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## Application of the Commodity Approach to Pigeonpea Value-Chain Analysis in Kenya

**Kennedy Otieno Pambo**

**[kennedypambo@gmail.com](mailto:kennedypambo@gmail.com)**

**University of Nairobi**

**P.O Box 29053-00625**

**Nairobi, Kenya.**

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## **ABSTRACT**

Pulses are the second most important source of human dietary protein and the third most important source of calories for over 100 million people in rural and poor urban communities in Africa. Its protein is cheaper than the animal-based protein, making it highly competitive and important in dietary regimes of poor people in Africa. For example in Kenya, pulses accounts for approximately 11% of the total daily-calorie requirements, only ranking second to cereals that provide about 45% of the daily calorie requirement. Among the pulses, pigeon pea ranks second to beans, which is among the most important staple crops in the country, with critical relevance to national food security equation. Pigeonpea is one of the most popular sources of protein for many Kenyans living in drier regions (eastern, parts of Rift Valley and coastal regions), mainly the poor who cannot afford to buy animal protein. However pigeonpea and other pulses including chickpeas and cowpeas, are considered insignificant in the country to the extent that they are sometimes excluded from the Ministry of Agriculture reports. But faced with climate change that threatens food security in Kenya, pigeonpea has gained significance due to its ability to withstand drier climatic conditions. In this regard, the paper applied the commodity approach to agricultural marketing to describe the stages in pigeon pea marketing system in Kenya. The functions relevant to this paper are value addition taking place once the commodity leaves the farms and follows through processing and marketing. The data used in the study was collected through focused group discussions with major stakeholders in the capital city of Nairobi. Results show that in Kenya, pigeonpea has three main uses for human consumption, namely; dry grain, dhal (split dry grain), vegetables and some parts for animal feeds and wood fuel. Of the total country's annual pigeon pea production which averaged around 130,000 MT between 2008 and 2012, about 60% was utilized as dry pigeon pea grain, and the rest in the form of vegetable peas. About 60% of pigeon pea growers in Kenya take their produce to pigeon pea markets, selling about two-thirds of their total production. The crop is marketed either as dry grain, processed (split) dry grain (dhal) or green (vegetable) pigeonpea. Farmers perform minimal farm gate processing to their produce since the market offers no premiums for it. Therefore, improving the market structure to reward value addition through simple processing would be important in employment creation as well as improving farm gate margins.

**Key words:** Pigeonpea, value chain, commodity approach, marketing

## INTRODUCTION

Pigeon pea (*Cajanus cajan*), a grain legume, is an annual crop widely cultivated in the semi-arid tropics. In 2007 the total world production was 3.3 million tons (MT) with India being largest producer, accounting for approximately 70% of the world production. Kenya is currently ranked fourth in terms of production after India, Myanmar and Malawi (Shiferaw et al., 2008).

Ninety percent of the total pigeon pea production in Kenya comes from eastern region. Of this, nearly 80 % of the production is concentrated mainly in three eastern districts of Machakos, Kitui and Makueni (District Annual Agricultural Reports, 2005). The grain legume is utilized as dry grains as well as green vegetable. While more than 70% of dry grain produced is traded for cash, the bulk of green peas from local landraces are consumed by the households as vegetable. Most of the cultivars grown by farm households are local, long-duration cultivars, native to the region, intercropped with maize, sorghum or millet. The post-harvest products of pigeon pea are used as fodder, firewood and as a thatching/fencing material. The pigeon plant, being a leguminous crop, also fixes soil nitrogen and replenishes the soil fertility across time.

In Kenya, pigeon pea is mainly cultivated by smallholder farmers in the arid and semi-arid lands, primarily as a source of food and cash, as already indicated. The country's total national annual production over the last five years has oscillated between 80,000 and 111,000 MT, from an annual average of 184,500 hectares. Yields per hectare have oscillated between 0.4 and 0.6 MT per hectare over the same period. Total national production in 2008 was approximately 84,200 MT-valued at nearly USD 38 million. While bearing in mind limitations in terms of accuracy of the country's agricultural data in general, official data from the Ministry of Agriculture (MOA) for the period 2004-2008 indicates that the country has been consuming an average of 106,280 MT per year (MOA Economic Review of Agriculture; 2009).

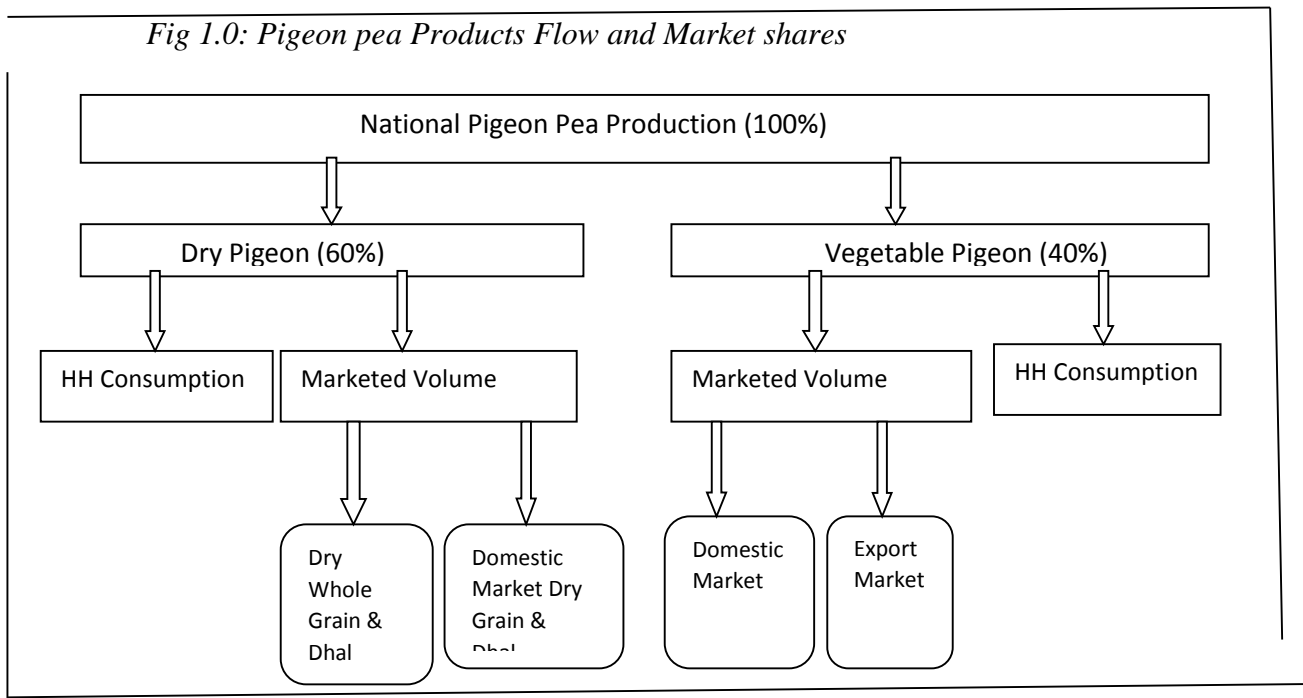
This paper applies the commodity approach to agricultural marketing to describe the stages in pigeon pea marketing system in Kenya. The functions relevant to this paper are value addition/processing and marketing. The following sections therefore, briefly describe these functions, key actors and overlays.

## Marketing

The basic marketing channel for commodities in Kenya is very similar to that found in most developing countries in Africa and other developing areas. It is a highly fragmented marketing channel based on individual family enterprises. In Kenya, pigeon pea has three main uses for human consumption, namely; dry grain, dhal (split dry grain) and vegetable pigeon pea. Other minor uses include animal feeding and wood fuel. Of the total country's annual pigeon pea production which averaged around 98,000 MT between 2004 and 2008, about 60% was utilized as dry pigeon pea grain, and the balance (40%) in the form of vegetable peas. About 60% of pigeon pea growers in Kenya take their produce to pigeon pea markets, selling about two-thirds of their total production. The crop is marketed either as dry grain, processed (split) dry grain (dhal) or green (vegetable) pigeon pea. Most market participating farmers sell at the farm-gate (Shiferaw et al. 2008).

However, only less than 10% of the total fresh peas harvested are marketed primarily for two reasons. Firstly, most farmers prefer to consume as fresh peas because it is sweeter and cheaper than the alternatives (especially beans). Secondly, the fact that maturity/harvesting of vegetable pigeon pea very often coincides with hunger periods characterized by acute shortage of household food staples (USAID-KENYA, 2010). Figure 1.0 below depicts the flow of both dry grain and vegetable pigeon pea.

*Fig 1.0: Pigeon pea Products Flow and Market shares*



*Source: USAID-KENYA (2010)*

The main players in marketing include farmers, rural assemblers/brokers, rural wholesalers, urban wholesalers/exporters/processors, open-air market retailers, rural and urban retailers, rural and urban shopkeepers, and supermarkets, rural and urban consumers. The bulk of trade is limited to one season with very minimal inter-seasonal trade, which is attributed to the high costs of storage because the grains are susceptible to storage pests such as bruchids. Consequently, a significant portion of pigeon pea is offered for sale immediately after harvest (Freeman et al. 1999).

### **Dry Pigeon pea Grain marketing**

About 62% of total annual production of pigeon pea grains is marketed, with the balance 38% being retained for household consumption. Consolidation of produce is undertaken by several types of assemblers; farm gate agents/brokers who are either farmers who have accumulated some little business capital or resident small-scale traders; or private agents/traders who are often non-residents. Resident farm gate assemblers visit farms often at harvest time and buy pigeon pea often in cash although they may get it on credit whenever adequate trust has been built between the buyer and the seller. These assemblers, who are often handle relatively smaller volumes (1-3 bags), may include some local farmers who have accumulated a little capital. Once they buy, they transport the produce using buses or matatus (local public means of transport) to local collection points to sell to rural merchants.

The physical marketing system begins with the collection and assembling of pigeon pea at points located in the rural areas close to the producers (farmers) by the private agents who include private individuals operating in the system as petty assemblers, traders, large-scale merchants, brokers and retailers of pigeon pea. Some of the agents in the system operate in rural areas and penetrate the remotest areas of the rural areas to purchase the product at farm gates. However, the local assembling and collection points usually have pigeon peas brought to them directly by the farmer-producers themselves. Thus in the case of dry pigeon pea grain, the assembly and storage functions are typically combined at this marketing stage (Imaita 2009).

As reported by Shiferaw et al., (2008), the pigeon pea grain farmer has about six marketing options, which are:

- Rural open-air retail markets channel-whereby the farmer disposes his produce through five separate outlets. These include rural assemblers who comprise the most important outlet in terms of volume; rural retail shopkeepers; others such as rural wholesaler, rural open air retailers and local household consumers including neighbouring farm-households.
- Rural retail shops-whereby rural retail shopkeepers receive produce from three sources including farmers which is the most important source; rural assemblers and rural wholesalers. They then sell to rural consumers and the process more or less ends there.
- Urban open-air retail markets-whereby urban open air retailers receive produce primarily from urban wholesalers, and primarily sell to urban consumers.
- Urban retail shops-whereby urban retail shopkeepers commonly receive produce from urban wholesalers and dispose the produce through sale to urban consumers (mainly households). Urban wholesalers deal in pigeon pea and a wide range of other grains. They own or rent warehouses from where they trade, mainly with urban retailers (including supermarkets) and, to some extent, urban processors/exporters. Urban wholesalers often get the grain delivered to their warehouses by sellers and sell in bulk from the same premises without incurring any transport costs. However, they clean the grain to some extent when the buyer demands higher quality and is willing to pay a premium for it. Their most important marketing function is the breaking down of large volumes of grains supplied to them into units affordable by the urban retailers.
- Urban supermarkets-whereby local supermarkets (Nakumatt, Uchumi, Tuskys and Ukwala) receive dry grain from urban wholesalers and urban processors/exporters; and then sell to urban consumers. The channel linking producers to urban supermarkets involves the movement of dry grain pigeon pea from rural areas to major urban markets (especially supermarkets) by urban processors/exporters. Typically, the grain passing through this channel is well cleaned, sorted, and pre-packed (mainly in well-labelled 1-kg

or 2-kg packets) by processors before delivery to the supermarkets. This channel is characterized by relatively large volumes, high consumer prices, high marketing costs, and use of improved technology, specialized marketing services, and higher net margins/profits (Shiferaw et al: 2008).

- Export markets-whereby actors (mainly exporters and processors) receive produce from rural wholesalers (the main source), rural assemblers and to a lesser extent urban wholesalers. They dispose their produce through two main outlets, export markets (the main outlet) and sale to local supermarkets. As mentioned earlier, the main export markets for dry grains are India and Europe with the former absorbing approximately 90% of total national dry grain pigeon pea exports.

Figure 1.1 below represents dry pigeon pea marketing channels.

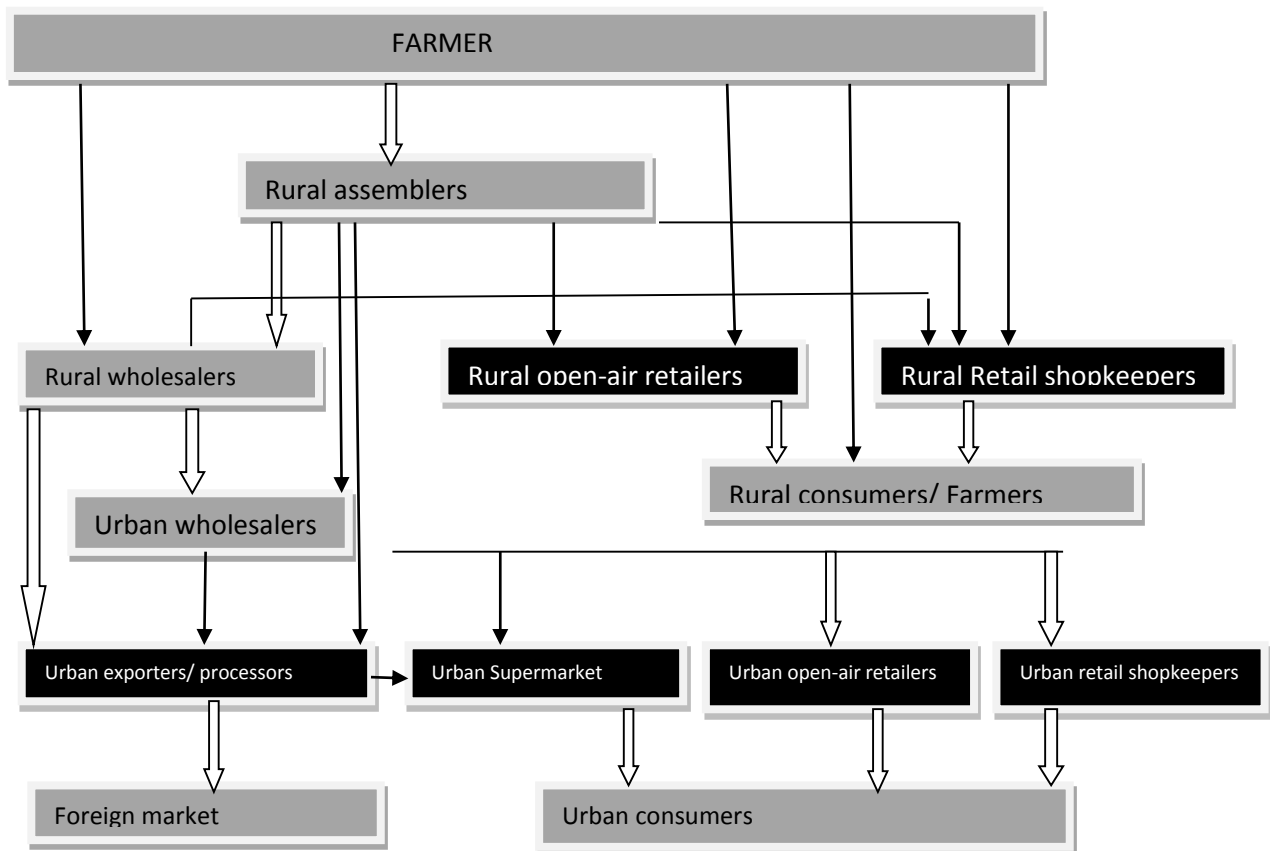


Figure 1.1: Dry pigeon pea marketing channels. Source: ICRISAT (2008).



### **Fresh or Vegetable Pigeon pea marketing**

In rural areas, pigeon pea is sold through rural assemblers, open-air retailers, and wholesalers (see figure 1.2). Farmers typically sell the unshelled fresh peas to rural assemblers who then sell it to rural open-air retailers, rural wholesalers, and, in some cases, to urban wholesalers (MOA, 2009). While these channels link farmers to rural open-air retailers, urban open-air retailers, and exporters, there is no channel directly linking farmers to urban supermarket retailers, probably due to the erratic and seasonal nature of vegetable pigeon pea supply and small volumes, which reduce incentives for supermarkets to directly source from farmers.

Rural wholesalers usually transport fresh peas in pods and sell it to urban wholesalers. Though the rural wholesalers serve as the main source of vegetable Pigeon pea for urban wholesalers, the latter also get some of their supplies from urban exporters. This occurs when exporters have fresh peas that do not meet export quality standards. Hence, most of the vegetable pigeon pea sold by exporters to urban wholesalers constitutes rejects mainly sourced from non-contracted farmers and rural wholesalers. Urban wholesalers mainly sell to urban open-air retailers, though in some cases they also sell to final consumers. The exporters of fresh peas consist mostly of Nairobi-based horticultural companies, who sell fresh peas in pods mainly to Europe (UK, France, and Denmark) (Nagarajan; et al; 2008). Some of the local export companies include SuperVeg Limited; and Makindu Growers and Packers Limited among others.

These exporters offer embedded services such as supply of packaging materials (corrugated 6-kg cartons) to their suppliers (farmers, rural assemblers, and rural wholesalers) and hence receive the crop from farmers in well labelled and traceable cartons. Vegetable pigeon pea sold in the domestic market is either shelled manually before selling to consumers in small volumes or sold in- shell depending on the target retail market. Quality requirements in the domestic vegetable pigeon pea markets are limited to physical attributes only and are less stringent than the export market requirements. As in the exported vegetable peas, quality is assessed through physical inspection in the domestic vegetable pigeon pea market channels (Imaita 2009).

Vegetable pigeon pea is traded both in the local and export markets mainly through three systems as indicated in Figure 1.2 below. These include rural assemblers/brokers, rural wholesalers/local and urban exporter.

- Rural assemblers/brokers: This the most important channel in terms of farmers' outlet. Typically, rural assemblers (also known as brokers) purchase the fresh peas (in pods) from farmers and bulk them before selling them on to the next intermediary. This could be the rural open-air retailer, rural wholesaler, urban wholesaler, or urban exporter.

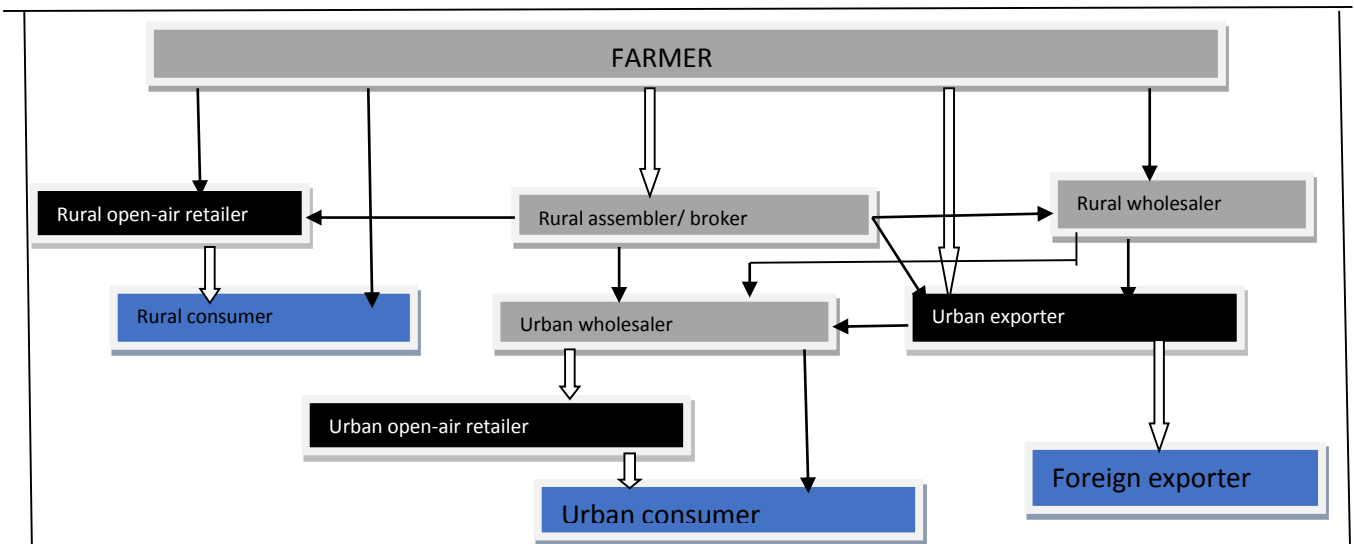


Figure 1.2: Vegetable pigeon pea marketing system: Source: ICRISAT, (2008)

- Urban-exporter: This is the second most important outlet for the farmer. Some urban exporters (especially the horticultural export companies) buy their supplies directly from farmers. Vegetable Pigeon pea for export is subject to stricter physical quality and pesticide residue standards, and is subjected to pesticide residue testing as required by the destination markets. In terms of physical attributes, the pods are required to be straight, of uniform size (usually about 5 cm in size), and spotless. In addition, the peas must be of the right stage of maturity. These physical quality attributes are verified by physical inspection and some export market buyers subject the peas to pesticide residue testing as part of the due diligence requirements of these markets (Mergeai et al., 2001). The authors' further report that the vegetable pigeon pea destined for export is usually collected by the exporters at various designated collection points on particular days of the week depending on flight

logistics. Since the peas are perishable, picking, collection, processing, and export must be carefully synchronized. Production of fresh peas for export is therefore characterized by temporal asset specificity. This means that farmers growing pigeon pea for export market must work closely with exporters' agents to plan their harvesting, transportation (to the collection points), and sale of peas. Poor scheduling of these activities can result in losses to producers because of its perishability.

- Rural wholesalers (local traders): These actors typically sell the peas to either to urban wholesalers or urban exporters. Urban wholesalers, on the other hand, sell the peas to either to urban open-air retailers or directly to consumers. Though the rural wholesalers serve as the main source of vegetable pigeon pea for urban wholesalers, the latter also get some of their supplies from urban exporters. This occurs when exporters have fresh peas that do not meet export quality standards. Hence, most of the vegetable pigeon pea sold by exporters to urban wholesalers constitutes rejects mainly sourced from farmers and rural wholesalers.

## **Grading**

Grading and standardization typically occurs at the assembly stage or when pigeon pea grain moves into storage, during storage, or just before it leaves storage. Grading and standardization are not normally a separate marketing stage, the functions are provided by the private agents or the brokers and the merchants along the system (MOA, 2009). Prescribed procedures for grading are set forth by the trade members of pigeon pea markets. Example for vegetable garden pea markets, physical attributes for grading include straightness of the pods and their uniformity in size, spotlessness, stage of maturity and percentage pesticide residue. For grains, several lots of grain are combined to produce a grade level required for a particular sale. This gives rise to what are known as house grades. A merchant's primary marketing advantage may be a reputation for house grades of consistent quality and quantity. Grading in pigeon pea is mostly achieved by physical inspection of the visible attributes based on sorting, cleaning and packaging. Measuring using conventional weighing scales, and usually in kilograms is another common practice for standardization.

## Processing

The only notable form of pigeon pea processing in Kenya entails de-hulling and splitting the pigeon pea grain to make what is commonly known as *dhal*. The essence of processing is to reduce cooking time, while to some consumers it improves the physical appearance, texture, and palatability (Freeman et al. 1999). This function is undertaken by processors who commonly also undertake the functions of assembling; urban wholesaling and retailing in the domestic market and also exporting of dry grain and dhal-depending on the prevailing world market prices. The key processors include Kenya Milers Ltd, Spice World Limited and Pisu & Company Limited, which are located in the main urban centres, with Nairobi and Mombasa having the highest concentration (Shiferaw et al. 2008). The other, albeit very basic form of value addition that is nevertheless often carried out is in the form of cleaning the grains by removing foreign objects and spoiled grains which is commonly undertaken by rural and urban wholesalers as well as exporters/processors. These actors then weigh and bulk the grain before transporting it to their buyers, who in the case of rural wholesalers are the urban wholesalers and processors/exporters; supermarkets and foreign market consumers in the case of exporters/processors.

The marketing system that link producer to retailers in rural and urban open-air markets and also those that link producers to rural and urban-retail shops involve purchase and sale of grain of average quality with very limited cleaning, sorting, and repackaging. Quality is verified by visual inspection and use of a weighing machine during the exchange process, which requires the physical presence of the buyer. While smallholders do not get any premium from assemblers for cleaning, grading or sorting, traders at the upper end of the chain seem to capture quality effects as product differentiation becomes more important for the end user.

Processing of pigeon pea in Kenya has continued to perform poorly partly because of higher raw material prices offered for dry whole grain in the domestic market and partly because of the high procurement and processing costs (Freeman et al. 1999). This has reduced the competitiveness of *dhal*, particularly for export, limiting processing only to small quantities merely to serve the Asian population settled in the country's major urban centres, mainly Nairobi and Mombasa. In the rural areas, there is very little processing of dried grain before it is cooked because many rural households are either unaware of or cannot afford improved processing methods and equipment.

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