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Constraints to the delivery of clean seed yams in the lowland sub-humid tropics of Nigeria: The supply chain approach

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An investigation into the seed yam supply chain was carried out to identify the components of commercial seed yam supply systems, which affect the supply of clean seed yams by smallholder farmers in Nigeria. Up to 108 respondents were used to generate data for the analysis. Data were analyzed using simple descriptive statistics. A one-way analysis of variance (ANOVA) was used to capture the mean ratings across the supply chain, while the Z – statistic was used to test for factors that influence seed yam traders' marketing strategies and extent of performance of marketing functions in the delivery of clean seed yams to farmers. The results of the analysis identified seed yam producers, collector agents (sometimes called yam traders or yam dealers), wholesalers and retailers as the main actors in seed yam supply within and outside the lowland belt of River Niger in Nigeria. The collector agents act as cartel and occupy a central position in the entire supply chain process. They act as intermediaries between farmers and wholesalers especially where farmer groups do not exist and provide a major distribution network or market linkage for the marketing of the seed yams. The study identified pests attack and disease infestation (24.0%), physical injury on the seed yams (65.1%), poor knowledge of seed multiplication techniques (39.4%) short shelf life of the tubers (33.2%), activities of cartels, deplorable road and poor proximity to market (45.5%) as the factors that affect consumer preference and efficient delivery network in the seed yam supply chain. The research also identified poor business practices including sharp practices, lack of trust and confidence amongst major actors (wholesalers and retailers), insufficient working capital (76.3%), amongst others as the factors militating against efficient seed yam supply chain.

Key words: Supply chain, seed yam dealers, small holder farmers, profitability, marketing strategies, marketing functions.

INTRODUCTION

Yam production is a major component of farmers' agricultural or food crop activities in West Africa. West Africa accounts for 90-95% of the world's yam production (Aquah and Nganje, 1991; FAO, 1998), out of which 71% is grown in Nigeria (Okwor, 1998). Eastern Nigeria and the

and the areas adjoining the Niger and Benue rivers constitute the main yam belt of the country, and have the largest genetic base in cultivated *Discorea rotundata* - one of the six species of yam believed to originate from the eastern bank of the River Niger and most preferred food crop by the people of that area (Hahn et al., 1987). Yam is an important staple food crop of high socio-cultural and ritual significance in the yam belts (rainforest and derived savannah zone) of the country, particularly in the

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lowland belt of the River Niger. It is understandably, a priority crop for development by the Nigerian Government as a food crop capable of feeding an expanding population of over 140 million people and providing both a valuable source of nutrition, income, employment and poverty alleviation for many impoverished rural families. This is in recognition of the fact that over 63 percent of Nigerians are estimated to be poor, with 76 percent of the core poor residing in the rural areas and actively engaged in agriculture (Okunmadewa, 2001). However, lack of reliable supply of good quality seed yams and other enabling factors have led to a considerable decline in productivity since 1971 and consequently a progressive decrease in the area under cultivation (FAO, 1997). The Federal Government of Nigeria and other agencies (local and international) have risen up to the challenges by establishing various programs for the development of the yam agribusiness sector. These include the Root and Tuber Expansion Program (RTEP), Crop Protection Program (CPP) for Root Crops, and Seed Yam Multiplication Program (SYMP) all working in tandem to increase productivity and improve consumer preference of yam products through the supply of clean seed yams and improved market strategies. Policy focus such as the ban on importation of rice, maize and wheat flour has further created enough motivation for farmers to increase yam production to meet the rising demands from households and industries for alternative commodities. But, in spite of these interventions, the average production of yam in Nigeria estimated at 23.9 million tons (FAO, 1997) is below the world average with limited scope for sustainable growth in output due to weaknesses in the yam agri-business supply chain management (SCM). These weaknesses manifest as inadequate supply of production inputs (principally clean seed yams), pest and disease infestation, a highly atomistic production side (where there are many small widely dispersed farmers growing yam without coming together to take advantage of economies of scale) and an oligopolistic marketing system (where there are only a few organized traders) taking advantage of market imperfection to reap gain (Mendoza and Rosegrant 1995), which creates inefficient economic exchange embedded within various overarching social institutions including locality, tenure regime, class, ethnicity, religion, gender and age (Zucker 1986; Fukuyama, 1995; Harris-White, 1997). The CPP project has responded to these needs through concerted efforts to design research and deliver high yielding disease-resistant seed yams, cultivation techniques, linkages to sources of improved production and seed yam input market, etc.

The National Root Crop Research Institute (NRCRI) and IITA developed the miniset technique in the 1970s as a rapid means of multiplying the yam gemplasm. In addition, IITA and other agencies have released three disease resistant and high yielding yam varieties. Unfortunately, there is low and unpredictable degree of adoption of these technologies due to scarcity of complemen-

tary inputs, lack of funds, high labour requirement, complicated production techniques, and socio-economic factors correlated with adoption. For instance, while 78.8 percent of farmers in eastern Nigeria were aware of the miniset technique, only 48.8 percent actually practiced it (Chikwendu et al., 1995). In addition, yam production is relatively expensive when compared with other root and tuber crops due to high cost of inputs especially labour and planting materials (Otoo et al., 1987). One major goal of the CPP project in terms of increase in output is to use hi-tech and low cost input combination techniques to improve efficiency, increase productivity, generate sales and reduce labour waste arising from insufficient supply of clean seed yam, in order to generate good remunerative services and the desired down-stream effects of job creation, poverty alleviation and food security. These became necessary as the supply from farmers using traditional methods of seed yam production; specialized seed yam producers and Non-Governmental Organizations (NGOs) cannot meet the demand. Thus, the availability of the right quality and quantity of seed yam is a critical aspect of yam production and enhanced livelihoods of the rural poor farmers. Variants of seed yam production methods have been adapted by farmers for commercial production of clean seed yam particularly in the lowland belt of the river Niger, Nigeria. In spite of the claims that the interventions have resulted in an unprecedented increase in output at the farmers' homes, there are obvious gaps in the supply of the seed yams to the ultimate consumers. Agriculturists and marketers are of the view that sustainable supply of clean seed yam depends on the availability of adequate information on the components of seed yam supply chain (input supply, production and marketing or distribution systems) that are adaptable to other yam growing ecologies. But, some are of the view that poor business practices breed lack of trust and confidence amongst the key actors in the supply chain (Woods, 2004) and this could mar seed yam businesses. There is obvious information gap on the impact of these factors on seed yam supply in the study area. This information is imperative as it forms the basis for targeting effective production and marketing interventions to guarantee sustainable supply of yam and improvement in the livelihoods of the key actors (farmers and marketers in particular) (Scouones, 2001).

This study, therefore, seeks to identify components of commercial seed yam production and supply systems that affect the supply of clean seed yams by small-scale growers in the lowland sub-humid belt of the river Niger. In doing this, the study aims to identify the factors that promote or constrain the delivery of clean seed yams in commercial-oriented production systems. The specific objectives are to:

- i) Identify and analyze the key actors and their socio-economic characteristics in the seed yam commodity supply chain.

- ii) Investigate and analyze the factors that promote or constrain efficient delivery of clean seed yams in a commercial-oriented systems.
- iii) Examine the role of confidence and best business practices on the business relationships amongst the downstream players and the effect on seed yam commodity supply process.
- iv) Examine the role of confidence and best business practices on the business relationships amongst the upstream players and the effects on seed yam commodity supply process.

METHODOLOGY

Key interviews with governmental, development organization and key informants, group discussions were held with community members and a questionnaire developed for use in fieldwork. Two (2) major seed yam producing settlements or camp groups were identified in Ilushi hinterland of Edo State, Nigeria. These were Akwa Asha (Igbo speaking) and Igbem (Ishekiri/Urhobo speaking) groups forming two main strata, Akwa Asha that comprises 70 camp settlements with an average of 12 seed yam producing households per camp, while Igbem is made up of 9 camps with an average of 38 seed yam producing households per camp. Five of the Igbem camps were not seed-yam producers, while 2 of the 4 remaining Igbem camps were not easily accessible. A multi-stage stratified random sampling technique was adopted for questionnaire administration, based on settlement group, population of farm households and access to the camps. At the first stage, 11 of the 70 camps and 1 of the 3 accessible camps were randomly selected from the Akwa Asha and Igbem settlement (statum), respectively. Next, was the random selection of 7 households from each of the previously sampled 11 Akwa Asha camps, and 31 households in the selected Igbem camp; thus making a total of 108 households. This was done using the list of farming households. From the list of registered yam traders in the study area, a total of 16 seed yam traders comprising 40% collector agents (dealers), 25% wholesalers and 18% retailers were randomly selected using simple random sampling technique for questionnaire administration. The questionnaire elicited information on seed yam production techniques, sources of inputs, level of input use, perceived constraints and opportunities to clean seed yam production, marketing, interrelationship with marketing agents, etc. The study took records of the geographical location of each camp, individual farm-fields and markets that were visited. The survey was conducted from December 2004 to January 2005.

In analyzing the supply chain for clean seed yams in the lowland belt of River Niger, detailed interviews were conducted with 108 of 836, representing 13% of seed yam farming households in the accessible camps within Ilushi hinterland of Edo State using a structured questionnaire. Information was sought on production techniques, post-harvest practices adopted by the farmer, marketing information (including distribution systems or network, price regime and other spatial determining factors). Farmers were then asked what criteria they believed a market intermediary would use in choosing to purchase seed yams from them.

Data were generated from the 108 respondents who were administered with structural interviews for the analysis. Data were analyzed using simple descriptive statistical tools, such as frequency counts, averages and percentiles. Budgetary analysis was used to determine the profitability of seed yam production under different management systems in the area, while mean ratings across the supply chain were analyzed using one-way analysis of variance (ANOVA). The Z – statistic was used to test for factors that influence farmers' choice of seed yam production technique, marketing strategies and extent of performance of marketing functions in the delivery of clean seed yams to farmers at 1% level of significance

RESULTS AND DISCUSSION

The analysis identified the key actors in the seed yam commodity supply chain and factors that promote or constrain efficient delivery of clean seed yams in a commercial-oriented system. It also sought to know the roles that confidence and best business practices play in business relationships amongst the downstream and upstream players and their effect on seed yam commodity supply process. The results are presented below.

Seed yam delivery chain

The main actors in seed yam supply within and outside the lowland belt of River Niger are seed yam producers, collector agents (sometimes called yam traders or yam dealers), wholesalers and retailers. The main seed yam market is the Ilushi market (6°40.317N and 6°37.754E). At home, the seed yam producers can sell their produce directly to collector agents, wholesalers, retailers and other farmers. However, the bulk of the seed yams are transported to the market (Figure 1) where the bulk of yam transaction takes place.

For most seed yam farmers around the River Niger, collector agents and traders provide the major mechanism for the disposal of the seed yams. However, traders purchase only the clean seeds and medium-sized tubers. Farmers generally retain some proportion (20-34%) of the seed yams for planting and on extreme hunger situation for domestic consumption. The price that farmers receive for their seed yams is dependent upon the market forces of supply and demand, tuber quality and variety. The traders or collector agents buy the seed yams from the farmer and deliver the tubers to wholesalers in the major market at Ilushi. During the seed yam season, the quantity of seed yams sold increases, with most traders handling more than 10 tones. As shown in Figure 1, wholesalers operate in the supply chain as market intermediaries. At the market, the farmers are not allowed to sell directly to anybody in the market except to the collector agents, who organized themselves into cooperative or other marketing cartels. The collector agents aggregate seed yams from a number of small growers, pay the growers, and store the yams until the traders come to collect them. Quite clearly, by aggregating the tubers in one place, the traders do not have to travel to as many farms to fill their truck. In most cases, the collector agents are seed yam growers themselves. Wholesalers deal with traders and collector

agents rather than farmers, as traders and collector agents are more able to provide tubers of the desired variety in the required quantity and quality. Traders and collector agents offer a more competitive price and deliver seed yams when the wholesalers require them. Wholesalers operate in the supply chain as market intermediaries, but unlike traders and collector agents, whose function it is to source seed yams from many small farmers and to aggregate these into larger quantities, wholesaler

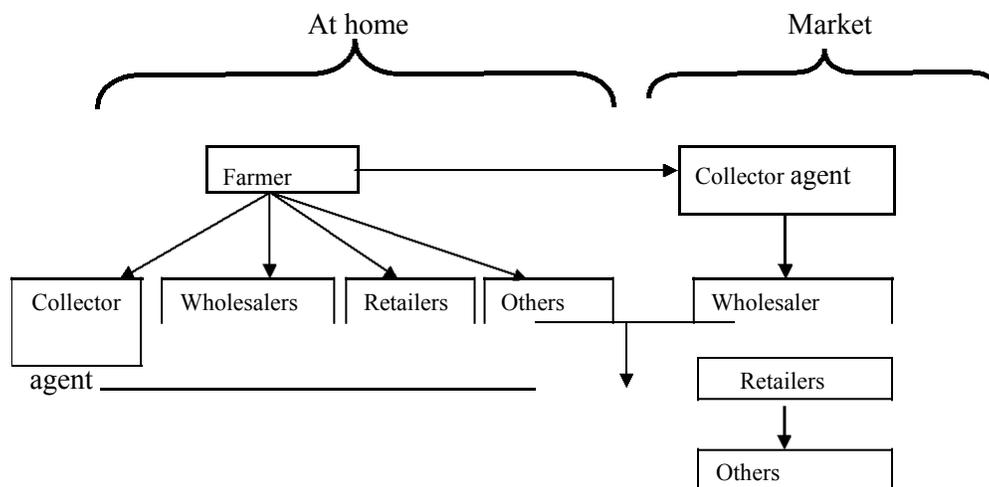


Figure 1. Seed yam supply chain in the lowland belt of River Niger, Nigeria.

Table 1. Mean rating for what market intermediaries desire from upstream suppliers (where 1 = 'not at all important' and 6 = very important).

Factor	Traders	Retailers
Desired size	4.88	4.40
Desired colour (without spots)	4.85	4.54
Desired variety	4.69	4.58
Freshness or maturity	4.69	4.54
Free from pest and diseases	4.63	3.95
Free from physical injury	4.58	4.62
High price (competitively priced)	4.55	4.44
Sufficient quantity	4.51	3.01
Proximity to market	4.48	4.58
Well graded	4.14	3.20
Storability (spoilage while in store)	3.81	2.81
Acceptability by different markets	2.96	2.54
Deliver when required	2.88	2.59

Source: Computed from field survey data, 2005.

break the consignment down into quantities sufficient to meet the needs of retail customers from adjoining States (Kogi, Delta and Anambra) and beyond (Imo, Enugu, Kwara, Ekiti, Ondo, Abuja, etc). The price at which retailers buy and sell seed yam differs markedly between and within the regions, depending upon the source of supply, period of sale and demand.

Factors affecting efficient delivery of seed yams

Generally, traders want to buy seed yams of the desired size (500-1200 g) that are free of pests attack, diseases infestation and physical injury, and those that provide an acceptable shelf life. In order to meet the needs of their downstream customers, traders buy sufficient quantities

of seed yams at a competitive price (usually during the peak season – December to February) (Table 1). Retailers in the area purchased in much smaller quantities. As such, ability to secure sufficient quantities of seed yams was relatively of less importance. In the same way, since most retailers purchased from market intermediaries rather than directly from farmers, geographical proximity to their source was not very important. Variety was of great importance to retailers, presumably because most of their customers did differentiate between varieties. While the market preferred large, evenly shaped tubers, the main criteria consumers used in their decision to purchase were desired colour (spot-free tubers), freedom from pest and diseases and freedom from physical injury. Wholesalers indicated that the collector agents were generally better able to meet their perceived needs than farmers. However, wholesalers (67.1%) report that it is more expensive to purchase seed yam from collector agents. Farmers were generally perceived as being able to deliver sufficient quantities of seed yams that were free of pests and diseases, physical injury, of the desired size and to deliver tubers of the desired shelf life. In Ilushi market in particular, collector agents re-graded the seed yams before resale. However, freedom from physical injury remained a problem for the traders. Though, majority of seed yams in the lowland belt of River Niger are harvested when they are mature, the seed yams are poorly transported thereby affecting the skin colour of the yams. As a result, the tubers are more vulnerable to damage, dehydration and decay. The high incidence of physical damage is no doubt related to harvesting and bruises sustained during transportation resulting from poor handling practices and long distances. Wholesalers reported that both pests and disease and physical injury damaged the tubers they received. As a result, the shelf life of the product was generally too short and does not favour market speculation. Most wholesalers (76.3%) reported that the prices that collec-

Table 2. What prevents suppliers from better meeting customers' needs (%).

Factor	Farmer	Traders
Lack of capital for yam cultivation	76.3	
Physical injury to the tubers		65.1
Lack of capital to buy enough seed yams		40.6
Inability to buy good-quality seed yams	43.1	
Lack of knowledge of modern multiplication techniques	39.4	
Do not have the desired variety	14.8	58.8
Proximity to market	45.5	
Disease infestation and pest attack		24.0

Table 3. Why suppliers fail to meet downstream customers' needs (%) (F = farmer, CA = collector agent, T = trader, W = wholesaler, R = retailer, DS = downstream customers).

Factor	F>DS	CA> W+R	T >DS	W > R
High purchase price	24.3	37.1	8.6	40.0
Poor grading	16.0		8.0	14.2
Inappropriate varieties		26.3	40.4	13.6
Narrow range of seed yams			62.1	13.4
Poor quality (Not free of disease and spots)	31.7	23.9	24.0	10.1
Not free of physical injury		19.0	8.2	9.0
Cannot meet immediate needs				9.0
Poor storage capability	6.6			6.3
Cannot deliver required quantity		8.1	24.0	
Excessive distance to market	56.1	8.4	45.4	

Source: Computed from field survey data, 2005

tor agents expected for the seed yams they sold were too expensive (Table 1).

On the other hand, majority of retailers (65.7%) reported that suppliers either met or exceeded their expectations. As shown in Table 3, traders (wholesalers and retailers) have higher preference for seed yams that are fresh at maturity, free from peat and diseases, of desired size and free from spots (yam mottle disease) than those that they can sell at different markets. In the study area, traders are satisfied with freshness of tubers, prices, variety, storability and proximity of market to farmers homestead. However, they have problems of insufficient quantity and physical injury of tubers from farmers. These problems could be due to the activities of collector agents, who prevent direct sale by farmers to retailers and poor transportation of tubers. On the other hand, traders are satisfied with collector agents' ability to supply preferred sizes of seed yam in sufficient quantity. In spite of these, the traders are not comfortable with the prices at which collector agents sell to them and seed yams that are free from physical injury and pest and diseases, proximity to market and level of grading. These factors usually generate quarrels and disaffections amongst the actors and sometimes lead to breakdown in bargain and marketing. Generally, the inability of farmers and collector agents to supply high quality seed yam (those that are free from physical injury and of desired colour) is significant. Specifically, poor delivery of tubers when needed, diseased

seed yams of undesired size and colour are significant problems traders have with seed yam farmers.

The high price of seed yams was recognized as a major constraint by two out of the three market intermediaries (Table 1). While wholesalers indicated that it was too expensive to purchase seed yam from both seed yam farmers (due largely to high transportation cost informed by lack of road to the camp settlements) and collector agents, retailers showed that it was too expensive to purchase seed yams from wholesalers. For wholesalers, it was too expensive to buy seed yams from collector agents. This suggests that wholesalers were able to extract the margin they desired irrespective of the purchase price and pass these higher costs onto the metro-politan retailers who had no alternative source of supply.

Constraints of upstream suppliers to meet downstream customers' needs

Generally, farmers believed that the major factors contributing to their inability to meet customers' perceived needs were insufficient capital for seed yam production (76.3%), inability to buy good quality or disease-free seed yams (43.1%) and lack of knowledge of modern seed multiplication techniques (39.4%). Insufficient capital prevents farmers from buying disease-free seed yams and lack of knowledge (39.4%). As shown in Table 2, paucity of the desired variety and capital to buy enough

Table 4. Mean ratings of relationship variables for downstream relationships between market intermediaries (1 = 'I disagree a lot', 6 = 'I agree a lot'; F = farmer, T = trader, W = wholesaler, R = retailer).

Factor	F > T	T > W	W > R
Satisfaction			
Trading with preferred partner is less risky	4.82	4.83	3.27
Good cooperation with preferred trading partner	2.04	4.72	2.13
Expect to continue to trade with partner	4.00	3.11	3.42
Trading partner meets expectations	2.30	3.11	2.60
Treats me fairly and equitably	2.49	4.15	3.89
Adequately rewarded	2.04	4.20	3.42
Quick to handle complaints	1.22	2.41	2.03
Much conflict with preferred trading partner	1.09	3.01	1.74
Trust			
Confidence in preferred trading partner	3.71	4.03	3.38
Always keeps promises	4.40	3.97	3.00
Always honest	1.31	4.71	3.14
Good reputation	2.16	4.28	1.30
Trust preferred trading partner	1.33	3.62	3.93
Believe information provided	4.01	3.24	2.35
Close personal friendship	3.75	3.59	2.40
Trading partner always considers best interests	2.18	2.01	2.64
Power-dependence			
Free to choose another trading partner at any time	1.11	3.69	1.51
Has best offer relative to alternatives	2.09	3.47	3.60
Must adhere to partner's demands	1.36	1.05	2.67
Trading partner has all the power	5.20	1.27	2.39
Trading partner controls all the information	4.04	1.68	2.01
Trading partner often acts opportunistically	5.47	1.90	2.88
More dependent on trading partner	4.20	1.27	

Source: Computed from field survey data, 2005

seed yams were important factors hindering traders from meeting the needs of their downstream customers.

Specifically, the major problems that prevent traders (wholesalers and retailers) from meeting the needs of downstream customers were the narrow range (little variation in sizes) of seed yams delivered (62.1%), inappropriate varieties (to meet the customers' intended use) and excessive distance to market (45.4%). Other factors include tuber infestation with diseases and absence of good storage system (24.0% each). Farmers considered excessive distance to the market, low buying prices offered by market intermediaries and high incidence of diseases and pests as constraints to meeting the needs of the downstream customers. Collector agents found high purchase price, absence of appropriate variety and diseased seed yams as factors responsible for their inability to deliver sufficient seed yams to wholesalers to meet the needs of their customers. This could be due to excessive distance and poor transportation of seed yams (Table 3).

Traders felt that it was more expensive to purchase seed yams directly from collector agents. This is because the farmers sell at a relatively higher price and have full

control over their produce (either to sell or grade or not). However, when dealing with collector agents, traders experienced more problems with inappropriate varieties, physical injury and tubers being infected with disease. The reason could be that when a trader purchases directly from farmers, he has an opportunity to select the tubers he wants to buy and rejects others. On the other hand, when traders purchase from a collector agent, the trader must purchase the entire quantity. A comparison of the various impediments that traders experienced with purchasing seed yams from farmers and collector agents are presented in Tables 3, 4, and 5.

Downstream relationships in the seed yam supply chain

Seed yam farmers in the lowland belt of the river Niger had a negative relationship with their main trading partners. The farmers preferred those that come to buy from their camps directly as they could influence the price of seed yams. The majority of farmers were not very satisfied with their trading partner and most farmers do not trust their main or preferred trading partner. Farmers re-

Table 5. Mean scores on relationship variables for upstream relationships between market intermediaries (1 = 'I disagree a lot', 6 = 'I agree a lot'; F = farmer, T = trader, CA =collector agent, W = wholesaler, R = retailer).

Factor	F > T	T > CA	W > T	T > R
Satisfaction				
Trading with preferred partner is less risky	4.37	3.77	2.69	4.05
Good cooperation with preferred trading partner	4.28	3.86	2.83	4.09
Preferred trading partner meets expectations	4.11	3.62	3.17	4.20
Treats me fairly and equitably	4.11	3.86	2.42	4.13
Adequately rewarded	4.06	3.68	3.24	3.83
Expect to continue to trade with partner	3.62	3.52	3.17	3.85
Quick to handle complaints	3.20	3.24	1.86	3.68
Much conflict with preferred trading partner	1.63	1.54	1.79	1.54
Trust				
Trust preferred trading partner	4.01	3.40	3.04	3.87
Always honest	3.88	3.60	2.76	3.68
Good reputation	3.71	3.18	2.76	3.45
Always keeps promises	3.68	3.56	2.83	3.64
Confidence in preferred trading partner	3.65	3.58	2.90	3.83
Close personal friendship	3.51	3.22	2.90	3.32
Believe information provided	3.08	2.88	2.83	3.71
Power-dependence				
Free to choose another trading partner at any time	3.58		3.04	4.35
Has best offer relative to alternatives	3.04	2.69	3.17	3.99
Trading partner has all the power	2.18	1.68	2.28	2.81
Must adhere to partner's demands	2.08	1.51	1.79	1.75
More dependent on farmers	1.77	1.45	1.86	1.86

Source: Computed from field survey data, 2005.

reported that their main trading partners were not always honest and kept their promises. In addition, their trading partners particularly their main partners always acted opportunistically; as such farmers had little confidence in their trading partner and have no choice than to believe the information they give them. Most farmers maintained that they had do not have close personal friendship with their trading partners (Table 4). It is also apparent that most farmers were able to act independently of their trading partner. Most farmers indicated that they could not readily choose an alternative trading partner. They wished to maintain their relationship with their trading partner because they perceived that there were no alternatives. Furthermore, most farmers indicated that their main trading partners have all the power in the relationship, and also control all the information. Consequently, the trading partner was most times able to coerce the farmer into making decisions that were not in their best interests

The traders' relationship with their most preferred wholesale trading partner was quite positive. Most traders indicated high levels of trust and satisfaction in the exchange of seed yams. However, it was apparent that the traders were more dependent upon their preferred wholesale trading partner, even though they did not necessarily

provide the best offer.

Traders perceived that their wholesale trading partners had more power and controlled more of the information, although they were less willing to provide financial assistance or to share the risks. On the contrary, the majority of wholesalers indicated very low levels of both satisfaction and trust in their relationships with retail customers. Transactions entailed a high degree of risk and there was a greater possibility of being exposed to opportunistic behaviour and conflict in the relationship. There was minimal cooperation between wholesalers and retailers and minimal trust. As a result, most wholesalers indicated that their retail trading partners had a poor reputation. Wholesalers were not only more dependent, but retailers also wielded more market power and controlled more of the information.

Upstream relationships in the seed yam supply chain

On their relationship with farmers and collector agents, the majority of traders also indicated that they experienced high levels of satisfaction and trust with the exchange. This is because the collector agents accumulated seed yams from many small farmers. In addition, traders generally felt that they can rely more upon the

collector agents than they could upon individual farmers. Unexpectedly, traders indicated that they were more dependent on farmers than they were upon their collector agents, largely because farmers generally exercised more power and controlled more information when they could choose the trader to whom they sold their seed yams (Table 5).

Wholesalers reported that their relationship with their downstream trading partners was not entirely satisfactory and that they were equally dissatisfied in their relationship with the traders and collector agents. Wholesalers reported that traders hardly ever treated them reasonably and fairly. In addition, they fail to meet their expectations. Traders were slow to respond to the wholesalers' complaints and there was evidence of only moderate levels of cooperation in the exchange. Wholesalers also reported that despite the opportunity to choose from several alternative suppliers, traders and collector agents had more power and controlled more of the information. Nonetheless, wholesalers indicated that they were neither dependent nor did they have to adhere to the trader's demands. This was achieved because most wholesalers (58.5%) purchased seed yams from more than two traders and collector agents. Because of the potential variation in the quantity and quality of the tubers delivered by traders and collector agents, wholesalers established the least amount of trust in their relationship with their upstream suppliers. Wholesalers believed that traders and collector agents were more dishonest and less likely to keep their promises. Wholesalers also appear to be less willing to believe in the information provided by traders and collector agents and perceived them to engage more frequently in opportunistic trading. These invariably suggest that price was of considerable importance in the transaction. Wholesalers believed that if traders and collector agents could obtain a higher price from an alternative customer, they would be more likely to abandon their relationship. This could lead traders and collector agents to blame their inability to deliver seed yams on the fact that there is inconsistent supply from farmers.

Wholesalers were generally dissatisfied in their relationship with their retail customers, while retailers expressed quite high levels of satisfaction and trust in their relationship with the wholesalers. Indeed, most retailers intended to continue to trade with their wholesale trading partner, even though there were plenty of alternatives. This is because their current wholesale supplier provided the best offer relative to the alternatives. That notwithstanding, retailers expressed several doubt as to whether wholesalers would always act in their best interests.

Conclusions

The supply chain approach provides a useful framework for understanding the key actors in yam agri-business and constraints to seed yam delivery. It provides insight

in the development of strategic interventions to enhance sustainable delivery of clean seed yams to consumers and improve the livelihood of stakeholders through an analysis of the impediments to effective and adequate flow of marketing information, and good business practices that oftentimes breed distrust and erode confidence among the key actors in the supply chain within and outside the lowland belt of the River Niger.

Interventions aimed at enhancing the ability of farmers and collector agents to supply seed yam of high shelf life that are substantially free from physical injury, disease infections, spots, and delivered when required would help farmers and traders in meeting the needs of their downstream customers and expand economic activities in the yam sub-sector. These should be accompanied by building farmers' confidence and trust on their trading partners who always act opportunistically, and eliminate farmers' preference of selling to those that visit their camps directly to buy seed yams. While the availability of desired yam variety is not a critical constraint to seed yam production by farmers in the area, financial institutions should provide sufficient capital to seed yam producers. This will enable them buy disease-free seed yams and improve their production activities. Additionally, research institutes and other training agencies should train seed yam producers on modern seed multiplication techniques.

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