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Structural Characteristics and Conduct of Sweet Potato Market in Rachuonyo Region, Kenya: Perception of Sweet Potato Farmers and Traders

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Myriad studies have been conducted on commodity markets in different parts of the world. However, such studies have yielded inconsistent results on various facets of market structure and market conduct, implying that each market may have its distinctive characteristics which impact on its performance. In Sub-Saharan Africa, the growth of sweet potato industry is hindered by lack of information on sweet potato market structural characteristics. Kenya's sweet potato industry is facing a similar challenge. This scenario calls for a baseline survey on the sweet potato market structural characteristics and conduct as a basis for subsequent robust studies on the possible nexus between the market structure, conduct and performance of the industry. The study adopted a descriptive survey design based on interpretivism research paradigm. A sample size of 384 farmers, 166 retailers and 55 wholesalers were taken. Pretested questionnaires were used to gather perception of the respondents on various parameters based on a five-point Likert scale. The views were then summarized in terms of means scores. It was established that the sweet potato market was imperfect since there were notable elements of potato differentiation and barriers to entry into the market. Such barriers included competition from other traders and uncertainties in the demand for sweet potato. The situation was exacerbated by lack of suitable storage facilities given the perishable nature of the commodity. High market concentration was noted at the wholesale level, a likely indicator of price collusion and exploitation by the few large sellers that dominated the market. In this regard, there is need to enhance value addition activities that can enable the market players especially the farmers to be more competitive within the supply chain. Efforts should also be made to eliminate the identified market barriers.

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INTRODUCTION

The concept of market structure refers to the set of variables that are relatively stable over time and affect the behaviour of sellers and or buyers (Cassey, 2007). Such variables from the theory of industrial organization include; barriers to entry into a market, product differentiation, market concentration and vertical integration (Cassey, 2007). Market conduct on the other hand refers to the way in which sellers behave both amongst themselves and amongst each other and it shows how competitive a market is. Its dimensions include research and development, pricing collusion or competition among firms, advertising or awareness creation and inter-firm-coordination. Performance is the outcome of the market structure and market conduct (Ngigi, 2008).

A number of studies have been conducted on commodity markets in different parts of the world with the view to providing reliable data for policy formulation. For instance, Ngigi (2008) investigated factors affecting performance of commodity markets in Southern Sudan and established that transportation costs, marketing risks due to civil insecurity, conditions of transportation and communication infrastructure, availability of storage and traders' level of access to the commodity were the main factors affecting performance of the commodity markets.

In the United States of America, Haizheng and McCarthy (2004): revealed a significant positive relationship between market concentration and price cost margins by examining changes over a period of five years. Ivana B and Dvouletý O. (2017) also concurs with their finding. However, Hall (2018) reported that low market share firms can also be very profitable.

A study by Braakmann and Wagner (2009) on profitability and product differentiation in German Manufacturing Firms, showed an inverse relationship between the degree of product diversification and profitability. However, an investigation into the interactive effect of product differentiation and cost variability on profit, revealed a positive association between profitability and product differentiation (Hun-chang & Joseph, 1996). A focus on the relationship between performance and entry barriers showed that market performance depends in an essential way on the importance of potential entry (Baumol and Lee, 1991). However, potential entry is an unobservable variable and this is likely to raise difficulties in econometric analysis.

Studies on awareness creation have also given mixed results on the relationship between awareness creation and profitability. For instance, Kundu *et al.* (2008) who used regression analysis to assess the relationship between advertising,

profitability, and business strategy in India, revealed a significant positive relationship between advertisement spending and profitability. However, Jiang and Srinivasan (2012), examined pricing and persuasive advertising in a differentiated market and showed that when firms make endogenous advertising decisions in addition to pricing, a seemingly favourable exogenous shock to one firm alone may lead to a lower equilibrium profit for that firm and a higher profit for its competitor. The outlined inconsistent results on the various aspects of market structure and conduct on performance suggest that each market may have its distinctive characteristics which are likely to impact on its performance. Information on market characteristics and their link with performance indicators is generally important for policy formulation and implementation in an industry.

Normally consumers face problems while trying to explain why they are more attracted to certain type of goods than others. Emotions towards goods or services are typical to consumers and the prices of a good as well as its practical benefits are not the sole determinants for selection of goods (Banytè *et al.*, 2007). In the views of Solomon *et al.* (2002), attitude is a long lasting and common assessment of people, including oneself, objects, advertisement, and a particular problem. According to the classical condition theory, people tend to form positive attitude towards rewarding products and negative attitude towards other products. These arguments, therefore, suggest that consumer attitude may affect market performance for a product in one way or the other. Carvalho (2008) revealed lack of statistical evidence that could support assuring that there was a positive relationship between a positive attitude towards a service or a product and a higher purchasing behaviour. However, he reported low consumer involvement in the purchase of a given company's product, since the consumers could first form their beliefs toward the company before deciding to purchase or not to purchase from the company. In this study however, sweet potato is a staple food crop which to a considerable extent,

constitute the diet of many people. The extent of buyer involvement is therefore likely to be high.

Nalley *et al.* (2005), who assessed the influence of taste on market demand for sweet potatoes in the USA, revealed significant influence of consumer taste on the demand for sweet potatoes. However, they asserted that when experience attribute of taste was introduced in their analysis, the respondents revealed significant preference ordering. Empirical analysis of persuasive awareness/ advertising in competitive markets was identified by Jiang and Srinivasan (2012) as a tool that significantly influences consumer behaviour in differentiated markets. This finding conforms to the economic theory of consumer behaviour which postulates that changes in the consumer behaviour due to shift factors (market factors other than the good's own price) are bound to alter the goods demand. Another factor that needs focus is diversity, which is considered as the staff of economic life (Rosen, 2002). Additionally, there are many approaches to relate diversity to the variety of choices that confront consumers. Joy, Oluwole and Ibidunni (2013), asserted that product differentiation is one of the important tools of dealing with diversity or variety. Differentiated products compete for consumers' attention and purchasing power. Therefore, information on product differentiation is necessary product market analysis.

In Sub-Saharan Africa for instance, CIP (2009) alludes that the growth of sweet potato industry is hindered by lack of substantial information on sweet potato market structural characteristics. Kenya is one of the Sub-Saharan African countries whose sweet potato industry is facing a similar challenge. A case in point is the challenge in implementation of food and agricultural policies in the sweet potato subsector. For instance, efforts are made through the Kenya's ministry of Agriculture to produce high yielding varieties of sweet potatoes. However, despite realization of more outputs as observed by Andea (2012), poverty situation is still high among farmers in the major sweet potato producing regions

(GoK, 2003, 2010). This scenario therefore, calls for a baseline survey on the existing sweet potato market structural characteristics and conduct of the market as a basis for subsequent robust studies on the possible nexus between the market structure, conduct and performance of the sweet potato industry.

Information on market characteristics and their relationship with performance is generally important for policy formulation and implementation at the firm and at the industry level. In sub-Saharan Africa for instance, CIP (2009) alludes that the growth of sweet potato industry is constrained by insufficient information on sweet potato market structural characteristics. Kenya is one of the Sub-Saharan African countries whose sweet potato industry is facing a similar problem. A case in point is the challenge of implementing food and agricultural policies in the sweet potato subsector due to insufficient information on the market structural characteristics of the sweet potato industry. For instance, efforts are made by the government of Kenya to produce high yielding varieties of sweet potatoes that could help in improving incomes and living conditions of the producers. However, even with the rise in sweet potato outputs as noted by Andea (2012), poverty situation is still high among farmers in the major sweet potato producing regions (GoK, 2003, 2010). This scenario calls for an investigation into the existing sweet potato market structural characteristics and behaviour of the sweet potato market players.

RESEARCH METHODOLOGY

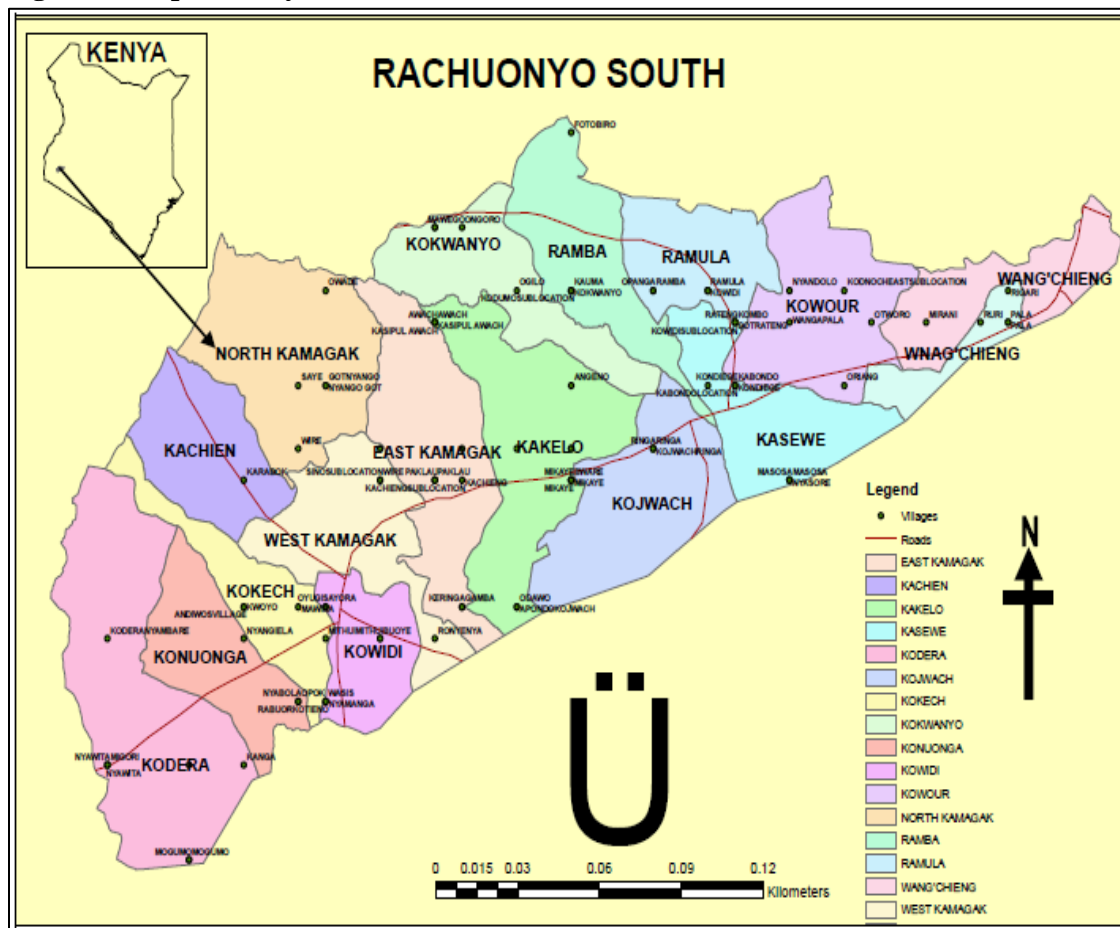
Research Design

This was a descriptive survey based on interpretivism research paradigm which avers that reality is subjective and emphasizes on understanding phenomena from the perspective of individuals. It helped in obtaining the traders' subjective views on the existing sweet potato market characteristics and conduct (behaviour of the market players) of the market.

Study Area

Kenya's Economy is basically dependent on agricultural production. This study focused on Rachuonyo south district where sweet potato production, processing and marketing were common. Rachuonyo south district is in the Southern Nyanza region of Kenya. It was carved out of the former Rachuonyo district which lies between longitudes 34°25 and 35°0 East and latitudes 0°15 and 0°45 south. Sweet potato related activities in Rachuonyo south district were concentrated in Kabondo division, which covered about 141.5 km² (GoK, 2008). The division had five locations in which sweet potato activities were evenly distributed. The divisions included: Wang'chieng', Kawuor, Kasewe, Kodumo and Kodhoch. Sweet potatoes produced in the region are sold locally in the district and to other market outlets such as Ahero town, Nakuru town and Nairobi City. *Figure 1* below is the map of the study area.

Figure 1: Map of Study Area



Source: Rachuonyo South District Bureau of Statistics

Sampling Procedures

The sampling frame was a list of 166 farmers from Kabondo division, registered by the department of social services in Rachuonyo south district as commercial sweet potato growers; 55 wholesalers and an infinite number of retailers.

From the sampling frame, the most conservative sample size for the sweet potato farmers was determined at 95% confidence level using Kothari's (2010) formula given as:

$$n = \frac{Z^2 pqN}{e^2(N-1) + Z^2 pq} \quad (1)$$

Where n = sample size, z = standard variate at a given confidence level, p = sample proportion of successes, q = 1-p, N = Size of population, e = acceptable error (precision)

Hence, the most conservative number of farmers to be interviewed was:

$$n = \frac{1.96^2 * 0.5 * 0.5 * 166}{0.05^2 (166 - 1) + 1.96^2 * 0.5 * 0.5} = 116.1238 = 116$$

For the infinite population of retailers, the following Fischer formula cited in Mugenda and Mugenda (2003) was used:

$$n = \frac{Z^2 pq}{e^2} \quad (1)$$

Where; n = desired sample size, z = standard normal deviation at 95% confidence level, p = proportion in target population with characteristics being used, q = 1-p, implying proportion in target population without characteristics being used, e = acceptable error (precision)

The value of "p" recommended by Fisher is 50%.

Since the population was infinite although approximately more than ten thousand (10,000), the recommended sample size of the retailers was thus:

$$n = \frac{1.96^2 * 0.5 * 0.5}{0.05^2}$$

Fifty (50) out of the 55 wholesalers were involved in the actual data collection exercise because five (5) of them participated in the questionnaires

pretesting. Individual farmers were selected using simple random sampling technique. This technique, gives each element of the target population an equal chance of being selected (Babbie, 1989). Because of the infinite population of the retailers, a purposive sample of 384 retailers was obtained. *Table 1* below shows the population and estimated sample size of each category of respondents.

Table 1: Population and sample size

Sampling Units	Population size	Sample Size
Commercial Sweet potato Farmers	166	116
Sweet potato Wholesalers	55	50
Retailers	Infinite	384
Total		550

Source: Computed from ROSPOGO (2012)

Response Rate

The study’s primary data were collected by trained research assistants in the months of February and March 2013. This was done with the help of questionnaires that had both closed and open-ended questions. *Table 2* shows the proportion of individuals who responded to the questions. It can

be noted that the response rate ranges between 71.09% to 94.0% with a mean response rate of 84.05%. The mean response rate was considered appropriate, as it conforms to the views of Jonson and Owens (2003) who asserted that in most instances, a response rate of 20% is too low while 80% is a de facto standard.

Table 2: Response rate

Category of Respondents	Sample	Respondents in various selling points					Response rate (%)
		Rachuonyo South district	Ahero town	Nakuru town	Nairobi city	Total	
Farmers	116	101	-	-	-	101	87.07
Retailers	384	-	67	92	114	273	71.09
Wholesalers	50	-	9	13	25	47	94.00%
Total	550	101	76	105	139	421	
Mean							84.05%

Source: Survey data (2013)

Data Sources and Data Collection Methods

Both primary and secondary data were collected on aspects of sweet potato market in the area. Primary data were collected using closed and open-ended questionnaires as well as interview schedules. Some aspects of sweet potato market that could not be directly quantified were captured on a five-point Likert scale. The Likert scale measures attitudes or opinions by asking people to respond to a series of statements about a topic, in terms of the extent to

which they agree with them, and so tapping into the cognitive and affective components of attitude (McLeod, 2008). Direct observation helped in cross-checking the respondent answers while photographs were taken to capture salient features relevant to the study. To avoid misinterpretation of the questions by respondents, the researcher administered the questionnaires with the help of a team of locally trained research assistants who also served as interpreters. Secondary information was obtained from: farmers, retailers, and wholesalers’

records, annual district agricultural reports, statistical abstracts, periodicals, journals, economic reviews, market reports from the municipal councils, textbooks, published and unpublished theses.

Data Analysis Techniques

Given the type and nature of data used, mean responses were obtained in respect to the respondents' observations on specific items under market structure and market conduct which were the main constructs used. The responses were captured on a five-point Likert scale that is generally accepted as means through which individual perceptions can be measured.

RESULTS AND DISCUSSIONS

Sweet Potato Market Structural Characteristics

Market structure influences the conduct of firms and the conduct affects various dimensions of market performance. The main features of sweet potato market structure captured in this study include; barriers to entry into the sweet potato industry, sweet potato differentiation and market concentration

Table 3 shows that based on the mean responses attributed to statements focusing on various aspects of barriers to entry into the sweet potato market, it appears that competition from other traders and uncertainties in the demand for sweet potato were the major barriers to entry into the sweet potato market at the retail level given the mean scores of 3.9451 and 4.1355 respectively. It is also notable that neither licenses nor legal obstacles deter entry into sweet potato business at the farmer's level. However, in overall, the three categories of market players agreed to a moderate extent that there were barriers to entry into the sweet potato market. This conforms to a study by Nabay, Koroma, Johnson and Kassoh (2020) who also noted the existence barriers to entry into the sweet potato market in Sierra Leone. They however, observed that inadequate initial capital and high transportation costs were the major factors militating against sweet potato marketing in the study area. In Rachuonyo region, transportation was not a major issue among the farmers as they resorted to locally available means of transport (*Plate 3*). Market barriers may also influence performance in terms of profitability (Odondo, Mohamed, Momanyi, and Bosire, 2014)

Table 3: Response on barriers to entry into the sweet potato market

Statement	Mean scores		
	Farmers	Retailers	Wholesalers
Large capital requirement deters entry into the sweet potato farm/retail/wholesale Business activities.	2.91	3.00	3.2766
Competition from others deters entry into the sweet potato business.	3.1	3.9451	3.1915
Scarcity of labour deters entry into the sweet potato farming.	3.1	2.54	2.915
Need for license deters entry into sweet potato Business.	-	2.9853	3.2766
Legal obstacles deter entry into sweet potato business.	-	1.77	2.3191
Uncertainties in the demand for sweet potato deter entry into sweet potato business.	3.12	4.1355	3.3191
Insufficient supply of sweet potato deters entry into the sweet potato business.	-	3.01	3.3191
Mean score	3.0575	3.05513	3.08814

Source: Survey data (2013)

From the theory of market structures, product differentiation is an element of market structure which refers to absence of homogeneity in the

characteristics of products sold in the market (Sexton, 1995; Koutsoyiannis, 1993). It is one of the distinguishing features of various forms of market

structures as opined by neoclassical economists. The welfare-enhancing benefit of product differentiation is the greater variety of products available to consumers (Holcombe, 2009). *Table 4* show that all the three categories of market players were in agreement that sweet potato is largely differentiated on the basis of colour, preference by buyers, size, and consumer taste. Farmers were however indifferent on the duration of maturity of sweet potato as a basis for differentiation. The overall mean scores for farmers (4.0633), retailers (3.97878) and wholesalers (4.0383) generally show

their agreement to the fact that sweet potato differentiation exists. This is in tandem with Hanna et al. (2020) who noted that variations in the flesh colour of the diverse sweet potato varieties exists and are attributed to the different phytochemicals and natural pigments they produce. Koehler and Kays (1991): observed that sweet potato preference ranking for flavour was closely related to sweetness, and for appearance to orange colour. This emphasizes the significant role that sweet potato differentiation plays in the market (Mohamed, Odondo & Momanyi, 2013).

Table 4: Response on sweet potato differentiation

Statement	Mean scores		
	Farmers	Retailers	Wholesalers
The produce is largely differentiated on the basis of colour.	4.4554	4.2967	4.2340
The produce is largely differentiated on the basis of duration of maturity.	3.0099	3.5092	3.7234
The produce is largely differentiated on the basis of preference by buyers.	4.2178	3.7253	4.1064
The produce is largely differentiated on the basis of size.	4.4752	4.4103	4.2553
The produce is largely differentiated on the basis of taste.	4.1584	3.9524	3.8723
Mean score	4.0633	3.97878	4.0383

Source: Survey data (2013)

Market concentration refers to the number and size distribution of sellers in a market. *Table 5* shows farmers', retailers', and wholesalers' perception on sweet potato market concentration. The respondents' views were sought on various aspects of market concentration and their views summarized. From the results, it is overt that there were a few large sellers who dominated the sweet

potato market at the wholesale level followed by the retail and finally the farm level. This suggests that the wholesale market is highly concentrated, a likely indication of the ability to wangle the sweet potato market prices along the supply chain to their advantage (*Ejechi, Anyaegbunam, Okoye & Eleodinmuo, 2014*). This is in line with Odondo, Mukras, Momanyi & Bosire (2014).

Table 5: Response on sweet potato market concentration

Statement	Mean Scores		
	Farmers	Retailers	Wholesalers
There are numerous sweet potato farmers/Retailers/wholesalers in the region.	3.9375	3.9344	3.1489
Each farmer/retailer/wholesaler always supply a small portion of the market with sweet potatoes.	3.8750	3.8226	3.6170
There are a few large farmers/retailers/wholesalers dominating the market.	3.2268	3.3459	3.5957
Many sweet potato farmers/retailer/wholesalers have formed Organizations/Societies.	3.3960	3.4373	3.4894
Mean score	3.6088	3.6351	3.4628

Source: Survey data (2013)

Sweet Potato Market Conduct

Market conduct refers to a firm's pattern of behaviour in executing its pricing and promotion strategies, and its response to the realities of the market (Cassey, 2007). In this study, several questions focusing on the possible behaviour of a firm were asked and responses obtained from the farmers, retailers, and wholesalers. *Table 6* shows that to a considerable extent, there is an element of price collusion among the wholesalers and that collectively set sweet potato wholesale prices are higher than individually set prices. These results are consistent with Nkamigbo and Isibor (2021) who revealed that majority of wholesalers and retailers used common pricing techniques of fixing prices

after considering their operation costs. In Nigeria, high market concentration was established at the retail level, a likely indicator that the retailers had more market power, hence the ability to wangle market prices to their advantage (Ejechi *et al* (2014). Similar findings were documented by Nkamigbo and Isibor (2021) in their study on market structure, conduct and volume of trade among the channels of sweet potato marketing in Anambra State of Nigeria. It can also be seen that sweet potato farmers are trained on efficient sweet potato production techniques and high yielding varieties, a situation that is likely to enhance sweet potato profitability not only among the sweet potato farmers but also other players within the marketing system.

Table 6: Response on sweet potato market conduct

Statement	Mean scores		
	Farmers	Retailers	Wholesalers
Generally sweet potato farmers/wholesalers/ retailers set market prices through their groups.	3.2871	2.8278	2.9149
Generally sweet potato farming groups/retail group/ wholesale group set their prices jointly.	3.2277	2.6886	3.8936
Generally sweet potato farmers/wholesalers/retailers set their prices individually.	3.3465	2.8608	3.0000
Collectively set sweet potato prices are higher than individually set prices.	3.4356	2.8535	4.3830
The farmers'/retailers'/wholesalers' societies/organizations train their members on efficient sweet potato production techniques & high yielding varieties.	3.0594	-	-
That individual farmers/retailers/wholesalers conduct research on how to improve on the quality of their individual produce.	2.4356	2.4615	2.4894
Each farmer/retailer/wholesaler struggles to create awareness on the existence, type and quality of sweet potatoes produced.	3.4554	3.3333	3.6596
Mean score	3.1782	2.8376	3.3901

Source: Survey data (2013)

CONCLUSION AND RECOMMENDATION

From the results and foregoing discussion, it is clear that sweet potato market in Rachuonyo region is imperfect as there are some perceptible barriers to entry into the market. Such barriers include competition from other traders and uncertainties in the demand for sweet potato. Being a perishable commodity, if the demand is not assured then post-

harvest loses ascribed to lack of suitable storage facilities may arise. It is also clear that efforts are being made to train farmers and introduce new sweet potato varieties that may endure the marketing dynamics and fetch good returns to the market players *ceterisparibus*. It can also be concluded that there is high market concentration at the wholesale level. High market concentration is a likely indicator of price collusion and exploitation

by the few large sellers that have the ability to control a larger percentage of the market share. In this respect, there is need to introduce and enhance value addition activities that can enable the market players especially the sweet potato farmers who are the majority to fetch good market prices that can increase their market margins. Based on the survey findings, subsequent researchers may collect and

analyse time series information with regards to the sweet potato market structural characteristics and market conduct, and determine their long run effects on performance of the sweet potato subsector.

Some of the economic activities carried out by the market players in Rachuonyo region are presented in the Plates: 1, 2, 3, 4 and 5 below:

Plate 1: Sweet potato washing



Plate 2: Sweet packaging



Plate 3: Sweet potato transportation from the farm using donkeys



Plate 4: Traders Loading sweet potatoes into a truck



Plate 5: Sweet potato retailers displaying their produce



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