The Depreciation Costs of Hand Tools in Paddy Farming in East Kalimantan, Indonesia

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ABSTRACT

Farmers own and use hand tools in paddy farming. Although they are not always purchased in every planting season, hand tools' depreciation is still considered a cost. This study's objectives were to calculate and identify the factors affecting the variation of depreciation costs among paddy households. This study was conducted in Subdistricts of Tenggarong Seberang, Loa Janan, Muara Muntai, Babulu, Penajam, Waru, South Bontang, and North Bontang, Province of East Kalimantan, Indonesia. Data collection was conducted by interviewing 380 respondents. Data were analyzed to calculate the depreciation costs of hand tools, and the descriptive analysis was applied to identify the factors affecting variation. Total depreciation costs of hand tools were IDR141,166.66 ha^{-1} planting season (ps)$^{-1}$ in paddy farming in East Kalimantan in 2014 (1.69% of production costs). The variation is mainly due to the number of hand tools used, the buying price, and the technical period.

Keywords: Depreciation Cost, East Kalimantan, Paddy Farming, Hand Tool

1. INTRODUCTION

The agricultural sector plays an essential role in East Kalimantan's economic development, contributing IDR7,216,901.00 million (5.81%) to the Gross Regional Domestic Product in 2013. The Agriculture Census 2013 showed that the number of farm households in East Kalimantan decreased to 180,614 (22.00% of East Kalimantan's total household), from 34.85% in 2003 [1, 2]. A decrease in farm households negatively impacts agricultural product production, while an increase successfully contributes to regional income. The high income will motivate the population to get involved with agriculture. Another way is to cultivate paddy to increase income, which is determined by the number of total revenue and the expenditure for production costs. Paddy farmers should have the ability to allocate inputs to reach maximum profit.

The allocation and price of inputs in paddy farming vary, affecting production costs. This includes the prices of hand tools, which differ from farm to farm – they need to calculate the expenditure as a production cost. Some researchers classified the depreciation costs into the fixed costs [3, 4, 5]. Depreciation should be an amount that is set aside at the end of the year, equal to the number of capital assets consumed during that period [6]. Further inflation may occur in later years where the total amounts set aside may not be equal to the amount required for replacements. Depreciation must be done because it is given benefit, and activa value will decrease [7].

The result of a previous study [8] showed that age of the farmer, depreciation of hand tools, experience of household in paddy farming, labor and tillage cost, paddy farm size, raw materials cost, and rice requirement of the household collectively affect the income of paddy farms in East Kalimantan Province, Indonesia. The elasticity of paddy farm income concerning the deprecation costs of hand tools is positive. This meant that with the increase of depreciation costs of hand tools, paddy farm income goes up.

This study's objectives were to calculate the depreciation costs of hand tools in paddy farming in East Kalimantan, Indonesia, and to identify factors affecting variation in depreciation costs among paddy households. The results of this study will guide paddy farmers on how much money should be saved to prepare for the purchasing of new hand tools and other assets such as raw materials, farm machines, and wages.

2. MATERIALS AND METHODS

2.1. Study Sites

This study was conducted from July to December 2014 in the Province of East Kalimantan, Republic of Indonesia. The purposive sampling was applied to choose the study areas: Kutai Kartanegara Regency, Penajam Paser Utara Regency, and Bontang City. Eight regions were also selected as part of this study, including Tenggarong Seberang, Loa Janan, Muara Muntai, Babulu, Penajam, Waru, South Bontang, and North Bontang.

2.2. Data Collection

Data was collected from the households of paddy farmers, comprised of a family or group of individuals who refer to the head of the house: paddy farming is considered their primary income source. However, other side jobs are coordinated to support the household. The household population was 36,970 (Statistics of East Kalimantan) at the time this study was conducted. The minimum sample size for populations of 20,000 persons is 377 and 382 for 50,000 [9]. The number of respondents for this particular study was 380 paddy households. Purposive sampling was applied to select the households residing in the subdistricts of Tenggarong Seberang (128 households), Loa Janan (17 households), Muara Muntai (4 households), Babulu (128 households), Penajam (84 households), Waru (16 households), South Bontang (2 households), and North Bontang (1 household).

2.3. Data Analysis

The depreciation cost of tools is calculated based on the equation [4]:

$$DC = \frac{NB - NS}{UP} \, xTN \qquad (1)$$

where:

DC = depreciation cost;

NB = new price;

NS = now price;

UP = utilization period;

TN = tools number.

This study was different from [4] in terms of the equation of depreciation cost. It considered technical age and formulated an equation for depreciation cost of hand tools as:

$$DC = TNx \frac{BP - SP}{TA} \, xUP \qquad (2)$$

where:

DC = depreciation cost;

TN = tools number;

BP = buying price;

SP = selling price;

TA = technical age;

UP = utilization period.

The identification of factors affecting the variation of depreciation costs among paddy households was conducted using descriptive analysis.

3. RESULTS AND DISCUSSION

3.1. Depreciation Costs

The depreciation costs of hand tools include fixed production costs in paddy farming, amounting to IDR141,166.66 ha^{-1} planting season (ps)$^{-1}$ in East Kalimantan 2014. It was found that they do not significantly affect East Kalimantan, Indonesia, *ceteris paribus* due to the proportion being relatively small in cost structure [8]. The result of this study showed the depreciation costs of hand tools covered 1.69% of production costs (IDR8,345,833.32 ha^{-1} ps^{-1}). This has little impact on total production costs and income.

The depreciation costs in groundnut farming in Anom Market Village, Grabag Subdistrict, Purworejo Regency in 2012 was IDR114,230.8 ha^{-1} [10]. It was bigger than those in Boya Baliase Village, Marawola Subdistrict, Sigi Regency in 2012 (IDR71,129 ha^{-1}) and in Pulahenti Village, Sumalata Subdistrict, North Gorontalo Regency (IDR33,230.02 ha^{-1}). Depreciation costs in the study are categorized as fixed costs besides tax [3]. The costs in the cultivation of borewell irrigated paddy in Tumakuru District, India, in 2014-2015 was Rs2,217 ha^{-1} (3.94% of the total cost of cultivation) [5]. This number was more significant than the depreciation costs in paddy farming in East Kalimantan Province, Indonesia.

Data in Table 1 exhibited the total fixed costs in groundnut and paddy farming as only being a small proportion of the total farm expenditure. Total fixed costs were an average between 0.03% and 3.99% of the production value, smaller than the variable costs, which reached a rate of 0.98% to 96.01%. The result of a prior study [8] showed that the coefficient is 0.08, found by measuring the elasticity of paddy farm income concerning the deprecation costs of hand tools. This number suggests that holding other factors constant, if the depreciation costs increase by an average of 1%, paddy farm income goes up by 0.08%, creating a positive effect. This finding contrasts with the result of other studies [11] that found that the interaction between

assets and income tends to be negative and insignificant. Data in Table 1 showed revenue and profit of groundnut farming and paddy farming. Total fixed costs are relatively small if it is compared to profit.

3.2. Identification Factors Affecting Variation of Depreciation Costs among Paddy Households

The depreciation costs of hand tools vary among paddy households. The result of this study showed that

the minimum price was IDR5,400.00 ha^{-1} ps$^{-1,}$ and the maximum was IDR650,000.00 ha^{-1} ps^{-1}. This difference is due to various factors such as the number of hand tools used, the buying price, and its technical age (Table 2).

Many tools are used in paddy farming, including hoes, chopping knives, grass knives, hand sprayers, and traditional threshers. The hoe is mainly used in land tillage, the main ones being: (a) heavy digging hoes with short handles, (b) light weeding hoes with long handles to allow the operator to stand upright and easily

Table 1. Production costs, revenue, and profit of groundnut and paddy farmings in some locations

Researcher	Commodity	Location of study	Economic analysis	Total	Percentage (%)
[10]	Groundnut farming	Anom Market Village, Grabag Subdistrict, Purworejo Regency	Depreciation costs	IDR114,230.8 ha^{-1}	
[3]	Groundnut farming	Boya Baliase Village, Marawola Subdistrict, Sigi Regency	Variable costs:		
			1. Seeds	IDR953,208 ha^{-1}	0.26
			2. Fertilizers	IDR475,245 ha^{-1}	0.13
			3. Laborers	IDR2,174,242 ha^{-1}	0.59
			Fixed costs:		
			1. Depreciation	IDR71,129 ha^{-1}	0.02
			2. Tax	IDR22,792 ha^{-1}	0.01
			Total costs	IDR3,688,412 ha^{-1}	100.00
			Revenue	IDR15,116,477.28 ha^{-1}	
			Profit	IDR11,371,022 ha^{-1}	
This study (2014)	Paddy farming	East Kalimantan Province, Indonesia	Total variable costs	IDR8,204,666.66 ha^{-1}	98.34
			Depreciation costs/total fixed costs	IDR141,166.66 ha^{-1}	1.69
			Total costs	IDR8,345,833.32 ha^{-1}	100.00
			Total revenue	IDR13,733,405.00 ha^{-1}	
			Profit	IDR5,387,571.68 ha^{-1}	
[4]	Groundnut farming	Pulahenti Village, Sumalata Subdistrict, North Gorontalo Regency	Hoe	IDR3,834.16 ha^{-1}	11.54
			Cutlass/machete	IDR6,013.51 ha^{-1}	18.09
			Hand sprayer	IDR23,385.35 ha^{-1}	70.37
			Total depreciation costs	IDR33,230.02 ha^{-1}	100.00
[5]	Paddy farming	Tumakuru District, India	Total variable costs	Rs.53,983 ha^{-1}	96.01
			Fixed costs:		
			1. Depreciation	Rs.2,217 ha^{-1}	3.94
			2. Land revenue	Rs.25 ha^{-1}	0.04
			Total fixed costs	Rs.2,242 ha^{-1}	3.99
			Total costs	Rs. 56,225 ha^{-1}	100.00
			Gross returns	Rs.90,316 ha^{-1}	
			Net returns	Rs.34,091 ha^{-1}	

Table 2. The used number of hand tools, the buying price of hand tools, and the technical age of hand tools in paddy farming in East Kalimantan in 2014

No.	Hand tool	Number (piece)	Buying price (IDR piece^{-1})	Technical age (year)	Total (IDR ha^{-1})	Percentage (%)
1	Hoe	2.00	35,000.00-125,000.00	3.00	30,000.00	21.25
2	Chopping knife	1.00-4.00	15,000.00-100,000.00	3.00	28,333.33	20.07
3	Grass knife	1.00-7.00	15,000.00-90,000.00	3.00	50,000.00	35.42
4	Tank sprayer	1.00	300,000.00	5.00	30,000.00	21.25
5	Traditional thresher	1.00	59,000.00	3.00	9,833.33	6.97
	Total				141,166.66	100.00

Table 3. Hand tools in farming of some commodities in some locations

Researcher	Commodity	Location of study	Hand tool
[13]	Soybean farming	Saboba and Chereponi Districts of Northern Region of Ghana	1. Hoe 2. Cutlass 3. Sacks
This study (2014)	Paddy farming	East Kalimantan Province, Indonesia	1. Hoe 2. Chopping knife 3. Grass knife 4. Sprayer 5. Traditional thresher
[4]	Groundnut farming	Pulahenti Village, Sumalata Subdistrict, North Gorontalo Regency	1. Hoe 2. Cutlass/machete 3. Tank sprayer

manipulate the hoe with both hands, and (c) light planting hoes with short handles for planting [12]. Paddy farmers in East Kalimantan own an average of 2 hoes per household^{-1} with the buying price between IDR35,000.00 and IDR125,000.00 piece^{-1}. Soybean farmers in the Saboba Chereponi Districts of the Northern Region of Ghana use hoes, cutlass, and sacks [13]. Similarly, groundnut farmers also use hoes, cutlass/machete, and tank sprayers in their farming activities [4] (Table 3).

The chopping knife is mainly used in weeding and harvesting processes, farmers usually owning between 1 to 4 with the buying price varying from IDR15,000.00 to IDR100,000.00 piece-1. A grass knife is cheaper than a hoe or a chopping knife, its price ranging from IDR15,000.00 to IDR90,000.00 piece-1.

The buying price depends on the size and quality; the more significant the size, the higher the price. Tools that have a high quality will be sold at a higher price by a trader. Paddy households own between 1 and 7 grass knives. Another standard tool is the tank sprayer, widely used for weeding and controlling pests and diseases.

Usually, farmers only own one tank sprayer per household-1, which is considered enough for paddy farming. Its buying price is IDR300,000.00 piece-1 on average. Commonly, farmers buy hand tools from markets or shops near their villages, although they may get the same items at a lower price with better quality if they go to the central market in the regency capital. Some farmers also use traditional thresher, its buying price being IDR59,000.00 piece-1.

Hand tools' technological age is predicted to be around 12 to 60 months to be used several times. The technical period of hand tools depends on their utilization, maintenance, and price. The frequency of usage affects the tools' capability, and there is no specific requirement to maintain them. In general, the farmers clean and dry the hand tools directly after using them, then store them in their houses. They stated that hand tool price determines technological age or quality, so the higher cost of a tool, the longer its technical age duration [8].

4. CONCLUSION

Even if farmers did not buy hand tools in every planting season, the depreciation tools are always considered cost in paddy farming. The capital constraint could be a problem, particularly when purchasing another tool to replace a broken one. Therefore, farmers should calculate the depreciation of hand tools to know how much money needs to be saved every harvesting season or period to avoid financial problems. This alternative could be considered a way out in facing capital issues, with tools and other assets such as raw materials and machines and wages.

The depreciation costs of hand tools were as much as IDR141,166.66 ha-1 planting season (ps)-1 in paddy farming in East Kalimantan in 2014. They covered 1.69% of production costs (IDR8,345,833.32 ha-1 ps-1). The depreciation costs of hand tools vary among paddy households because of factors such as the number of tools used, the buying price, and the technological age of hand tools.

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