

Supply Chain Analysis of Cocoyam in Ghana

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Abstract

Cocoyam is one of the most important food crops contributing to the incomes and food security of most Ghanaians. However, there is co-existence of weakly connected commodity chain that poses challenges to the distribution and marketing of the crop in Ghana, thus affecting incomes of various chain members. Through formal surveys, cocoyam chain members were interviewed to identify challenges, barriers, opportunities and the way forward to develop and expand production and marketing of cocoyam. Results revealed that production of the crop was dwindling. Farm sizes were small varying from 0.2 ha to 0.5 ha. Cocoyam productivity remained low with yields averaging 6 tons/ha. Positive margins were recouped by all the actors along the cocoyam supply chain with farmers enjoying the most net margins. The analysis also revealed the existence of both horizontal and vertical linkages among chain level members. These relationships could be strengthened to reduce the constraints poor storage system, poor transportation system, limited market information, limited use of improved technologies, poor marketing skills and inadequate product development.

Key words: Cocoyam, development, supply, vertical-linkage

Analyse de la chaîne d'approvisionnement du taro au Ghana

Résumé

Le taro est l'une des cultures vivrières les plus importantes qui contribuent aux revenus et à la sécurité alimentaire de la plupart des Ghanéens. Cependant, il existe une coexistence d'une chaîne de produits faiblement connectée qui pose des défis à la distribution et à la commercialisation de la culture au Ghana et affecte ainsi les revenus des membres de la chaîne. par des sondages formelles, les membres de la chaîne du taro ont été interviewés pour identifier les défis, les obstacles, les opportunités et le façon de progresser pour développer et augmenter la production et la commercialisation du taro. Les résultats ont révélé que la production de la culture diminuait. Les tailles des fermes étaient petites variant de 0.2ha à 0.5ha. La productivité du taro est restée faible avec des rendements moyens de 6 tonnes / ha. Les marges positives ont été récupérées par tous les acteurs de la chaîne d'approvisionnement de la cocoyam, les agriculteurs profitant de leurs marges nettes. L'analyse a également révélé l'existence de liens horizontaux et verticaux entre les membres

de la chaîne. Ces relations pourraient être renforcées afin de réduire les contraintes liées au mauvais système de stockage, à un système de transport médiocre, à des informations limitées sur le marché, à l'utilisation limitée de technologies améliorées, à de faibles compétences en marketing et au développement inadéquat des produits.

Mots-clés: *taro, développement, approvisionnement, liaison verticale*

Introduction

Cocoyam is an important crop in many parts of the world, mainly for smallholder farmers. The crop plays a major role in the lives of many as a food security and income generation crop. It is a cash crop and a foreign exchange earner, as well as an important component in the rural development of many areas and individuals. According to FAO (2013) the total world production of cocoyam in 2011 was 10 million tonnes. Africa as a continent is the major producer of cocoyam, followed by Asia, (with about half of the African production) and Oceania (with just a tenth of the total African production). Cocoyam production is almost exclusively used for human consumption and an important food security crop in times of failure or shortage of other crops.

Cocoyam production in Ghana is undertaken by small-scale subsistence farmers. The surplus of the production is supplied to the market in the rapidly growing urban centres. A lot of urban dwellers turn to cocoyam when plantains are in short supply. The high yield potential, affordability, nutritional value and consumer preference for cocoyam have impacted the rural population through income and employment generation.

The Government of Ghana has reiterated the need to diversify agricultural production from subsistence one to commercial one. Farmers' desire to increase production of staple crops is very high; however they are mostly concerned about the marketing of their produce. The overall goal of this study is to evaluate the

functionalities within the cocoyam value chain in Ghana. Specifically it evaluates the full range of activities required to bring a product from production through processing, marketing and consumption and suggests measures required for strengthening the value chain linkages. The study was therefore intended to inform the development of strategic plans that would improve the productivity and competitiveness of cocoyam to the benefit of all the actors within the chain.

Methodology

The study was conducted in cocoyam producing regions (Ashanti, Brong Ahafo, Eastern and Western) of Ghana and employed two data collection methods; the qualitative and quantitative data collection techniques. Qualitative technique such as the focus group discussions and key informant interviews were used. This was followed by a quantitative survey where structured questionnaires were administered to selected value chain actors.

Multi-stage sampling techniques were used to select the study area and the survey sample. The four cocoyam producing regions were purposively selected and two districts within a region were selected based on production, processing and marketing activities. At the district level three communities were randomly selected from the list of communities and 10 farm households were randomly selected from each community. The households were drawn randomly from the list of cocoyam farmers presented by the District Agricultural officers. At each district one

focus group discussion was held with representatives of all actors of the cocoyam value chain. In addition two key informants from each level of the value chain per community were also interviewed using structured questionnaires. Five main categories of value chain actors were identified in each community. These included producers, collectors, wholesalers, processors and consumers. Total sample size for each category across the regions was 240.

Results and Discussions

In the study area, all the cocoyam farmers were subsistence farmers. Producing cocoyam as an intercrop with cassava, plantain and other vegetables. The crop usually grows as a volunteer crop after land preparation. Cocoyam was produced primarily for sale and then for consumption. In the surveyed area, about 30% of the cocoyam produced was utilized for food and the remaining 70% sold for cash. Cocoyam was normally planted on small areas of the farm on scattered plots of between 0.2 ha and 0.5 ha. The use of traditional implements such as hoes and cutlasses were predominant among the producers. Family labour and hired labour

were used during weeding and harvesting. Traditional varieties prone to diseases were common among farmers and as such recorded low yields ranging from 4-6.5 tons/ha compared to improved varieties with yields of 8 tons/ha (MoFA, 2013). Many authors (Owusu-Darko *et al.*, 2014; Sagoe, 2006; Opere, 2000) report of cocoyam decline in Ghana due to low yielding cultivars, pests and diseases, poor husbandry practices, deteriorating soil fertility, lack of processing and innovation of products as found in this study.

3.1 Supply chain of cocoyam

The flow of cocoyam usually started from the farm through to rural (tertiary) markets where it was passed on to secondary markets where it is purchased by intermediaries (middlemen) and urban wholesalers, and conveyed to primary or main markets. From these final marketplaces, cocoyam was sold to retailers/urban wholesalers/final consumers. The simple supply chain for cocoyam from the study is as shown in figure 1.

3.2 Cost and margins on the cocoyam supply chain

Actors in the cocoyam value chain performed

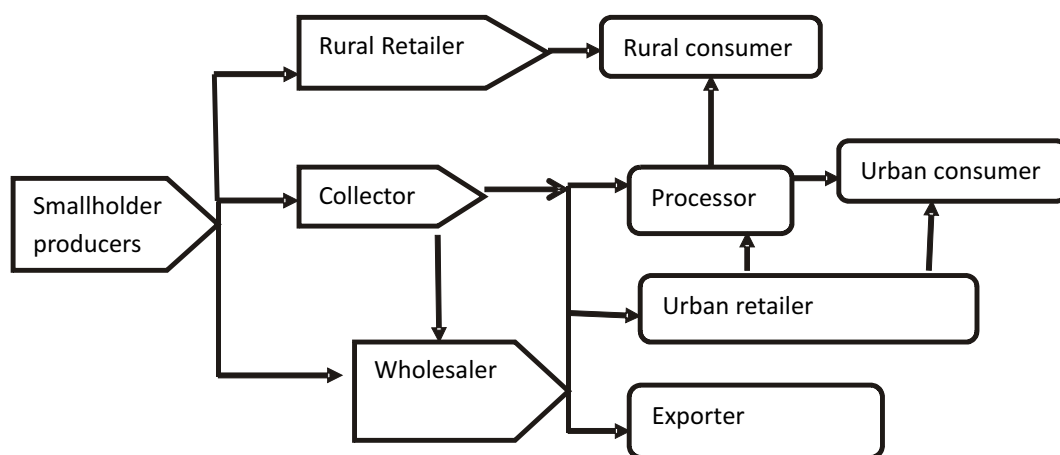


Figure 1. Supply chain of cocoyam in Ghana

different activities at different levels. It is important to determine the profitability of an activity before venturing into it. This is particularly important for poor cocoyam actors who have limited resources and so cannot afford to choose the wrong market or sector. Revenues, costs and margins of the cocoyam value chains should therefore be compared. The cost and margins analysis is also important for potential scaling up of existing activities. Table 1 summarizes a chain that starts with a farmer selling cocoyam cormels to a rural collector through to an urban retailer. While this chain is not the only way fresh cocoyam is traded, it describes what we believe is a common practice for rural to urban trade. The cost and price information used to construct the Table were gathered during fieldwork conducted in March, 2013. Consequently, the analysis provides a snap-shot of trading during the beginning of the planting season where cocoyam cormels are generally scarce. The situation during the normal harvesting period may somewhat be different due to many farmers harvesting at the same time.

Table 1: Calculation of marketing margins for supply chain actors, 2013

Actor	Total cost (₵/50 kg) ¹	Selling Price (₵/50 kg)	Net Margin (₵/50 kg)	% selling profit
Farmer	20	60	40	66.6
Rural collector	65	70	5	7.0
Urban wholesaler	90	100	10	10.0
Retailer	105	130	25	19.2

¹ An average farmer was spending an average of ₵2400/ha from production to packing of output. This cost was shared for average output of 6000kg/ha. Total costs for rural collector include payment for carting and sacks. Total costs for urban wholesalers include payment for transportation, sacks, loading and offloading. Total costs for retailer include transportation, offloading, market tolls, watchman fee.

From the test, farmers and retailers recouped the most profit. Collectors were the least rewarded. All the actors seemed to enjoy positive net margins implying that they were all benefiting from cocoyam sales. However their high margins were matched by high costs. In the case of the urban wholesaler all costs were variable. The largest proportions of retailers' costs were transport costs. Given that retailers added approximately 20% to the price of a 50 kg bag of cocoyam in between buying and selling, lowering transportation cost would benefit consumers.

3.3 Cocoyam supply chain relationships

Supply chain relationships are the interactions between firms and individuals distributed horizontally and vertically within a supply chain (Sebstad and Manfre, 2011). The vertical relationship is more of linkages along the cocoyam supply chain and the horizontal relationship is the linkage between actors on the same level of the supply chain. Figure 2 shows cocoyam farmer linkages with different organizations and businesses.

Farmer to farmer linkage was highest as 95% of the farmers reported to be linked to other farmers. This horizontal relationship between farmers is very important to the growth of the production node of the chain. More farmers were linked to collectors and wholesalers. 80% and 70% of farmers interviewed were linked to collectors and wholesalers respectively. The nature of linkage was informal. The linkage was very important as it helped market their produce outside the communities.

Farmers' linkages to extension and research, were also encouraging. About 60% of farmers had linkage with extension while 40% had linkage with research. There was virtually no linkage to other institutions such as the Ministry of Trade and Industry (MOTI) and the Ministry of Road and Transport (MORT).

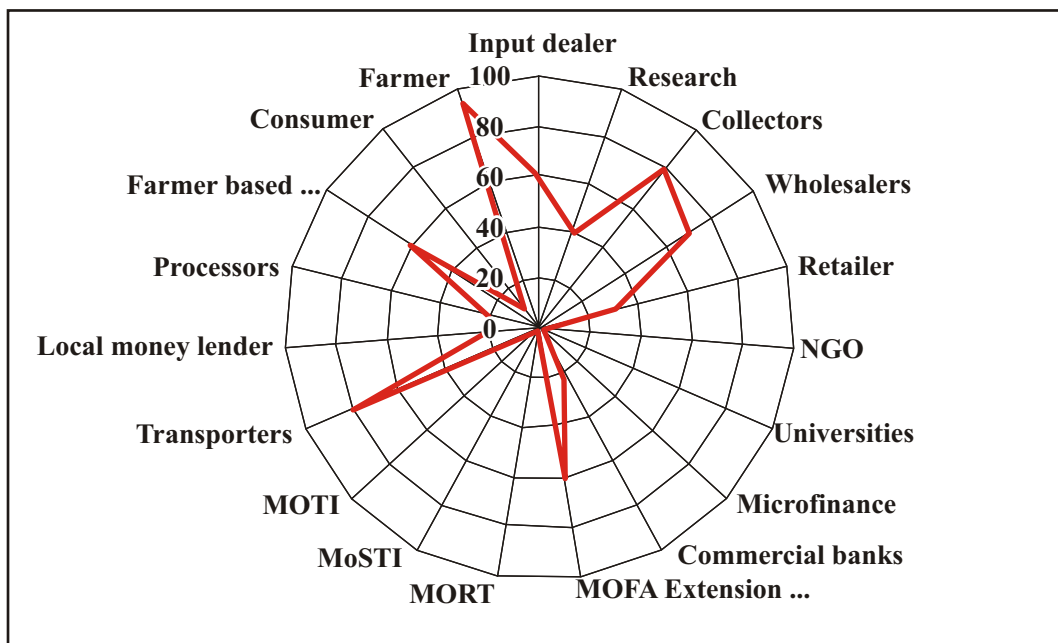


Figure 2: Farmer linkages with organisations

About 80% of farmers reported to be linked to transporters. They received inputs from towns and cities through transporters and some served as linkages between farmers and wholesalers in the cities. Transaction cost was reduced as a result of the linkage. The linkage between farmer and financial institutions such as the commercial banks and the micro finance institutions were very low. Only 10% of farmers had links with commercial banks.

Cocoyam trader linkages are also very important in the supply chain. Trader relationship with other stakeholders along the value chain builds trust and improves efficiency. Cocoyam traders had more vertical relationships. Figure 3 shows cocoyam trader linkages with organizations and businesses.

From Figure 3 traders had most linkage with each other. These actors were horizontally

linked. Results revealed that ninety eight percent of collectors had linkages with wholesalers and vice versa. All the retailers had linkages with wholesalers. Due to these horizontal linkages among traders, there were assurances of cocoyam root supply throughout the year. Supply constraints are somehow eliminated due to linkages.

Trader linkages with farmers were very important as that assured constant supply. Collectors and wholesalers had the most relationship with farmers. Forty percent of traders reported that they had relationship with farmers. Due to some trust that had been built over the years, traders could make advance payment and cocoyam roots delivered later.

The results also revealed that eighty percent of farmers had links with transporters.

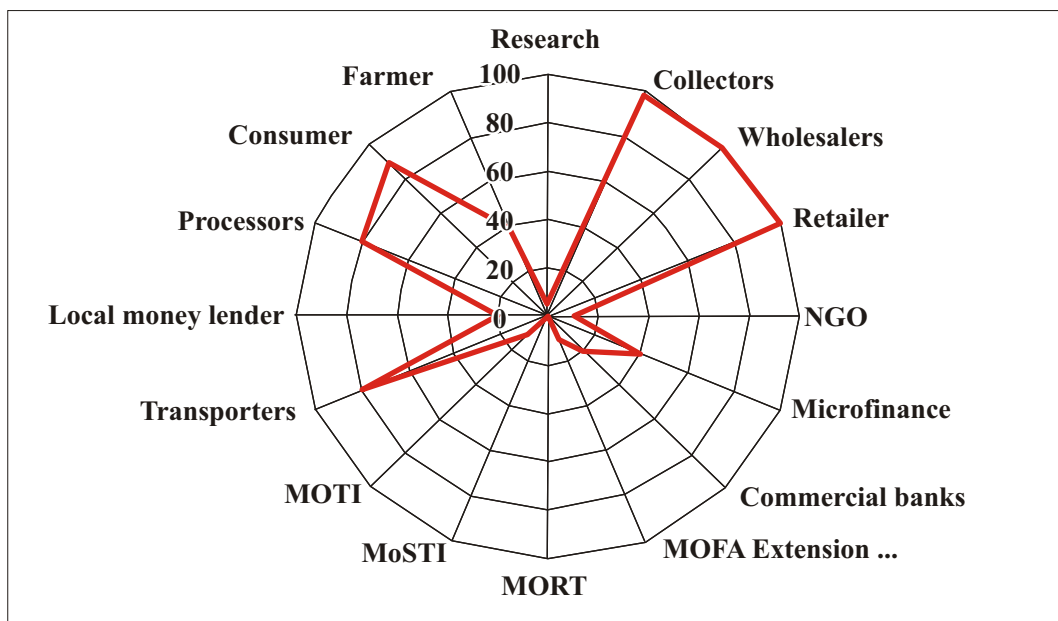


Figure 3: Cocoyam trader linkages with organizations

Wholesalers were able to connect to farmers and collectors through transporters. Wholesalers only had to communicate to farmers or collectors through mobile phones and payments and deliveries were made through transporters. Frequent journeys to farms were reduced due to trader-transporter linkages. Cost of transportation was also reduced thereby increasing trader profit.

Forty percent of traders had linkages with micro-finance companies. Only 20% mentioned that they had linkage with commercial banks. Traders were affected by this limited association. They had difficulty getting credit to expand their businesses. The need to encourage trader financial institutions linkages to influence credit acquisition is important.

There were also cocoyam processor linkages with institutions. However, compared to other actor linkages, cocoyam processor linkages

were few. These linkages are as shown in Figure 4.

The results showed that processors had strong relationships with wholesalers and retailers. Eighty percent of processors had linkages with wholesalers and 90% had linkages with retailers. Processors took direct delivery from traders. Transaction cost due to processor-trader linkage was reduced.

Cocoyam processors had limited interaction with researchers and other agents from the ministries. Only 10% of processors interviewed had some relationship with researchers.

Processors had no or little knowledge about new products of cocoyam. They had to rely on the same traditional products which were monotonous and thus did not encourage competition.

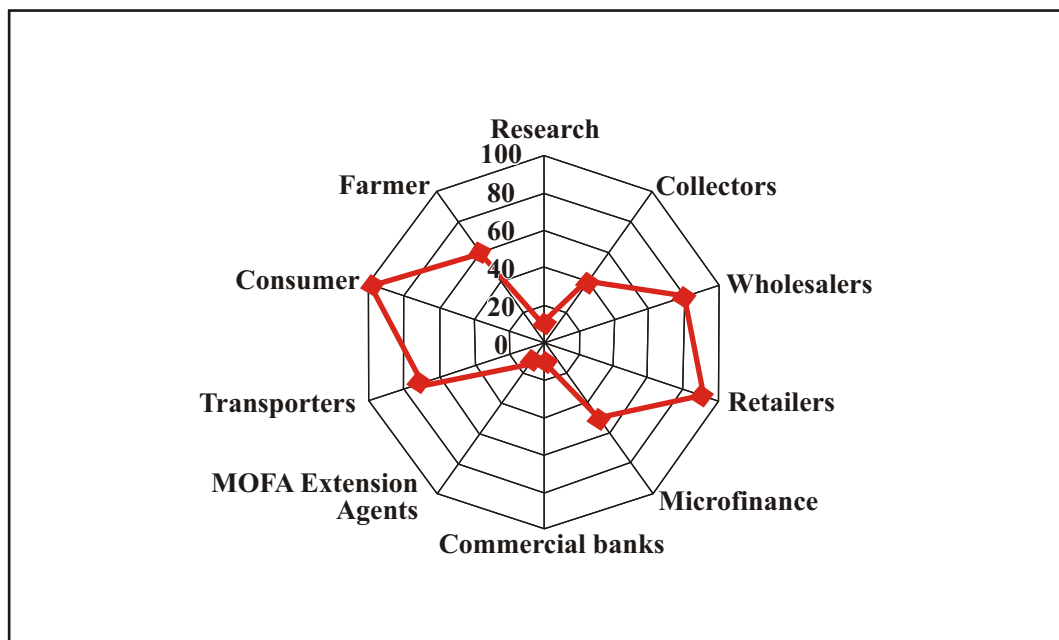


Figure 4: Cocoyam processor linkages

Processors had direct relationship with consumers as shown in Figure 4. There was direct feedback from consumers to processors and this helped them to improve upon their products.

The relationships were all informal and therefore commitment was not guaranteed. These relationships can therefore be formalized to increase upgrading and efficiency in the cocoyam supply chain.

4.0. Constraints to Cocoyam Supply

Constraints to cocoyam supply impede market efficiency and chain actors suffer as profits are reduced. In the study the following were found to constrain efficient supply of cocoyam:

Market information: A condition for traders to be included in successful value chains is

that they have access to market information and possess the ability to translate it to market intelligence (Trienekens, 2011). Traders should have knowledge of and be willing to conform to demands in the value chain end-markets (Grunert et al. 2006). Fifty percent of the traders only received information on prices from their counterpart traders in the market. There was no formal structure in which information was distributed to traders. Efficient flow of products to markets was therefore affected as areas of high production were not reached by traders. Traders were not able to take advantage of other markets due to lack of information on prices.

Storage: Cocoyam is perishable as any root and tuber crop. Marketers had indigenous knowledge as to how to store cocoyam, however, the period for which it could be stored was short from a week to two weeks

maximum. Thirty-three percent (33.3%) of marketers reported that storage was a problem in cocoyam marketing. There were no warehouses for cocoyam storage anywhere in the country. Marketers had to sell off any consignment within a specific period and this reduced their profit.

Transport cost: Transporting cocoyam from producing areas to marketing centres is difficult. Cocoyam is mainly produced in the forest agro-ecological zones which experience the most rainfall in the country. The heavy rainfalls deteriorate the already bad roads. Vehicles that ply these roads charge exorbitant prices in order to maintain their vehicles and to stay in business. Over twenty-seven (27.7%) of traders reported that high cost of transport affected their businesses.

Bad road network: As mentioned above roads leading to production areas are bad and this affect transportation in and out of those areas. Traders found it difficult taking deliveries on time and thus affected their clientele especially those that dealt with exporters and processors. Over twenty-two (22.2%) reported bad road network as a constraint to their marketing of cocoyam.

Capital: Financial institutions decline to deal with marketers of the agricultural value chain especially those that deal with primary agricultural products due to the short shelf life and thus high risk involved in such a business. There are also the high interest rates attached to loans that actually deter traders from accessing loans. Over sixteen (16.7%) of respondents reported lack of capital as the main constraints for marketing.

Conclusions and implications

The study in analyzing the supply chain of cocoyam in Ghana, found that cocoyam production was still at the subsistence level where most farmers used volunteer crops that

sprouted after land preparation. This resulted in farmers obtaining low yields far below most known cocoyam producing countries such as Cameroon and Egypt (Onwueme and Charles, 1994). The development of improved cocoyam varieties, increased access to inputs (credit, fertilizer, pesticides) and agricultural extension cannot be overemphasized.

Positive margins were recouped by all the actors along the cocoyam supply chain with farmers enjoying the most net margins. The need for more efficient marketing systems in terms of improving market information, improving storage facilities, improving bad roads and improving credit acquisition are important for increased incomes.

Horizontal linkages among chain actors were seen to be beneficial. However these relationships were all informal and therefore commitment was not guaranteed. These relationships can therefore be formalized to increase upgrading and efficiency in the cocoyam supply chain.

Acknowledgements

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