income refers to the financial resources that an individual relies on to fulfill their daily necessities. It plays a crucial role in ensuring one's survival and overall well-being, either directly or indirectly (Díez-Minguela et al., 2018).

Hydroponics, often known as soilless cultivation, refers to several methods of producing crops without relying on soil as a medium for plant growth. The term hydroponics is derived from the Latin words "hydro," meaning water, and "ponos," meaning work. Hydroponics refers to the process of utilizing water as a substrate for plant growth and as a source for plant roots to absorb essential nutrients (Lang & Lang, 2016). Production is the transformative process of converting input into output, resulting in an increase in the value of products. Input refers to the commodities or services that are utilized in the process of production, while output refers to the goods or services that are generated as a result of the production process (Huang et al., 2022).

By utilizing capital and equipment, the production elements of land and labor can yield much greater advantages for humanity. Moreover, the utilization of capital and equipment can also lead to conservation of land and labor resources (Sigiro et al., 2023). Hence, capital can be categorized into two types: land-saving capital and labor-saving capital. Land-saving capital refers to capital that can optimize land utilization by doubling production without the need for land expansion. On the other hand, labor-saving capital refers to capital that achieves the same outcome with reduced labor input. This has the potential to reduce the need for manual labor (Harahap et al., 2021).

Land serves as the primary source of agricultural production. Land refers to a portion of the earth's surface that is available for human use, including both managed and unmanaged land (Naidu, 2014). The management of agricultural land is crucial for the efficiency and success of agricultural production. When it comes to agricultural companies, it is clear that owning or controlling a smaller plot of land is less efficient than having a larger one. As per Law no. 13 of 2003, the term "labor" refers to any individual who possesses the capability to do or execute tasks aimed at producing goods and/or services to fulfill personal or societal requirements. The level of labor input in hydroponic farming directly impacts the profitability of the hydroponic technology farming enterprise.

## III. METHODS

The methodology employed in this study is quantitative research. Quantitative research methods

are characterized by their methodical, organized, and well-structured approach, which is evident from the initial stages of research design. The research methodology employed in quantitative research is grounded in the concept of positivism (Sugiyono, 2017). It is utilized to investigate specific populations or samples by gathering data through research instruments. The analysis of this data is quantitative in nature, with the objective of testing predetermined hypotheses.

#### IV. RESULTS AND DISCUSSION

The methodology employed in this study is quantitative research. Quantitative research methods are characterized by their methodical, planned, and well-structured approach, starting from the first stages and continuing until the development of the research design (Sugiyono, 2017). The research methodology employed in quantitative research is grounded in the concept of positivism. It is utilized to investigate specific populations or samples, employing research tools to collect data. The analysis of the data is quantitative in nature, with the objective of testing the formulated hypothesis.

Table 2. Results of Multiple Linear Regression Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	
	B	Std. Error	Beta			
	(Constant)	350521,273	122656,574		2,858	,006
1	Modal	,256	,050	,752	5,164	,000
	Luas_Lahan	1246,488	1129,460	,547	3,104	,025
	Tenaga_Kerja	47033,742	51691,087	,063	,910	,368

To create numerous regression equations, one can interpret the values of the unstandardized coefficients in the table provided. To construct a multiple regression equation, one must carefully consider the values in the unstandardized coefficient column.

$$Y = 350521.273 + 0.256X_1 + 1246.488X_2 + 47033.742X_3 + e$$

1. The equation above has a constant value of 350521.273. This figure illustrates the overall revenue level when the factors of capital (X1), land area (X2), and labor (X3) are not taken into consideration.
2. The capital regression coefficient (X1) in the equation above has a value of 0.256. Thus, holding all other independent variables constant, a one rupiah increase in capital (X1) will result in a 0.256 rise in the income variable (Y).
3. The land area variable (X2) has a regression coefficient of 1246.488. The coefficient value indicates that there is a relationship between land area (X2) and income (Y). This demonstrates that a one-unit increase in the land area variable (X2) will result in a corresponding rise of 1246.488 in the income variable (Y).
4. The labor variable (X3) has a regression coefficient of 47033.742. The coefficient value indicates that labor (X3) exerts an impact on income (Y). Increasing the labor variable (X3) by one unit will result in a corresponding rise of 47033.742 in the income variable (Y).

The t statistical test is employed to ascertain the extent of the influence between the independent variable and the dependent variable separately. The presence of a significant or insignificant impact can be identified by applying the t statistical test to the outcomes of regression data analysis (Ghozali, 2016). Decision making as the process of selecting choices or reaching conclusions based on careful consideration and analysis.

1. If the p-value is less than 0.05, the null hypothesis (Ho) is rejected, indicating a substantial influence between the dependent variable and the independent variables individually.
2. If the p-value is greater than 0.05, then the null hypothesis (Ho) is accepted, indicating that there is no statistically significant relationship between the dependent variable and the independent variables separately.

Table 3. t Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	350521,273	122656,574		2,858	,006
1 Modal	,256	,050	,752	5,164	,000
Luas_Lahan	1246,488	1129,460	,547	3,104	,025
Tenaga_Kerja	47033,742	51691,087	,663	4,110	,002

According to the data presented in the table above, the impact of each independent variable on the dependent variable can be described as follows:

1. Conversion of capital (X1) into income (Y)

The test findings for the variable representing capital (X1) on income (Y) indicate a very significant result of 0.000. The p-value is 0.05, indicating statistical significance, and the t-value is computed to be 5.164. This demonstrates a substantial correlation between capital (X1) and the revenue (Y) of hydroponic growers in Palangkaraya City.

2. Relationship between land area (X2) and income (Y)

The statistical analysis revealed a substantial correlation coefficient of 0.025 between the variable land area (X2) and income (Y). The p-value is 0.05, indicating statistical significance, and the calculated t-value is 3.104. This demonstrates a substantial correlation between the land area (X2) and the revenue (Y) of hydroponic farmers in Palangkaraya City.

3. Increase in labor (X3) leads to an increase in income (Y).

The empirical analysis of the labor variable (X3) in relation to income (Y) reveals a coefficient estimate of 0.002. The statistical significance is  $p < 0.05$ , with a computed t-value of 4.110. These findings indicate that the variable of labor (X3) has a substantial impact on the income (Y) of hydroponic growers in Palangkaraya City.

The F statistical test is employed to determine the adequacy of the regression model and ascertain whether the collective independent variables exert an influence on the dependent variable (Ghozali, 2016). Decision-making provisions as follows:

1. If the count of F is greater than the table value of F or the probability is less than the significance value of 0.05, then it may be concluded that the independent variable model as a whole is related to the dependent variable.
2. If the count of F is less than the value from the F table or the probability is greater than the significance value of 0.05, then it can be concluded that the independent variable model as a whole does not have a relationship with the dependent variable.

Table 4. F Analysis

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	49347408690301,720	3	16449136230100,572	91,483	,000 <sup>b</sup>
Residual	8450826603815,932	47	179804821357,786		
Total	57798235294117,650	50			

Based on the test findings presented in the table above, it is evident that the p-value for this study is 0.000, which is less than the significance level of 0.05. The coefficient of determination test quantifies the degree to which the independent variable can account for the variation in the dependent variable. The coefficient of determination can take on values of either zero or one (Widiati et al., 2020). Criteria for determining the coefficient of determination as follows:

1. If the value of R<sup>2</sup> is close to zero or small, it indicates that the independent variable has very little or restricted ability to explain the relationship with the dependent variable.
2. If the coefficient of determination (R<sup>2</sup>) is close to or larger than one, it indicates that the independent variables contain nearly all the necessary information for predicting the dependent variable.

Table 5. Coefficient of Determination Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,924 <sup>a</sup>	,854	,844	424033,986

The calculation results from the table above indicate that the coefficient of determination (R square) obtained is 0.854. Consequently, the factors of capital (X1), land area (X2), and labor (X3) have a significant impact on 85% of the income generated by contemporary hydroponic farmers in Palangkaraya City. However, this research does not take into account other elements that may affect 15% of the income of modern hydroponic farmers in Palangkaraya City.

Based on the test findings presented in the table above, it is evident that the p-value for this study is 0.000, which is less than the significance level of 0.05. The coefficient of determination test quantifies the degree to which the independent variable can account for the variation in the dependent variable. The coefficient of determination can take on values of either zero or one (Suharjo, 2008). Suharjo (2008) outlines the criteria for determining the coefficient of determination as follows:

1. If the value of R<sup>2</sup> is close to zero or small, it indicates that the independent variable has very little or restricted ability to explain the relationship with the dependent variable.
2. If the coefficient of determination (R<sup>2</sup>) is close to or larger than one, it indicates that the independent variables contain nearly all the necessary information for predicting the dependent variable.

The calculation results from the table above indicate that the coefficient of determination (R square) obtained is 0.854. Consequently, the factors of capital (X1), land area (X2), and labor (X3) have a significant impact on 85% of the income generated by contemporary hydroponic farmers in Palangkaraya City. However, this research does not take into account other elements that may affect 15% of the income of modern hydroponic farmers in Palangkaraya City.

The statistical tests indicate that the variables capital (X1) and land area (X2) have a substantial impact on income (Y). However, the labor variable (X3) does not exert a substantial impact on income (Y). The elucidation of the influence of each variable is provided below:

Research findings indicate a substantial correlation between capital (X1) and income (Y) based on the results of partial hypothesis testing. The calculated t-value is 5.164, with a significance level of 0.000, which is less than 0.05. Therefore, we accept the existing hypothesis. The findings of this study are further supported by the research conducted by Ferlinda Wardani (2019), Hikmawati (2018), and Asep Heryanto et al (2020).

The results indicate a positive correlation between capital (X1) and income (Y) among modern hydroponic farmers in Palangkaraya City. Similarly, if the capital (X1) of contemporary hydroponic farmers in Palangkaraya City is minimal, the revenue (Y) acquired by contemporary hydroponic farmers in Palangkaraya City will also be minimal. According to Soedarsono (1987), capital is a decisive factor in production activities, and the magnitude of capital directly affects the quantity of output generated. The capital (X1) has a direct impact on the revenue (Y) of contemporary hydroponic farmers in Palangkaraya City.

This research demonstrates a substantial correlation between the land area (X2) and income (Y) of contemporary hydroponic farmers in Palangkaraya City, based on the findings of partial hypothesis testing (Zakiah et al., 2023). The obtained t value is 3.104, which above the significance level of 0.025. Since this value is smaller than the critical value of 0.05, we can accept the hypothesis. The findings of this study are further supported by the research before (Hajjali et al., 2022; Subianto et al., 2023; Wei et al., 2020; Zakiah et al., 2023). The income (Y) obtained by modern hydroponic farmers in Palangkaraya City increases proportionally with the expansion of the land area (X2) maintained using hydroponic technology. Conversely, there is an inverse relationship between the size of land area (X2) controlled by contemporary hydroponic farmers and the amount of money (Y) they generate. The limited land space hinders the proper utilization of technology in agriculture, leading to excessive use and inefficiency in

agricultural operations.

Hypothesis testing reveals a substantial correlation between the labor variable (X3) and income (Y). The calculation results indicate that the calculated t value is 4.110, with a significant value of 0.002. Therefore, it was determined that labor (X3) exerted a substantial impact on income. Therefore, it can be inferred that the hypothesis is accepted. Therefore, the employment of extra workforce (X3) will result in an augmentation of the revenue (Y) obtained by contemporary hydroponic cultivators in Palangkaraya City. In contrast, a decrease in labor (X3) will result in a decrease in the income (Y) of contemporary hydroponic farmers in Palangkaraya City. The findings of this study are consistent with the research before, which asserts that labor has a substantial and influential impact on farmers' income (Susilowati et al., 2020; Zakiah, 2022).

## V. CONCLUSION

The research findings yielded the following conclusions the statistical tests were conducted to assess the combined impact of the independent variables capital (X1), land area (X2), and labor (X3) on the income variable (Y). This implies that the independent variables have a concurrent and tangible impact on the income or variable (Y). The partial testing of capital (X1) on income (Y) of modern hydroponic farmers in Palangkaraya City demonstrates a statistically significant impact on income (Y). The primary determinant for running a business is capital (X1). If modern hydroponic farmers in Palangkaraya City have a substantial amount of capital (X1), they will be able to efficiently establish a modern hydroponic farming business, resulting in an increase in their income (Y). The partial testing of land area (X2) on income (Y) of modern hydroponic farmers in Palangkaraya City demonstrates a considerable impact on income (Y). The production and income of modern hydroponic farmers are influenced by the amount of the land area (X2) used for hydroponic farming. Expanding the hydroponic farming area in Palangkaraya City will lead to a boost in productivity and subsequently improve income. The partial testing of the labor variable (X3) on the income (Y) of modern hydroponic farmers in Palangkaraya City demonstrates a considerable impact on their revenue. This is because an increase in the workforce leads to a corresponding increase in revenue (Y). Employing non-family personnel will solely diminish the income (Y) of contemporary hydroponic growers in Palangkaraya City.

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