Analysis of the Productivity of Carrot Farming Labor in Sugihen Village, Dolat Rakyat District, Karo Regency

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ABSTRACT

This study aims to see the effect of land area, farmer age, education and farming experience on labor productivity and to analyze the optimization level of carrot farming labor. The research was conducted in Sugihen Village, Dolat Rakyat Subdistrict, Karo Regency, North Sumatra Province with a total sample of 30 farmers who cultivated carrots using simple random sampling technique. The data obtained were tested using multiple linear regression test and optimization level analysis. The results obtained are that the productivity of carrot farming labor in the research area is quite high with a value of Rp523,277.57/HKP. Simultaneously, land area, farmer age, education and farming experience have a significant effect on labor productivity with the coefficient of determination (R^2)=92.10%. Partially, the land area and farmer age have no significant effect on labor productivity, while the education and farming experience have a significant effect on labor productivity. The level of optimization of carrot farming labor (NPM/Hx)=-2.31. The value of the level of optimization <1 indicates that the labor expenditure in carrot farming is not optimal.

Keywords: Land Area, Farmer Age, Education, Farming Experience, Labor Productivity

INTRODUCTION

Indonesia is an agricultural country where most of the population live in rural areas with a livelihood as farmers. The Indonesian population generally consumes agricultural products as staple food. Thus increasing the production of agricultural products is aimed at food self-sufficiency, but the challenge to achieve this result is very large due to the narrowing of the agricultural area, the occurrence of climate deviations and the use of less modern agricultural technology (Mardikanto, 2011).

Agricultural commodities in Indonesia include food crops, plantations, horticulture, ornamental plants and industrial plants. Horticultural crops have received great attention because they have proven themselves as commodities that can be used as sources of new growth in the agricultural sector. The development of horticultural commodities has its own characteristics because it has the main purpose of production is to be sold not to be consumed by farmers themselves. Therefore, horticultural development must be carried out commercially, market-oriented and professionally managed with profitable economies of scale (Sunarjono, 2011).

One of the horticultural plants that play an important role is carrots because they have a contribution as a provider of food, especially a source of vitamins and minerals. Increasing population, standard of living and health interests are reasons for people to consume carrots so that the demand for carrots will continue to increase. The high market demand for carrots can be seen from the growth and development of the role of industrial companies that process carrot tubers into various types of products, including food, beverages and cosmetics. The development of carrot cultivation in

Indonesia is supported by regional agro-climatological and agro-economic conditions that are suitable for horticultural crops, especially carrots (Rukmana, 2015).

Carrot cultivation in Indonesia is spread across various provinces in which Central Java, West Java, East Java, North Sumatra and Bengkulu are the main carrot producing regions. Data from the Badan Pusat Statistik of North Sumatra Province (2019) shows that Karo Regency is the main producing area for wotels in North Sumatra which are spread across various districts.

Pasaribu's research (2016) shows that capital, labor, seeds, fertilizers and pesticides have a significant effect on the production of carrot farming in Raya Village, Berastagi District, Karo Regency. Furthermore, Fitria's research (2018) shows that land area, farmer's age and number of family dependents have a significant effect on farm income in Suban Ayam Village, Selupu Rejang District, Rejang Lebong Regency, Bengkulu Province.

The discussion of the role of labor in farming is of particular concern because it relates to the number and quality of labor which directly affects farm income. Apart from this, it is a fact that from various production factors, the labor production factor is a production factor that can be controlled by farmers compared to other production factors for the sake of increasing production and income and the fact that labor provides the largest contribution to the cost of farming production.

One measure of the progress of farm management is labor productivity. The higher the labor productivity, the better the farm management progress. Therefore, it is necessary to study the factors that influence labor productivity in farming and the optimization level of labor outpouring, so that the description of the level of progress in farm management can be known as well as a description of the energy expenditure for further farm management in order to obtain maximum income.

Based on the description above, the problems in this study are as follows: (1).

How are the effects of land area, age, education and farming experience on the productivity of carrot farming. (2). What is the level of optimization of labor in carrot farming.

LITERATURE REVIEW

Labor is an important business production factor besides land, capital and management. Hernanto (2012), divides labor into human, livestock and mechanical labor. Human labor is divided into men, women and children. Human workers can do all types of work based on their level of ability. In addition, human labor in farming can be influenced by the level of age, education, skills, experience, level of nutritional adequacy, and level of health of farmers. Natural factors such as climate and conditions of agricultural land also contribute to employment.

In carrying out farming, farmers in Indonesia generally use labor that comes from within the family. According to Mubyarto (2011), the use of family labor is influenced by several factors, namely the level of wages, the level of income to be earned, the range of available work opportunities, local labor institutions and land assets owned. According to Mulyadi (2016), the success of the farming branch can be seen from the amount of output and labor is one of the important production factors in farming because it can affect the amount of costs incurred in farming.

Rukasah in Hernanto (2012) states that to find out the potential of family labor, all types of labor in the family are calculated based on the number of working hours used in a year. A male worker will work 300 working days (HKP) a year. Female workers work 226 working days and children 140 work days in one year. Yang (1995) in Hernanto (2012) makes a labor conversion, namely by comparing male labor as the standard measure and other types of labor are converted or equalized with men, namely: 1 man = 1 male work day; 1 woman = 0.7 male work days; 1 livestock = 2 working days for men; and 1

child = 0.5 man working days. One working day is calculated for 7 working hours. The work unit (working day) is needed to measure the efficiency of the use of labor. Efficiency is an effort to achieve goals by using the minimum possible resources. One way to measure efficiency is by looking at labor productivity. Labor productivity is the ratio between farm revenues received and the amount of labor devoted to farmers. High labor productivity will indicate efficient use of production factors for farming.

According to Mubyarto (2011), the optimization level of input use is generated from the ratio of the marginal product value (NPM) to the cost or price of each input. The optimum value indicates the adequacy of the use of the input to the value of the resulting product.

For subsistence farming, most of the workforce comes from the farmer's own family consisting of the farmer's father, wife and children, so there is no need for wages in the form of money to be paid in cash so that it can reduce labor costs. In an economic sense, capital is goods or money which together with the factors of production of land, labor and management produce new goods, namely agricultural products. The main element that also plays a very important role in doing business is management. This element must be owned by farmers to be able to determine, organize and coordinate the controlled production factors, so as to provide optimal results.

RESEARCH METHODS

The research was conducted in Sugihen Village, Dolat Rakyat District, Karo Regency, North Sumatra Province. The research area was determined purposively because it is the largest carrot-producing agricultural area in North Sumatra Province. The research sample was 30 carrot farmers in the research location. The samples were selected by simple random sampling. The research data was collected through interviews with farmers

for the carrot growing season for the period August - November 2019.

Hypothesis testing (1) is carried out by multiple linear regression test with 4 independent variables (Widarjono, 2020).

To determine the effect of the independent variable simultaneously on the dependent variable, an F test is carried out with the testing criteria if the significance value F≥0.05 then H0 is accepted H1 is rejected, and if the significance value F<0.05 then H0 is rejected, H1 is accepted. To determine the effect of the independent variable partially on the dependent variable, a t test was carried out with the testing criteria if the significance value t≥0.05 then H0 was accepted H1 was rejected, and if the significance value t<0.05 then H0 was rejected, H1 was accepted.

Hypothesis testing (2) is carried out by analyzing the optimization level of labor outpouring with the formula optimization level = NPM/Hxi (Soekartawi, et al, 2010):

NPM=marginal product value

Hx=Price per unit of labor (Rp/HKP)

The test criteria used are:

NPM/Hx=1, then the optimal labor expenditure.

NPM/Hx>1, the labor disbursement is not optimal so that the labor expenditure must be increased

NPM/Hx<1, the labor disbursement is not optimal (too much) so that the labor expenditure must be reduced.

RESULT

The characteristics of the research sample are that in general the sample manages own land with an average of 0.19 ha, the average age of the sample is 46.77 years, the average sample education is 9.3 years and the average sample farming experience is quite good, namely an average of 24.03 years.

Labor Outpouring Analysis

In carrot farming activities, the sample carried out activities ranging from soil processing to plant maintenance while harvesting was carried out by traders who

bought carrots from farmers. In addition to involving family members, the sample also uses non-family labor (wages) to carry out soil processing, making raised beds, planting, fertilizing, spraying pests and diseases and weeding. The average wage of workers in the study area is Rp80,000/day, with a work time of 7 hours. Carrot farming work expenditure in the study area can be seen in Table 1.

Table 1. Average Outpouring of Labor in Carrot Farming

No.	Type of Activity	Total (HKP/Ha)	Percentage
1	Soil Processing	3.81	3.64
2	Making Raised Beds	29.83	28.53
3	Planting	17.72	16.95
4	Fertilizing	3.48	3.33
5	Spraying Pests and Diseases	3.29	3.15
6	Weeding	46.42	44.40
	T o t a l	104.55	100.00

Source: Primary Data Processed, 2020

From Table 1 it can be seen that the total expenditure of carrot farming labor is 104.55 HKP/Ha. The largest labor expenditure was for weeding activities of 46.42 HKP/Ha (44.40%) and the smallest labor expenditure was for spraying pests and diseases of 3.29 HKP/Ha (3.15%).

Analysis of Carrot Farming Production Costs

The production cost of carrot farming is the total value of the involvement of production factors in the carrot farming production process. The production costs include labor costs, production facilities costs (seeds, fertilizers and pesticides) and depreciation of agricultural equipment. The production costs of carrot farming in the study area can be seen in Table 2.

Table 2. Carrot Farming Production Costs

No.	Type of Costs	Total (Rp/Ha)	Percentage
1	Labor	8,364,967.70	62.28
2	Seeds	1,789,335.24	13.32
3	Fertilizers	1,632,610.89	12.16
4	Pesticides	665,367.72	4.95
5	Depreciation	977,942.15	7.28
	T o t a l	13,430,223.70	100.00

Source: Primary Data Processed, 2020

From Table 2 it can be seen that the total production cost of carrot farming is Rp13,430,223.70/Ha. The largest production cost is for labor of Rp8,364,967.70/Ha (62.28%) and the smallest farm production cost is for pesticides of Rp665,367.72/Ha (4.95%).

Analysis of Carrot Farming Income and Efficiency Level

Carrot farming income is the difference between revenue or production value and the cost of carrot farming. Revenue is obtained from the multiplication of production and the price per unit of production. The efficiency level of carrot farming is the ratio (the result of sharing) between the revenue and production costs of carrot farming. The income and efficiency level of carrot farming can be seen in Table 3.

Table 3. Carrot Farming Income and Efficiency Level

No.	Description	Unit	Total/Ha
1	Production	Kg	16,875.64
2	Revenue	Rp	54,708,670.03
3	Cost	Rp	13,430,223.70
4	Income	Rp	41,278,446.33
5	Revenue/Cost (RCR)	-	4.07

Source: Primary Data Processed, 2020

From Table 3 it can be seen that the income of carrot farming in the research area is Rp41,278,446.33/Ha. The efficiency level of carrot farming can be obtained by looking at the ratio of revenue and cost of carrot farming, which is the value of RCR=4.07. Thus it can be concluded that carrot farming in the research area is a profitable farming (feasible to be cultivated). From every Rp1.00 costs to be incurred will be obtained in the amount of Rp4.07 in order to obtain an income of Rp3.07.

Analysis of the Productivity of Carrot Farming Labor

One way to measure efficiency is to look at the productivity of the labor force. Productivity of labor disbursement is the ratio between farm revenues received and the amount of labor devoted to farmers. The high productivity of labor will show the efficient use of production factors for farming. The productivity of labor in carrot farming in the study area can be seen in Table 4.

Table 4. Productivity of Carrot Farming Labor

No.	Description	Total
1	Revenue (Rp/Ha)	54,708,670.03
2	Outpouring of Labor (HKP/Ha)	104.55
3	Productivity of Labor (Rp/HKP)	523,277.57

Source: Primary Data Processed, 2020

From the table above, it can be seen that the productivity of carrot farming labor in the study area is Rp523,277.67/HKP. The productivity value of this labor expenditure is quite large when compared to the value of 1 HKP of labor = Rp 80,000.00.

F Test

Table 5. Result of Effect of Land Area, Farmer Age, Education and Farming Experience on Labor Productivity

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1442338907815.871	4	360584726953.968	72.864	.000b
	Residual	123718807388.296	25	4948752295.532		
	Total	1566057715204.167	29			

Source: Primary Data Processed, 2020

From Table 5, it can be seen that based on the F test, the significance value of F<0.05 indicates that simultaneously land area, farmer age, education and farming experience have a significant effect on labor productivity.

Coefficient of Determination (R2)

The magnitude of the influence of land area, farmer age, education and farming experience on labor productivity can be seen from the coefficient of determination (R2) as in Table 6.

Table 6. Value of the Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.960a	.921	.908	70347.36879

Source: Primary Data Processed, 2020

From Table 6 it can be seen that the coefficient of determination (R2)=0.921, which means that the influence of land area, farmer age, education and farming experience on labor productivity is 92.10% and the remaining 7.90% is influenced by other factors. Which were not analyzed in the regression equation. Testing the effect of land area, farmer age, education and farming experience partially on labor productivity can be seen in Table 7.

t Test

Table 7. Result of Effect of Land Area, Farmer Age, Education and Farming Experience on Labor Productivity

Model		Unstandaized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	29341.180	104975.128		.280	.782
	Land Area	-76347.815	164485.437	-.034	-.464	.647
	Farmer Age	-165.988	3160.779	-.010	-.053	.959
	Education	28003.445	9813.637	.274	2.854	.009
	Farming Experience	12586.339	3819.661	.757	3.295	.003

Source: Primary Data Processed, 2020

From Table 7, based on the t test, the t significance value of land area is 0.647>0.05 so that partially the land area has no significant effect on labor productivity, the t significance value of farmer age is 0.959>0.05 so that partially the age of the farmer has no significant effect labor productivity, the significance value of t education is 0.009<0.05, so that partially education has a significant effect on labor productivity and the significance value of t farming experience is 0.003<0.05 so that partially the experience of farming has a significant effect labor productivity. By looking at the value of the Beta coefficient, it can be concluded that the variable farming experience is the most influential variable on the productivity of carrot farming labor compared to the other three variables.

Analysis of the Optimization Level of Labor Outpouring

The analysis of the optimization level of labor outpouring was carried out to see the level of optimization of carrot farming labor in the research area. The results of the optimization level analysis of labor outpouring produce the following functions:

$$Y = 82{,}985.08\ X0.35$$

Where:

Y=Carrot farming production (Kg/Ha)

X=Outpouring of labor (HKP/Ha)

Furthermore, the value of the optimization level can be calculated=NPM/Hx=-2.31.

The value of the optimization level of labor outpouring <1 indicates that the labor expenditure on the carrot business in the study area is too much (excessive) or not optimal. Thus, to obtain maximum carrot farming income, labor expenditure must be reduced.

CONCLUSION

The results obtained are that the productivity of carrot farming labor in the research area is quite high with a value of Rp523,277.57/HKP. Simultaneously, land area, farmer age, education and farming experience have a significant effect on labor productivity with the coefficient of determination (R^2)=92.10%. Partially, the land area and farmer age have no significant effect on labor productivity, while the education and farming experience have a significant effect on labor productivity. The level of optimization of carrot farming labor (NPM/Hx)=-2.31. The value of the level of optimization <1 indicates that the labor expenditure in carrot farming is not optimal.

REFERENCES

1. Badan Pusat Statistik Sumatera Utara. (2019). Provinsi Kabupaten Karo dalam Angka.
2. Badan Pusat Statistik Sumatera Utara. (2019). Sumatera Utara dalam Angka.
3. Fitria, I. (2018). Analisis pendapatan usahatani wortel di Desa Suban Ayam Kecamatan Selupu Rejang Kabupaten Rejang Lebong Propinsi Bengkulu. Jurnal Agroqua, 16(1).
4. Hernantho, F. (2012). Ilmu Usahatani. Jakarta: Penebar Swadaya.
5. Mardikanto. (2011). Pengantar Ilmu Pertanian. Surakarta: Puspa.
6. Mubyarto. (2011). Pengantar Ekonomi Pertanian. Jakarta: LP3ES.
7. Mulyadi, D. (2016). Analisis Faktor-Faktor Yang Mempengaruhi Agribisnis Tanaman Pangan dan Hortikultura dan Implikasinya Terhadap Penyerapan Tenaga Kerja dan Kesejahteraan Petani di Jawa Barat. Disertasi. Jakarta: Universitas Borobudur.
8. Pasaribu, D. (2016). Analisa optimasi faktor-faktor produksi usahatani wortel di Desa Raya Kecamatan Berastagi Kabupaten Karo. Jurnal Sabilarrasyad, 1(1).
9. Rukmana. (2015). Budidaya Wortel. Yogyakarta: Lily Publisher.
10. Soekartawi, A. Soeharjo, John L. Dillon, & J. Brian Hasdaker. (2010). Ilmu Usahatani dan Penelitian untuk Pengembangan Petani Kecil. Jakarta: UI Press.
11. Sunarjono. (2011). Pembangunan Pertanian. Yogyakarta: Kanisius.
12. Widarjono, A. (2020). Ekonometrika Penganatar dan Aplikasinya. Edisi 5. Jakarta: UPP STIM YKPN.

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