



Cost and Return Analysis of Small-scale Cacao (*Theobroma cacao*) Production in Camarines Sur, Philippines

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

The presence of cacao industry plays a critical role in the economic development of a country. A study was conducted to determine the cost, return and added value along the value chain stages of cacao in Camarines Sur, Philippines. Sixty-eight farmers served as respondents using purposive sampling technique and interviews/key informant surveys were conducted. Results of the study showed that cacao production has high return on investment of 77.89% and 160% for the farmer and processor, respectively but a low return on investment of 13% for traders. The value added from farmer to processor is Php 590.00/kilogram, and Php 125.00/kilogram from processor to trader. Various opportunities and prospects for cacao production had been identified such as increased technical and production support from the government, presence of R & D programs, increasing trend towards wellness & healthy lifestyle, and increasing businesses offering cocoa-based products. Recommendations include improvement in access and availability of processing facilities, improvement of market information for farmers, provision of trainings to enhance capability of farmers, strengthening of farmers' groups to increase their access to technical and financial assistance from government and provision of infrastructure support and storage facilities.

Keywords: Cacao production; cost and return analysis; value addition; return on investment.

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1. INTRODUCTION

The presence of cacao industry plays a critical role in the economic development of a country and has made significant impact in the global and local market. In the cocoa market review for August 2017 of the International cocoa organization (ICCO), it reported that world cocoa bean production is expected to increase by 18.1% which is equivalent to 4.7 million tons. Price movement on the other hand, is recorded at an average price of US\$ 1,989 per ton [1].

In the Philippines, the trend of the volume of imports for cocoa had been increasing from 2011-2015 with 31,920 metric tons and 48,480 metric tons for 2011 and 2015, respectively. Likewise, there was a tremendous increase in the value of imports of cocoa from US\$ 103,370,000 to US\$ 199,690,000 for 2011 and 2015, respectively [2]. Furthermore, the highest recorded volume of cocoa imported to the Philippines was from Malaysia with 10,360 metric tons valued at US\$ 26,010,000 (PSA, 2016). The high number of cocoa import recorded for the Philippines is to be expected because cacao production only stands at 10,000-12,000 metric tons from 20,000-25,000 hectares of land planted with cacao [3].

The Philippine cacao industry needs serious attention not only from the government but from the other industry stakeholders as well. Realizing this critical need, the Philippine Cacao Roadmap for the next 5 years has been crafted to serve as guide towards the development of the cacao industry in the country. In this roadmap, cacao stakeholders envision a competitive and sustainable Philippine cacao industry by year 2022. This vision is expected to be achieved through the realization of the goal dubbed as the 2022 Cacao challenge. This goal is to produce 100,000 metric tons of fermented beans by the year 2022 for the export and domestic markets through a 40% annual increase in production [3]. Likewise, the roadmap further defines the contributing factors that will lead to the attainment of the goal by increasing farmers' income to at least Php 130,000.00 per hectare per year and an increase in export sales by at least 250 million US dollars per year.

This national goal needs the concerted effort from the various regional sectors all over the country. Towards this end, regional commitments were made in order to attain the industry goal and objectives by taking a percentage share from

the national target. Bicol regions' industry stakeholders' commitment to the 2022 cacao challenge is 3,000 metric tons in production volume which represents 3% of the total commitment from the 17 regions all over the country.

The task at hand is gigantic in terms of achieving the goal set for the next 5 years as enunciated in the Cacao Roadmap. It is imperative then, that local industry stakeholders in Camarines Sur has to make aggressive moves in order to achieve the regional goals. This can be done through an in-depth analysis of cacao production at the local level, coupled with an investigation on the cost and return associated with its production and the growing opportunities and prospects available for the cacao industry hence, this study.

2. OBJECTIVES

This study aims to:

1. Determine the socio-economic characteristics of cacao growers in Camarines Sur
2. Estimate the cost and return associated with cacao production
3. Determine the added value along each stage of the chain in cacao production
4. Provide recommendations to increase productivity of small-scale cacao production in Camarines Sur

3. METHODOLOGY

The research study employed the descriptive-evaluative method. A total of sixty-eight (68) cacao growers/farmers served as respondents in this study. They were selected based on the list provided by the Department of Agriculture from the municipalities of Tigaon, Lupi, Baao, Pili, Iriga, Minalabac and Buhi, Camarines Sur, Philippines. Purposive sampling was used in the selection of the respondents. A survey-questionnaire was used as the main tool for gathering the needed data. The questionnaire was pre-tested and consisted of open-ended questions to determine the socio-economic characteristics of farmers. Farm visits, focused group discussion and key informant surveys were conducted to get first-hand information regarding the present status of cacao industry in Camarines Sur. Document review and analysis of data was also undertaken to confirm and validate the data gathered from the survey.

Secondary data were also gathered from other agencies such as Department of Environment and Natural Resources (DENR) and Department of Trade and Industry (DTI) which may have relevant information for the project. Likewise, data were also gathered from publications of various government offices, private institutions, previous researches/thesis/dissertations, journals and articles. Cost and return analysis was used to determine the return on investment and value added along the different stages of the cacao value chain.

4. RESULTS AND DISCUSSION

Table 1 shows the socio-economic characteristics of selected cacao growers in Camarines Sur, Philippines. Of the total, 75% are males and 25% are females. In terms of age, about half of the respondents are above 50 years old, 35% belong to the age bracket of 41 to 50 years old and the remaining respondents are 40 years old and below. About 34% of the farmers are high school graduates, while 24% are elementary graduate. A few are college graduate (19%) and college undergraduate (16%) and the rest are high school or elementary undergraduate. About half of the respondents (49%) have an average family size of 4 to 6, 38% have family size of 1 to 3 and the rest (13%) have big household size consisting of 7 to 9 members in the family.

In terms of farm size, 52% of the respondents have 1 to 3 hectares farm, 28% have less than 1 hectare and the rest have more than 3 hectares of farm land. Thirty per cent (30%) of the respondents are into farming for 1-5 years and 24% had been involved in farming for 6-10 years. The same number of respondents (15%) is into farming for 11-15 years and 16-20 years and the rest had been farming for more than 21 years already.

In Camarines Sur, cacao production entails several crucial activities which start with planting of seedlings. Pruning and clearing follows when five or more branches have grown. The next process is fermentation using wooden boxes and a perforated bottom for aeration and drainage of sweating. After fermentation, drying is done slowly and evenly and beans are turned occasionally. Dried beans are then, processed to come up with appropriate products. Processing of dried beans consist of roasting, grinding, moulding, packaging and labelling. Processed products include milk chocolate, classic

chocolate, dark chocolate and pure cocoa. Channels of marketing include face-to-face and the use of social media (Facebook) and through friends.

Table 1. Socio-economic Characteristics of Respondents

	Number	%
Gender		
Male	51	75
Female	17	25
Total	68	100
Age		
Above 50	37	54
41 – 50	24	35
31 – 40	6	9
21- 30	1	2
Below 20	0	0
Total	68	100
Educational Attainment		
College Graduate	13	19
College Undergraduate	11	16
High School Graduate	23	34
High School Undergraduate	4	6
Elementary Graduate	16	24
Elementary Undergraduate	1	1
Total	68	100
Household Size		
7 – 9	9	13
4 – 6	33	49
1 – 3	26	38
Total	68	100
Farm Size (in hectares)		
Above 9	3	4
7.1 – 9.0	0	0
5.1 – 7.0	8	12
3.1 – 5.0	3	4
1.0 – 3.0	35	52
Less than 1 hectare	19	28
Total	68	100
Years in Farming		
Above 25 years	6	9
21 – 25	4	6
16 – 20	10	15
11 – 15	10	15
6 – 10	16	24
1 – 5	21	30
Less than 1 year	1	1
Total	68	100

Currently, the involvement in the cocoa-chocolate global value chain in our country is limited as it primarily acts as an importer of immediate and final products for domestic consumption [4]. Likewise, despite many competitive advantages, the country's exports remain low as it ranks 72nd in terms of exports, as its global market share of less than 0.01% [4].

4.1 Cost and Return Analysis

Grafted cacao seedling usually cost Php35.00 per piece however, if the buyer is a member of the association, he gets a discount of Php 25.00/piece. If scion is bought, the price is lower at Php10.00 per piece. Some of the associations mentioned by the respondents are the Bicol Cacao growers, Tigaon Cacao growers, Iriga cacao growers, Minalabac cacao growers and B Farmers Community associations.

Based on the cost and return analysis in Table 2, a kilo of dried cacao beans will cost Php 85.00 however, if sorted, the cost can increase between Php 100.00-Php 150.00/kilo. The total sales is P63,750.00 and the total cost is P35, 835.00 which is used for buying tools, seedlings, materials and labor. The net return is P27, 915.00 with a return on investment of 77.89%. The high return on investment is indicative that cacao production is highly profitable. On the processor side, a kilo of cocoa will result to a sales value of Php 675.00 and a total cost of Php 260.00. This will give a net return of Php 415.00 and a return on investment of 160%. On the trader's side, the return per kilo is computed at Php 800.00 with a cost of Php706.00. This results to a net return of Php 94.00 or an ROI of 13%.

The cost and return analysis for cacao can vary because price fluctuation is expected since cacao is a globally traded commodity [5]. For instance, in a study in Solomon Islands [6], the market trend analysis demonstrated that prices have increased by an average of 13% and relative to this, production had increased by an average of 5% over the last decade until 2013. Based on projections, price increases of between 10% and 30% annual production is realistically expected to reach what is considered to be an achievable target of around 10,000 metric tons by 2020.

In a similar study conducted in 2012, results showed profitability and efficiency ratios were 2.33 and 3.33 respectively implying that cocoa production is profitable and efficient [7]. Farm

size, access to credit, chemical inputs and farm age were identified as the significant factors affecting the output of cocoa production.

Previous study also found differential profitability and environmental impact of cacao based on the type of farming systems used. While cacao produced in monoculture systems are much more profitable, cacao produced in agroforestry systems rated higher in biodiversity and ecological benefits. Agroforestry systems, which are planted with wider arrays of other crops, native plants, and trees, maintain better soil quality [8]. Because traditional cacao is a modified forest and not a field crop the research needs to be based on both the holistic understanding of the cacao forest ecosystem alongside with the more traditional agronomic approaches. It remains to be seen how comfortably the ecological and agronomic approaches to cacao production can coexist [9].

To further enhance the profitability of cacao production, there should be a holistic approach in the distribution channels of small organic cacao companies [10]. Companies should focus on multiple components to enhance profits in their distribution channels. The key components identified were price point strategy, Business to Business (B2B) relationships, differentiation, strategic location, and building customer relationships. Strategically addressing all of these components enhances small organic cacao companies' profits.

4.2 Value Addition in Cacao

Fig. 1 shows the various activities performed in cacao production, processing and trading before the final product reaches the target consumers. The key players are the cacao growers who are responsible for planting, harvesting and drying of beans, small processors who are responsible in the transformation of dried beans to tablea, traders who buy processed cocoa products in wholesale and retail and the consumers. The diagram further shows that given the various computed selling prices at different stages of cacao production/processing, the value added is Php 590.00/kilo (with a share value of 82%) and Php 94.00/kilo (with a share value of 18%) from farmer to processor and processor to trader, respectively.

4.3 Opportunities and Prospects

Based on the findings of this study, cacao farming is profitable and there is a multitude of

Table 2. Cost and return analysis

Farmer					Processor					Trader							
ITEM	Cost	Unit	No.	Total	ITEM	Cost	Unit	No.	Total	ITEM	Cost	Unit	No.	Total			
I. Return																	
Average Dried Beans (kg)	85	per kilo	750	kls.	63,750	Sales per kilo	135	Per pack	5	pouches @200g	675	Sales per kilo	160	per pack	5	pouches @ 200 g each	800
Total Return (P)					63,750						675						800
II. Cost																	
1) Tools (bolo, water hose, scythe)					5,000	1) Dried beans	85	Per kilo	1	kl	85	Additional Sticker	141	per pack	5	packs/kl	706
2) Seedlings	35	Per grafted seedling	500	Pcs	17,500	2) Brown sugar	68	Per kilo	1	kl	68	P25/sheet @ 4 stickers/sheet = P6.25/pack + 135/pack = 141.25					
3) Materials (jute bag)	89	per bag	15	Bags	1,335	3) Standing pouch	15	Per pc/200g	5	pcs	75						
4) Labor	250	per wk	48	Wks	12,000	4) Grinding	20	Per kilo	1		20						
Land prepn																	
Planting						5)Transportation Cost	20	Trans	10	kls	2						
Fertilizer Application						6) Sticker/Label	2	Per label	5	labels/kl	10						
Harvesting																	
Total Cost (P)					35,835						260						706
NET RETURN					27,915						415						94
Return on Investment					77.89 %						160 %						13 %

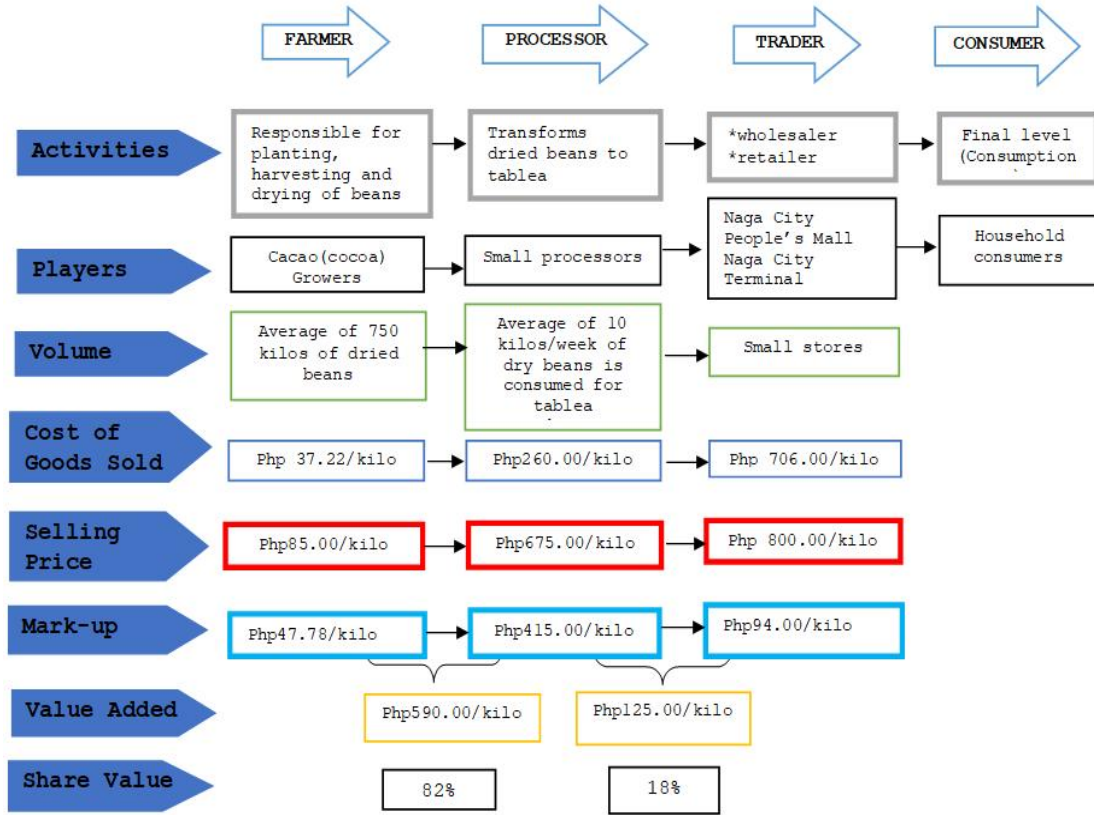


Fig. 1. Value Addition Diagram for Cacao Production in Camarines Sur, Philippines

opportunities available for small-scale cacao farmers. One enabling opportunity is the provision of free seedlings from the Department of Agriculture (DA) to cacao farmers since Camarines Sur was identified as a potential area for cacao production and industry. There is an increased support from the government considering the volume of seedlings being distributed freely to farmers. In 2014, DA released cacao seedlings to farmers and for 2017, 1 million seedlings were released with UF 18 variety. The government sees the potential of this crop in the province and with the increasing interest in cacao production, it can respond to the inadequate supply in domestic and global market.

Given this scenario, government intervention is indeed highly imperative to ensure increase and continuous production of cacao [7,11]. Without government support, cacao production may not reach its optimum level. Previous studies revealed that farmers have limited technological trainings and information on value-adding on food processing and product development [12].

This is further corroborated by a study whereby training of farmers on nursery development on the establishment of their own farms or individual backyard is a development option towards a more sustainable production of planting materials [13]. On top of this, other constraints and challenges on harvesting, sorting, drying and storage as well as economic and social constraints should be seriously considered [14]. With all these issues, the government should come up with programmes aimed at improving farm size and development, provide trainings, make credits available at no or little interest, provide basic amenities in the rural areas and facilitate the development of locally made farm machineries at affordable prices.

Furthermore, growing cacao in Camarines Sur may be accelerated because there are available large coconut and banana farms which may be used for intercropping with cacao. This corroborates with the findings that large coconut and banana areas are available for intercropping in the country [5]. Likewise, the presence of R & D programs for cacao will also be a great help to

farmers to increase their production and make their processing more efficient. A previous study suggested that improving productivity will require support to Research and Development [6]. Extensive R & D on varietal improvement is also crucial for cacao production [5]. R & D must be coupled with public and private partnerships between government, development partners and private sector enterprises including domestic and international stakeholders will offer opportunities for improving services to the cocoa industry [6].

Consumers nowadays are increasingly concerned about health and safety of their food, as well as the environmental and social implications of cacao production; they are beginning to truly grasp the meaning of “organic” and “fair-trade” and demand such products from their retailers. They are increasingly willing to pay premium prices for luxury, differentiated cocoa products, usually darker chocolate with a higher cocoa content [15].

It was also observed that farmers have continued to expand production even when cocoa prices hit record lows, although production rates varied across countries [16]. This suggests that, even in periods of low cocoa prices, cocoa has remained relatively competitive compared with other crop options and/or there are other factors that motivate farmers to expand cocoa production.

The opportunities for cacao production are clear and highly motivating for farmers. The Department of Trade and Industry (DTI) has identified the most pronounced strength of our country in terms of cacao production, that is, the geographic conditions that allow for growth of higher-value cocoa beans across the country, as well as its location, which is close to emerging markets [4].

5. CONCLUSION AND RECOMMENDATIONS

Cacao production is economically feasible with a high return on investment of 77.89% and 160% for the farmer and processor, respectively but a low return on investment for traders. The value added from the farmer to processor is Php 590/kilo, and Php 125/kilo from processor to trader.

There are various opportunities and prospects for cacao production. There is an increasing demand for cacao-based products however; the supply is still inadequate at the domestic and

global market. There is also sufficient area of banana and coconut farms where cacao may be used for intercropping. Likewise, government support is evident in terms of providing budget for research and development undertakings and providing seedlings to cacao farmers.

Based on the findings of this study, recommendations are: increased access and availability of processing facilities that will allow farmers to increase their farm productivity level; increased accessibility to market and market information by the farmers; provision of trainings and workshops to enhance capability of farmers especially on processing; strengthen farmers' groups/cooperatives to increase their access to technical and financial assistance from government and non-government organizations, effective integrated pest management for cacao pest and diseases and provision for infrastructure support especially on storage facilities.

Increased competitiveness of cacao over other high value crops is crucial. Focusing on fundamental supply chain effectiveness such as production, post-harvest, consistent quality, farmer group capacity building, infrastructure, market information and diversification will deliver results for the majority of cacao producers [17].

The future of cacao industry is very optimistic as the need for more quality cocoa beans is undeniably certain as well as the insatiable demand for chocolate [18]. It is evident that financial stability and income of cacao key players can be increased with the proper investment in production, processing and marketing systems and processes. As one author puts it and aptly describes, “Money may not grow on trees, but chocolate does” [19]. It is therefore, imperative to address all the critical needs of stakeholders engaged in the various links along the supply chain in order to raise the overall sector revenue and household income of cacao farmers. In doing so, the country is assured of a more dynamic, sustainable and competitive cacao industry.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

COMPETING INTERESTS

Author has declared that no competing interests exist.

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