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COMPARATIVE STUDY: EVALUATING THE COST AND PROFITABILITY OF GINGER (ZINGIBER OFFICINALE) FARMING IN NORTHERN MINDANAO, PHILIPPINES"

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Abstract

The evaluation of the costs and profitability of ginger was investigated using a mix of quantitative and qualitative methods. Data collection and analysis includes a triangulation approach with focus group discussions, key informant interviews, and farmer surveys using pre-structured questionnaires. Results showed that Misamis Occidental has the highest net return followed by Bukidnon and Lanao del Norte. Improvement of farm to market road and efforts to provide value-added technologies and services is seen to a lower cost, a higher selling price and product competitiveness thus, would lead to higer farmer income.

Keywords: Family Labor, Net Return, Optimum Choice, Profitability, Shared Labor

INTRODUCTION

Ginger is consumed worldwide as a flavoring agent and is extensively used in the food, beverage, and confectionary industries in products such as marmalade, pickles, chutney, ginger beer, ginger wine, liquors, and other bakery products (Wang et al. 2011). The world's production is 20,95,056 tons from an area of 3,22,157 hectares (FAO, 2014). Japan is the number one importer and consumer of ginger, with 1,04,379 tons in the year 2002 (ITC, 2002), but Japanese traditionally consume preserved ginger made from a mild fresh rhizome (Govindarajan, 1982).

In the Philippines, it is one of the 20 priority vegetables of the Department of Agriculture and belongs to the 14 commonly processed vegetables and root crops for export purposes (Invest Philippines, 2017). As a functional food, its components provide additional benefits, such as reducing the risk of diseases, aside from their primary nutrient function (Philippine Council for Health Research and Development, 2017).

As a frequently used spice and seasoning and commonly used in home cooking, there is an opportunity for ginger among local restaurants and health food stores, with organically grown ginger becoming increasingly popular (Valenzuela, 2011). According to FAOSTAT, in 2017, the Philippines produced 27,482 tons of ginger on 3,908 hectares. For five years, 2012–2015, Northern Mindanao topped the list in production among regions in the country.

Challenges in ginger marketing are common as with other agricultural products, which include price changes due to seasonality of supply, competition, and product deterioration (Endrias & Asfaw, 2011; Keating, Camacho, & Brescia, 2009). The Northern Mindanao region, nevertheless, experienced a decreasing trend in production for the past four years with the

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occurrence of diseases and factors such as the low buying price of ginger, which were major problems in the past years and resulted in some growers decreasing their production areas. However, because of favorable climatic conditions, topography, and the potential for additional farm income, farmers still opted to plant ginger in many areas of the region.

This study was conducted with the aim of investigating the cost and return structures by determining and analyzing factors that can help ginger farmers choose the best alternative. The tables allow for realistic comparisons of expenses as they aim to respond to the challenge of characterizing the costing and return situation of ginger production in Northern Mindanao; hence, they further provide empirical evidence for ginger production planning and decision-making by farmers. Finally, policy recommendations can be inferred that are important for the promotion and development of ginger farming in the chosen study area.

MATERIALS AND METHODS

Population of the study

Non-probability convenience sampling was used to identify the population of 200 ginger growers. A written consent form was secured before the interview with key informants.

Study sites

There are four provinces in Northern Mindanao, namely: Bukidnon, Lanao del Norte, Misamis Occidental, and Misamis Oriental, specifically in Valencia City, Munai, Bonifacio, Calamba, and Balingasag, respectively.

Research design

A mix of quantitative and qualitative methodologies was employed. Cost, net return, and the proportion of net return to total cost were all calculated quantitatively. On the other hand, a qualitative approach was employed to identify the elements that caused the increase or decrease in costs incurred.

Sampling procedure

The selection of a quota sample of 200 producers is justified by the lack of an accurate and comprehensive list of ginger growers in the study locations. The lack of a list in the towns was caused by the crops receiving less attention than other agricultural products. For instance, ginger is not recognized as an important vegetable or root crop. Therefore, a non-probability convenience sampling was used to determine the final 200 ginger farmers.

Data collection technique

Focus group discussions (FGD), key informant interviews (KII), and farmer surveys are all used to collect data in a triangulation fashion to provide a preliminary grasp of production practices and cost estimates. Several farmer interviews were conducted using a pre-structured questionnaire that contained subject matter from the survey material. These questions covered knowledge and perceptions regarding production techniques and expenses. Agricultural responders provided production information for the 2016 crop year.

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Data analysis

Simple accounting methods such as totals, percentages, and averages were employed in the analysis of primary data. The profitability of ginger production is evaluated using cost-return analysis (CRA). According to Ciaian et al. (2013) and Netayarak (2007), it is a type of economic analysis that takes into account farmers' costs, both explicit and implicit, as well as opportunity costs. In this work, the ideas of Ciaian et al. (2013) and Preedasak (2004) were used, and they are stated as follows:

a. Total cost (TC): this represents the final value of all inputs (cash and noncash) a farm uses in a given period.

b. Total revenue (TR): this represents the total sale that farmers receive from selling the total quantity (Q) of ginger per season at the prevailing and/or agreed selling price (P).

According to Ezeh's postulate from 1992, a company must set the price of its output to cover the variable (explicit) costs of production in order to survive in the short term.

While non-cash costs, such as land rent, the depreciation of farm equipment, and the cost of capital used, are not related to the real expenditure payments, they are nonetheless taken into account. Cash costs, also known as explicit costs, are the actual expenses incurred. This study used the following estimating guidelines from Ciaian et al. (2013) and Khunthongjan (2016) for non-cash (implicit costs):

a. Family labor: this represents the cost of hired labor, which was determined using the prevailing market wage rate in the study area, which ranges from 200 to 300 PHP per day.

b. Land rent: farmers' land was assessed on the basis of a local rental rate.

c. Depreciation of agricultural machinery: this represents costs accounting for the declining value of farm assets computed using the straight-line method.

d. Cost of capital: uniform interest rate of 20% per annum based on the interest rate for agricultural loans in local rural banks.

The net return (NR) is the difference between the total revenue (TR) and the total cost (TC). Thus, the analysis of costs and returns from ginger production will be done using the following formulas:

$$\text{Total cost (TC)} = \text{total cash cost} + \text{total non-cash cost} \quad \text{(i)}$$

$$\text{Total revenue (TR)} = \text{total quantity (Q)} \times \text{selling price (P)} \quad \text{(ii)}$$

$$\text{Net return (NR)} = \text{TR} - \text{TC} \quad \text{(iii)}$$

Furthermore, to compare the profitability of ginger production in each province, this study applied the net return-to-cost ratio (NR-C ratio), which was calculated by dividing the net return by the total cost:

$$\text{Total cost Net return (NR)} \quad \text{(iv)}$$

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RESULTS

Province of Bukidnon

Ginger can be purchased for anywhere from PhP10.00 to PhP40.00 per kg, with a PhP15.35 average price per kg. Between 2,000 and 16,000 kg/ha per crop are produced in Bukidnon, with an average of 7,718 kg/ha. The comparison between cash and non-cash costs is shown in Table 1. Payouts for hired labor and material input purchases were the largest. Family labor was the largest portion of overall imputed costs, however.

Additionally, the high cost of land leasing was a result of the existence of multinational corporations, which rent for higher amounts, which serve as the benchmark for landowners when setting the rent per hectare. In order to expand their businesses, multinational corporations compete for land rentals. As a result, productivity increases by an average of PhP84,801.83/ha. A net return of PhP 38,586.60, or 40% of the total production expenses, is indicative of profitability.

Table 1: Average cost and return analysis: Bukidnon, 2017

Particular		Amount (PhP)	Percentage of Total Cost (%)
Sales		**135,407.26**	
Quantity	**8,821.32**		
Price	**15.35**		
Cash Cost		**50,605.43**	**52.27**
Hired Labor		26,771.19	27.65
Material input		20,284.81	20.95
Transportation		2,799.43	2.89
Food		750.00	0.77
Non-Cash Cost		**46,215.23**	**47.73**
Family labor		22,344.14	23.08
Land rent		13,500.00	13.94
Depreciation		400.00	0.41
Cost of capital		9,971.09	10.30
Total Cost		**96,820.66**	
Total Revenue		**135,407.26**	
Return Above Cash Cost		84,801.83	
Return Above Non-Cash Cost		89,192.03	
Net Return		38,586.60	
Net Return-to-Total Cost Ratio		0.40	

Province of Lanao del Norte

Table 2 shows that there is a significant volume of production, which results in better sales than the farms in Misamis Occidental and Misamis Oriental. Farms produce 4,550 to 20,000 kg/ha on average, with selling prices ranging from PhP9.00 to PhP21.00/kg, which is greater than Bukidnon.

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The uncommon shared labor method known as "bayanihan" or "hunglos" was a factor in the higher non-cash expenses, which accounted for 80% of the overall labor cost. Farms benefit from having less need for cash capital because non-cash labor makes up a larger share of the cost components and is therefore more advantageous.

As all sample farms employ inorganic fertilizer, material inputs rank second in terms of cash costs. Urea (46-0-0), complete (14-14-14), and solophos are fertilizers that were frequently used. Most farmers in Munai avoid using organic fertilizers because they regard chicken dung as disgusting and repulsive.

Additionally, with an average price of 237 kg/ha, the cost of planting material (rhizome) is the highest in the area. Rhizome utilization in a sample farm ranges from 200 to 2,000 kg/ha, with a purchase price of PhP18.00 to PhP20.00/kg. Therefore, the net return is minimal and equals 29% of the total cost.

Table 2: Average cost and return analysis: Lanao del Norte, 2017

Particular		Amount (PhP)	Percentage of Total Cost (%)
Sales		**166,560.00**	
Quantity	**8,328.00**		
Price	**20.00**		
Cash Cost		**56,573.30**	**43.75**
Hired Labor		13,600.00	10.52
Material input		27,401.33	21.19
Transportation		6,771.97	5.24
Food		8,800.00	6.80
Non-Cash Cost		**72,748.66**	**56.25**
Family labor		52,214.00	40.38
Land rent		10,500.00	8.12
Depreciation		480.00	0.37
Cost of capital		9,554.66	7.39
Total Cost		**129,321.96**	
Total Revenue		**166,560.00**	
Return Above Cash Cost		109,986.70	
Return Above Non-Cash Cost		93,811.34	
Net Return		37,238.04	
Net Return-to-Total Cost Ratio		0.29	

Province of Misamis Occidental

Compared to Lanao Del Norte, the total sale is lower but higher than that of Bukidnon. Based on Table 3, the sample farms' average production volume is 7,779.23 kg/ha, which falls within the 2,500–40,000 kg/ha range for the province. The typical farm selling price is PHP 20.00 per kg.

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Table 3: Average cost and return analysis: Misamis Occidental, 2017

Particular		Amount (PhP)	Percentage of Total Cost (%)
Sales		**155,584.64**	
Quantity	**7,779.23**		
Price	**20.00**		
Cash Cost		**62,385.72**	**58.56**
Hired Labor		17,743.58	16.66
Material input		32,533.79	30.54
Transportation		10,478.35	9.84
Food		1,630.00	1.53
Non-Cash Cost		**44,148.29**	**41.44**
Family labor		25,264.15	23.71
Land rent		5,000.00	4.69
Depreciation		1,733.00	1.63
Cost of capital		12,151.14	11.41
Total Cost		**106,534.01**	
Total Revenue		**155,584.64**	
Return Above Cash Cost		93,198.92	
Return Above Non-Cash Cost		111,436.35	
Net Return		49,050.63	
Net Return-to-Total Cost Ratio		0.46	

Remarkably, the cash cost was the highest among the four provinces, with rhizome constituting the majority of the costs at a retail price of PhP38.83. With a price range of PhP15.00 to PhP50.00 per kg of rhizomes and an average need of 608 kg/ha, over half of the total respondents prefer to buy good-quality ginger from other farmers since quality should be prioritized. The region has the greatest ratio of transportation costs to overall costs, excluding wages for hired personnel. Most farms are located far from the points of sale. On the other hand, family labor accounts for the largest proportion of the total cost of the non-cash cost components. Second only to Lanao del Norte in terms of overall production cost is PhP106,534.01.

Farms in the Misamis Occidental had, on average, the highest return on total costs. As a result, with a net return of PhP49,050.63 (46% of the total cost), it became the region's top producer of ginger, implying that sample farms in this province benefit more from producing ginger than farms in other parts of Northern Mindanao.

Province of Misamis Oriental

An extremely low yield of between 1,600 and 5,760 kg/ha resulted in the lowest total sales in the region. A 3,254 kg/ha yield has been calculated as the average, which, according to the farmers' reports during the focus group discussion and those that were confirmed during the interviews, is caused by a disease infestation. The average farm gate price in the province is PhP18.60/kg, as indicated in Table 4, and it ranges from PhP7.00 to PhP35.00/kg.

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Table 4: Average cost and return analysis: Misamis Oriental, 2017

Particular		Amount (PhP)	Percentage of Total Cost (%)
Sales		**65,086.98**	
Quantity	**3,499.30**		
Price	**18.60**		
Cash Cost		**42,779.89**	**62.05**
Hired Labor		21,553.10	31.26
Material input		15,315.00	22.21
Transportation		2,911.79	4.22
Food		3,000.00	4.35
Non-Cash Cost		**26,164.04**	**37.95**
Family labor		12,708.06	18.43
Land rent		5,000.00	7.25
Depreciation		500.00	0.73
Cost of capital		7,955.98	11.54
Total Cost		**68,943.93**	
Total Revenue		**65,086.98**	
Return Above Cash Cost		22,307.09	
Return Above Non-Cash Cost		38,922.94	
Net Return		(3,856.95)	
Net Return-to-Total Cost Ratio		(0.06)	

While wages for hired labor and the acquisition of material inputs accounted for the majority of sample farms' costs, production and marketing expenses were the lowest. Planting materials, organic fertilizer, straw, and bare sacks are examples of material inputs. A larger portion of the overall cost per hectare is attributable to family labor and capital expenditures, which results in a net return of PhP3,856.95 per hectare, or a net loss of 6% of total costs. However, when accounting for simply cash costs, it shows gains of PhP22,307.09.

DISCUSSION

Profitability

The comparative return on investment of the four provinces indicates highly differentiated strategies and production cultures. The ratio of net return to total cost of 40%, 29%, and 46% for Bukidnon, Lanao del Norte, and Misamis Occidental, respectively, indicates that ginger production is moderately profitable. However, disease infestations must be seriously addressed to avoid losses, as in the case of Misamis Oriental, which caused a net loss of 6% to the total cost.

Accounting for the average labor contribution of 24% to the total cost of four provinces supports the report of Ezedinma (2000) that labor activities have been found to be labor intensive and the greatest constraint to all food crop production. The next category is material inputs, which account for an average of 23% of the overall cost across the four provinces, indicating that planting materials must be prioritized in any attempt to reduce production costs. In addition, the average capital cost across the four provinces of 10% indicates ease of access to rural banks, lending organizations, input merchants, and private, informal lenders for capital

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requirements. Overall, labor, materials, and capital account for 57% of the total production cost across Northern Mindanao.

Opportunities and Prospects

According to the study's conclusions, ginger production is profitable and offers a wide range of prospects. Given that Northern Mindanao has great potential for ginger production and industry, one enabling opportunity would be for the Department of Agriculture (DA) to give free seedling distribution to ginger growers. The government recognizes the potential of this crop in the four provinces, and with the growing need for ginger production, it can address the supply in the domestic and international markets.

Factors affecting profitability

Any farming activity's profitability is evaluated using a cost-benefit analysis. In addition to profitability, cost and return analysis is highly helpful in determining the optimum choice for farmers.

Results revealed that sample farms in Lanao del Norte gained the highest sales in marketing ginger, followed by Misamis Occidental, Bukidnon, and Misamis Oriental. Despite having a lower average purchase price than neighboring provinces, Lanao del Norte has the largest production volume. Contrarily, Misamis Oriental has the lowest sales as a result of disease infestations, which the farmers claim have caused a 50% reduction in crop volume.

Fresh ginger is sold at varying prices depending on the province, with Misamis Occidental having the highest average price at PhP21.78/kg, while other provinces only have prices between PhP13.00 and PhP15.00/kg.

The highest overall cost was borne by the ginger farms in Lanao del Norte, followed by the sample farms in Misamis Occidental, Bukidnon, and Misamis Oriental. The biggest expenditure across all provinces is labor, which includes harvest hauling and rhizome preparation. The highest labor cost is in Lanao del Norte, which is understandable given that it pays PhP300.00 per day for hired labor, compared to PhP200.00 to PhP250.00 in the other three provinces. Additionally, one reason why farm owners are unable to manage the number of laborers is the practice of shared labor, or "hunglos," as it is known locally.

Moreover, planting material or rhizomes represent the largest cost factor under material inputs. Rhizome availability and cost vary by province, with farmers in Misamis Occidental using more rhizomes per hectare than those in the other three provinces. In Misamis Oriental, farms use just 163 kg of rhizome per hectare on average. The highest price for planting material per kilogram is PhP38.83 in Misamis Occidental, and the lowest price is PhP14.95 in Bukidnon.

All provinces employ a combination of organic and synthetic fertilizers, with the exception of Lanao del Norte, which uses mainly inorganic fertilizers. Farmers in Bukidnon and Misamis Oriental are reportedly paying somewhat more for organic fertilizers than for inorganic ones. However, none of the farmer respondents applied inorganic fertilizers before having their soil tested. Common inorganic fertilizers include 6-0-0, 0-0-60, and 16-20-0. For empty bags and straw, costs are almost uniform among provinces. Straws and bags are regarded as crucial post-

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harvest supplies. Land rent, transportation costs, meals and snacks, depreciation costs, and the cost of capital are also included in the analysis. Bukidnon has the highest annual land rent of any province, at PhP13,500 per hectare. The lowest land rent cost is in Misamis Oriental and Misamis Occidental, which is PhP5, 000/ha/year.

The largest transportation costs are incurred in Misamis Occidental when double hauling from the farm to passable highways is taken into consideration. In Lanao del Norte, the practice of shared labor results in comparatively higher expenditures for food and snacks.

Farmers from all provinces said they were aware of the places to find finance, including rural banks, lending organizations, stores selling inputs, and private, informal lenders that provide variable interest rates ranging from 20% per month to 20% per year.

Overall, Misamis Occidental has the highest net return on production when harvest volume and better market prices for ginger are taken into account. The next in line are sample farms in Bukidnon and Lanao del Norte. On the other side, farms in Misamis Oriental suffered losses due to disease infestations during the study period. A comprehensive approach should be used in the production strategies in order to further increase the profitability of ginger production. To increase profitability, farmers should concentrate on a variety of factors, including price, labor costs, material inputs, and land rent. All of these elements can be strategically addressed to increase ginger production revenues. Furthermore, boosting awareness and instituting product and marketing standards, including better farm-to-market pathways, efforts to provide value-added techniques and services, and the development of more ginger-derived product lines, will result in a higher selling price and product competitiveness, including cost reduction and a high return.

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Declaration of Competing Interest

The authors declare that there are no competing interests among them.

Role Of Authors: SCP – data collection and sampling procedures, data analysis and manuscript writing, advising, verification of results and interpretation; writing of this article ZCODV and TARM – data collection and sampling procedures, data analysis and manuscript writing, advising, verification of results and interpretation.

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