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# **Comparative assessment of market-oriented patterns and Utilization among rural grain legume smallholder farmers in Kenya**

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## **Abstract**

Grain legumes have great potential for improving smallholder farmers' productivity even though their potential has not been fully exploited due to critical problems such as high insect pests and disease infestation. At the time, farmers are faced with lack of access to markets and poor prices that cannot sustain production costs. This can be attributed to poor knowledge on utilization and consumer consumption patterns of the grain legumes. The present study sought to analyze utilization and commercialization overview of the legumes. The study further analyzed the degree of commercialization of the legumes studied across 164 grain legume farmers. Qualitative data analysis including thematic analysis was used and information from semi structured questionnaire was coded and categorized by themes. Results were presented in graphs and tables were used to present results. Results showed that majority of the respondent's utilized legumes for home consumption. Also few respondents practice value addition on the grains. This has led to poor utilization of some of the legumes such as soybean that needs longer boiling hours and cowpeas grains. Increased knowledge on utilization of such legumes among rural households is necessary. Also results have shown that most of the farmers sell their produce to local markets with less than 20% sold to urban markets through brokers. The findings offer useful insights on promotion of low-cost grain processors that would increase farmer participation along the value chain. This is important as it will increase the consumption of legumes in different forms hence increasing their commercialization. Also, strategies to sustain both men and women smallholder legume farmers' participation are important.

## **1. Introduction and Problem Statement**

Agriculture is central to economic growth in the Sub Saharan Africa. In Kenya agriculture play a big role in terms of food security, employment and income generation (Omiti et al., 2006). One of the common crops grown in smallholder farming systems in Kenya is grain legumes. They are important within agricultural sub sector since they provide various multiple benefits to poor rural households as opposed to other staple crops such as maize. Grain legumes have the economic importance in the provision of food and income and at the same time provide other benefits such as feeds for animals and improve soil fertility. Grain legumes are the most important source of proteins especially in the developing countries because they are relatively inexpensive compared to other sources of protein. In the urban Kenya, many people rely on protein from animal products, which is relatively more expensive than protein from plant sources.

According to Braun (1995), agricultural commercialization is a process involving transformation of agriculture to market oriented production which impacts the income, consumption and nutritional setup of the household. Agricultural systems commercialization leads to greater market oriented patterns of farm production and input use. Farm level and institutional factors such as resource endowments, economic, social conditions and government policies are important in determining adaptation of agricultural commercialization by farmers.

Various literatures have suggested the potential of agricultural commercialization to improve smallholder wellbeing. Geda et al., (2001) indicates that poverty could be reduced by promoting investments in agricultural commercialization though there is need to shift priority setting, more so in the rural areas of Kenya. Similarly, Braun (1995) states that smallholder commercialization is supposed to be vital in improving smallholder incomes and food security. Consumer changing consumption patterns towards high value agriculture create market niches for crops such as grain legumes.

Despite the benefits of agricultural commercialization, there is limited smallholder farmer involvement in the commercial production of agricultural commodity with majority still producing for subsistence. Further, the impact of interventions towards agricultural commercialization has been limited by factors such as minimal organization by farmers and lack of access to resources. Diao and Hazell (2005) observe that poorly functioning markets, weak domestic demand, and lack of export possibilities could constrain the potential for agricultural growth.

In depth analysis of agricultural commercialization by commodity is important to comprehensively capture commodity specific dynamics. The nature of agricultural commercialization depends on market, institutional variables such as policies governing the input and output market, infrastructure, linkages at the farm and firm level. This study focused on grain legume as it has been identified one of the multipurpose crops. In Kenya, the main grain legumes grown by smallholder farmers for both subsistence and commercial purposes are common beans, cowpeas, soybeans, groundnuts, lablab and others. Matching the available options farmer have access to in terms of commercialization by the context representing the

farmers is vital in decision making. It is also important to support market trend analysis with sufficient evidence based on indepth understanding of available local resources that could help farmers in participation of markets.

Against this backdrop, the present study assessed market-oriented patterns among rural grain legume smallholder farmers. Specifically, the study characterized the current consumption trends of legumes and established the degree of commercialization among grain legume farm households. Further, the study highlighted some of the production practices for grain legumes. This is essential in establishing investment measures to promote business efficiency.

## **2. Methodology**

This study was carried out in Nandi County located in the Western part of Kenya. It occupies a total area of about 288450 hectares, with arable land of 206,959 hectares. On average, temperatures range from 15<sup>0</sup>C to 26<sup>0</sup>C and rainfall of between 1200mm and 2000mm per annum. Nandi county has two rainy seasons; the long rains between March and June and the short rains between October and early December and the dry spell usually experienced from end December to March. With an estimated population of about 753,000 (National Census, 2009), the area is mainly characterized by subsistence agriculture and livestock rearing (Nandi County Integrated Development Plan 2013–2017). The main staple food is maize and beans and in addition they also consume finger millet, sorghum, sweet potatoes, bananas and vegetables while the main cash income earners is tea.

The County was selected as it is one of the areas in Western Kenya where Multi-Purpose Grain Legume Project implemented by Kenya Agricultural and Livestock Research Organization have been going on. Experiments are being conducted on different legume types and varieties at farm level. Data was collected through semi structured questionnaires where data on socio-demographic characteristics, input use, output prices and market participation was collected. A list of 487 farmers growing grain legumes and had participated in the Multi-Purpose Legume Project was made. A random sample of 163 farmers was chosen through probability proportionate to size sampling technique. Face to face interviews were conducted as it guarantees high response rates besides enabling clarification of survey questions in interviews (Bennett and Birol, 2010). Three focus group discussion (FGD) sessions with an average of eight participants was also conducted in each of the three study sites. The focus group discussion and key informants from the region was used to provide general information on farmers' perspectives on grain legumes.

Thematic analysis was used to analyze qualitative data while descriptive statistics was used for quantitative data analysis. The results were presented in frequencies and percentages, bar graphs, pie charts, simple averages and cross tabulations. Data on socio demographic characteristics of the household, consumption and utilization of legumes and levels of commercialization were analyzed using STATA version 13.

## **3. Results and Discussion**

### ***3.1 Descriptive Measures***

Table 1 presents the descriptive statistics of the variables used in this paper. The mean age of the farmers interviewed was 49 years similar to the findings by Samboko (2011). Nearly three-quarters of the households are headed by men.

The study further shows that the mean land size owned was 2.1 acres with area under grain legumes covering approximately only 0.1 acres. This indicates declining farm sizes which could be one of the constraints in the legumes production. Land ownership influences agriculture productivity, hence agriculture commercialization and profitability, since farmers who do not own land can be unwilling to develop and maintain the land (Randela, et al. 2000). The small land holding is attributed to intense population pressure in the region (Conelly and Chaiken, 2000). This therefore results in small sizes of land devoted to farming. On average, two-thirds of farmers were members of farmer groups. Involvement of farmers in farmer groups can be attributed to benefits such as easy access to credit and reduced transaction costs which influence farmers' participation in markets. Ngugi et al. (2007) found that farmers who were organized into groups earned greater income compared to those who did not.

Distance to the main market was used as a proxy of access to input and output market for grain legumes. Closer markets reduce transportation costs and tracking time, hence motivate the farmers to improve production (Masuku and Xaba, 2013). The authors further states that the further away the production area is to the market, the lesser would be the probability to participate in commercial agricultural production, hence poor profits because of high transport costs.

**Table 1: Sample Characteristics for Grain Legume Farmers in Nandi County, Kenya**

	Mean	Std deviation
<b>Socio-economic factors</b>		
Age of farmer (years)	49.88	11.22
Formal education of farmer (years completed)	9.07	3.60
Farming experience (years)	20.82	11.90
Average household size	6.73	2.58
Land size owned (acres)	2.14	1.45
Distance to the input and output market (Km)	5.06	3.79
Area under grain legumes (acres)	0.20	0.12
Gender (% male-headed households)	72.40	
Awareness of value addition on legumes (% households )	57.9	
Undertake value addition on legumes (% households)	16.7	
Sell legumes (% households)	80.2	
Access to credit (% households)	65.60	
Extension contact over the last 12 months (% households)	53.30	
Belong to farmer group (%)	65.6	

Source: Computed from survey data (2015)

The results further showed that more than half of the farmers belonged to farmer groups; however the most common type of group was women group with main services obtained from the group being provision of credit through table banking which was mainly used in non-farm activities such as school fees (Table 2). This illustrates poor organization of legume farmers in production and marketing groups that could enhance commercialization of pulses.

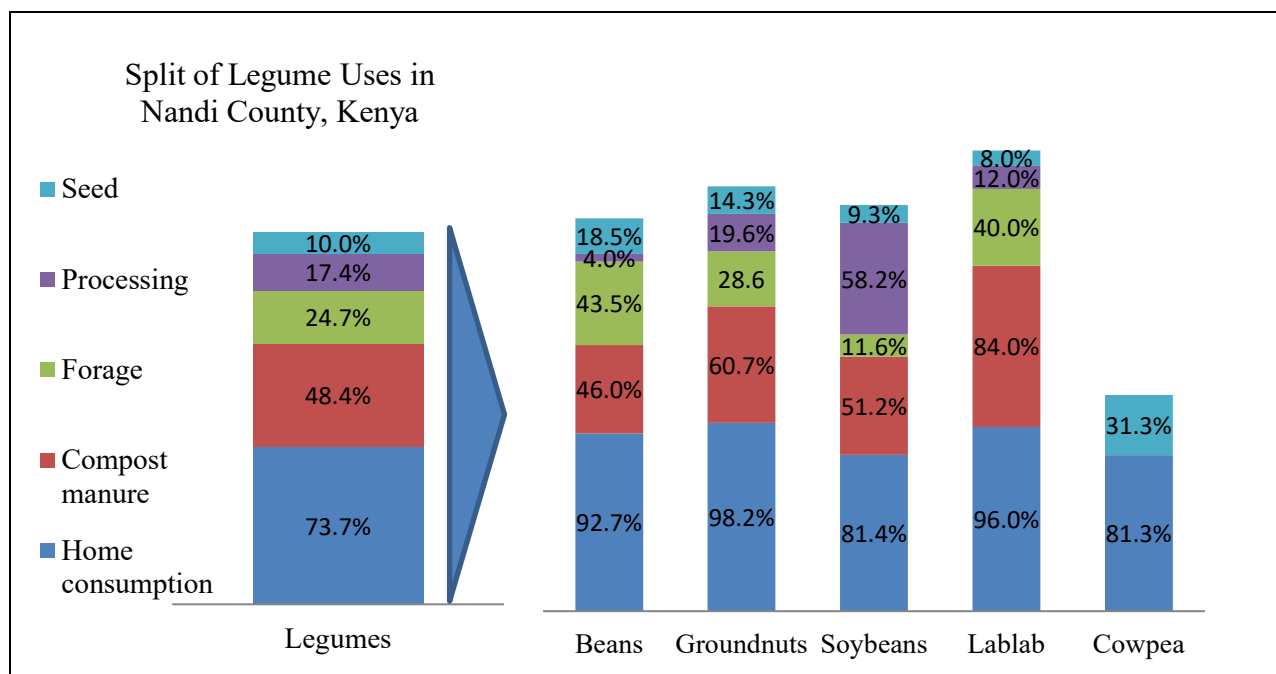
**Table 2: Major legumes farmer group types disaggregated by service received**

Major type of farmer group	Services offered by the farmer group					
	Credit	Input purchase	Joint extension services	Training	Other	Total
Cooperative society	15.5% (9)	20.0% (1)	0.0% (0)	12.5%(1)	0.0%(0)	13.8%(11)
Women group	81.0%(47)	60.0%(3)	75.0%(6)	62.5%(5)	0.0%(0)	76.2%(61)
NGO	1.7%(1)	0.0%(0)	12.5%(1)	0.0%(0)	100.0%(1)	3.8%(3)
Other	1.7%(1)	20.0%(1)	12.5%(1)	25.0%(2)	0.0%(0)	6.2%(5)
Total	100.0% (58)	100.0%(5)	100.0%(8)	100.0%(8)	100.0%(1)	100.0%(80)

### ***3.2 Consumption Overview***

#### ***Utilization trend of the Grain legumes***

Figure 1 shows the main pattern of utilization of grain legumes in Nandi County. Utilization of legumes is predominantly for home consumption with minimal value addition through processing done. These findings are similar to those of Mhango, (2011) who found that high value attached to food reasons may be a plausible explanation as to why farmers grew grain legumes for home consumption. Overall, about 74 percent of legume production was for home consumption and only 10 percent was used for seed. This may indicate that only a few farmers keep a small portion of the harvest for seed.



**Figure 1: Main Patterns of Utilization of Legumes Grown**

**NB: The figures do not add to 100 percent because farmers gave multiple uses including legumes leaves as fodder and compost manure**

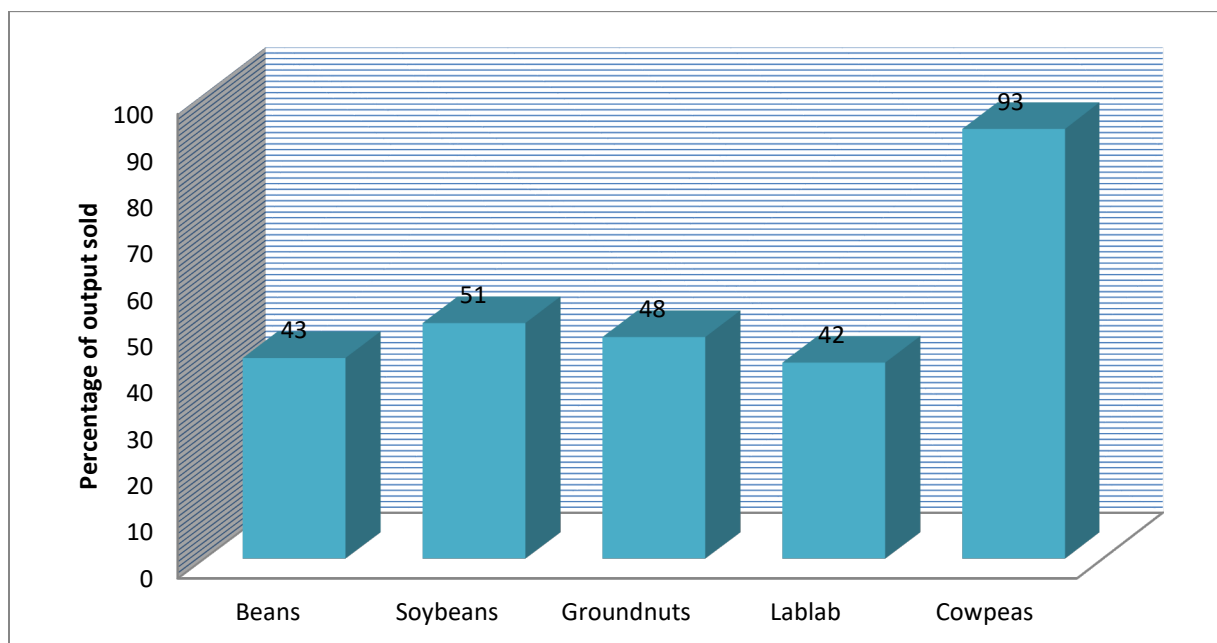
Source: Survey Data (2015).

Splitting the trend in the use per legume indicated that cowpea had limited use as an additional vegetable and for seeds compared to the other legumes. The limited use of cowpea results is consistent with Mwangi and Wanjekeche (2003) who found that cowpea leaves was mainly utilized as compared to their grains. This suggests that cowpea grain is underutilized and this because in Western Kenya the leaf is the part of legume utilized as a major vegetable eaten with *ugali*. The species they grow for leaf do not produce much of seed, but eventually they do and the households use them in a mixture with maize (*githeri*) due to inadequate knowledge on other ways of utilization of cowpea grains.

Results in figure 1 indicate that soybean was the most processed legume. About 58 percent of soybean farmers processed soybean grain with other cereals such as maize, millet and sorghum to make porridge flour mostly for the young ones. Also, few farmers processed soybean to powders and soy milk by soaking it in water and later grinding and sieving used as beverage. This results suggest that majority of farmers perceive soybean to be more nutritious to children than other legumes hence can easily be marketed to mothers with young ones. More than 90 percent of farmers who grew groundnuts and beans mainly used them for home consumption. Groundnuts was roasted consumed as snacks at home while beans was mainly mixed with maize and boiled to make *githeri*. Results in figure 1 further show that lablab was mainly utilized for meals and the leaves residues used to make composed manure. These results point out to minimal utilization of grain legume for commercial purposes as there is low value addition.

### 3.3 Average degree of commercialization

Results show that cowpeas and soybean have the highest percentage sold than the other grain legumes shown in figure 2. This demonstrates higher demand for these legumes compared to beans, groundnuts and lablab. Differences in sales reflect variation in market conditions for various grain legumes. Producers sell more of a commodity whose trade entails lower costs (Omiti et al. 2006). High percentage sales for cowpeas could be attributed to the fact that mostly cowpeas are utilized as vegetables. Its leaves are edible and because vegetable is eaten almost daily in most of the Kenya meal making its demand to be high. Soybean on the other side is perceived to be nutritious especially for young ones. It is processed to soybean flour used to make porridge. Nearly for all the legumes the output was sold as dried grains except for the case of cowpeas.



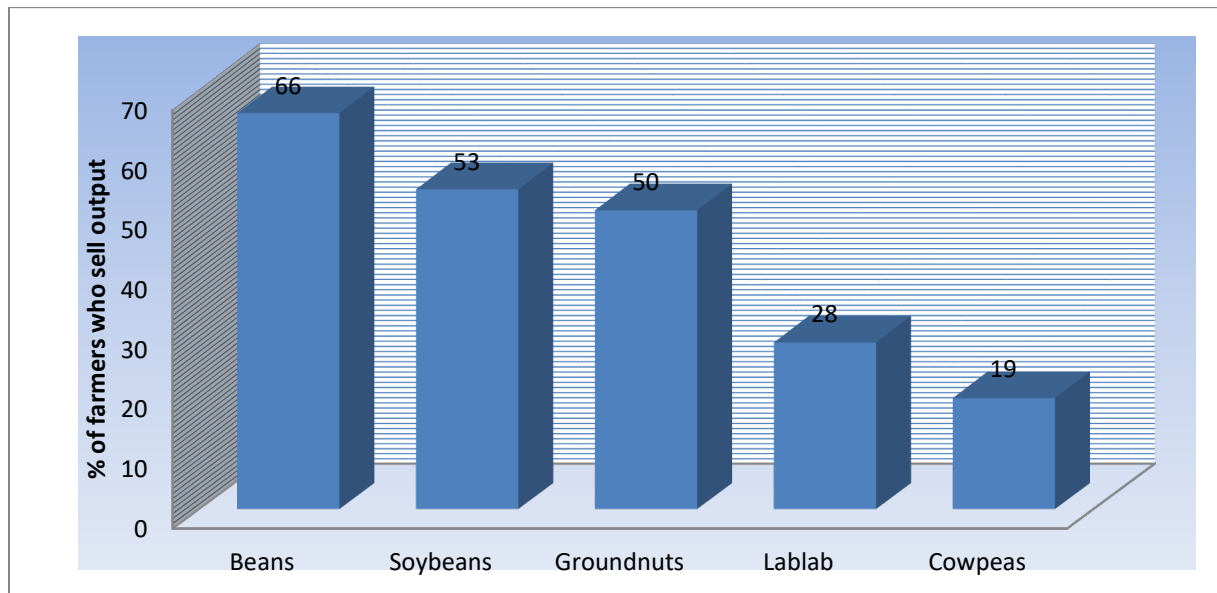
**Figure 2: Average degree of grain legumes commercialization in study sites**

There is high degree of commercialization among beans farmers. High participation of beans farmers in the market could be explained by the fact that it is the major legume grown in Western Kenya and hence it's not only sold for consumption but also sold for seeds for the next planting season. Also beans have higher market demand as it is popular among consumers both at the rural and urban areas.

Figure 3 illustrates that about 66 percent of beans farmers sell their output in market while only 20 percent of farmers sell their cowpea in markets. This is contradicting with the results above showing high percentage of cowpea output being sold. This could mean that the few farmers who were selling their output harvested larger quantities of cowpea and sold them. While majority of cowpea farmers who harvested low outputs mainly utilized it for subsistence. Slightly 40 percent

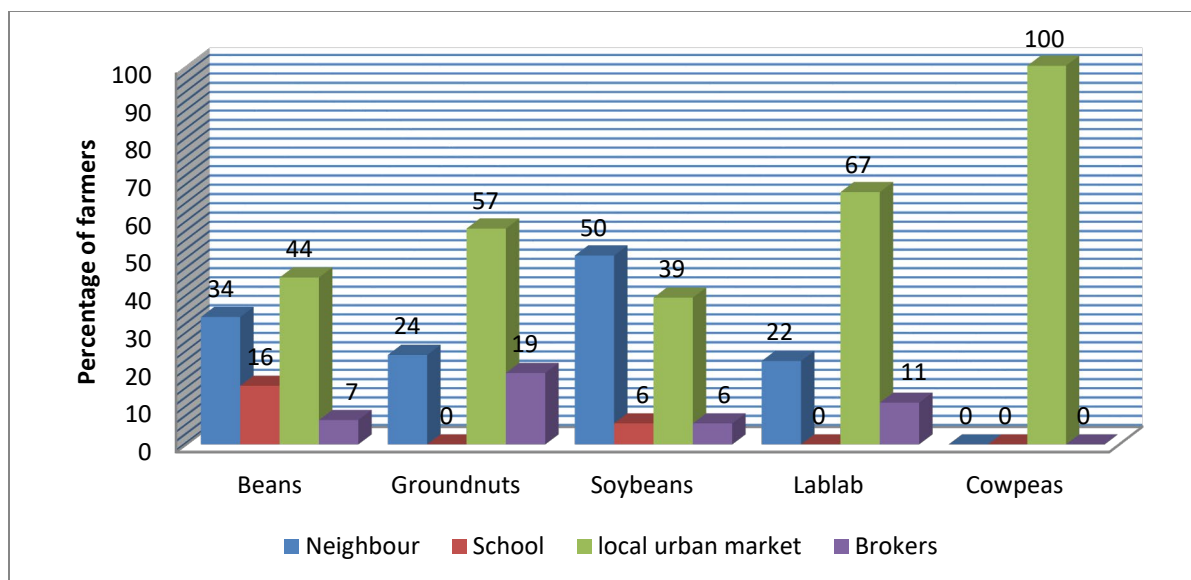


of the total legume harvest was sold within the six months of the harvest. At least across the entire legume species studied there was an aspect of commercialization. However, low market participation may be explained to poor market access. This is according to Alene et al. (2008) for the case of maize markets in Western Kenya. Diversification on the utilization forms would be a platform towards increasing market participation. Also farmers would consider their household food security as a priority before selling the surplus. Therefore, for a household that produces mainly for subsistence, there may be no market surplus after the household has satisfied its subsistence needs. Hence, higher yields are necessary for commercialization.



**Figure 3: Average smallholder participation in markets**

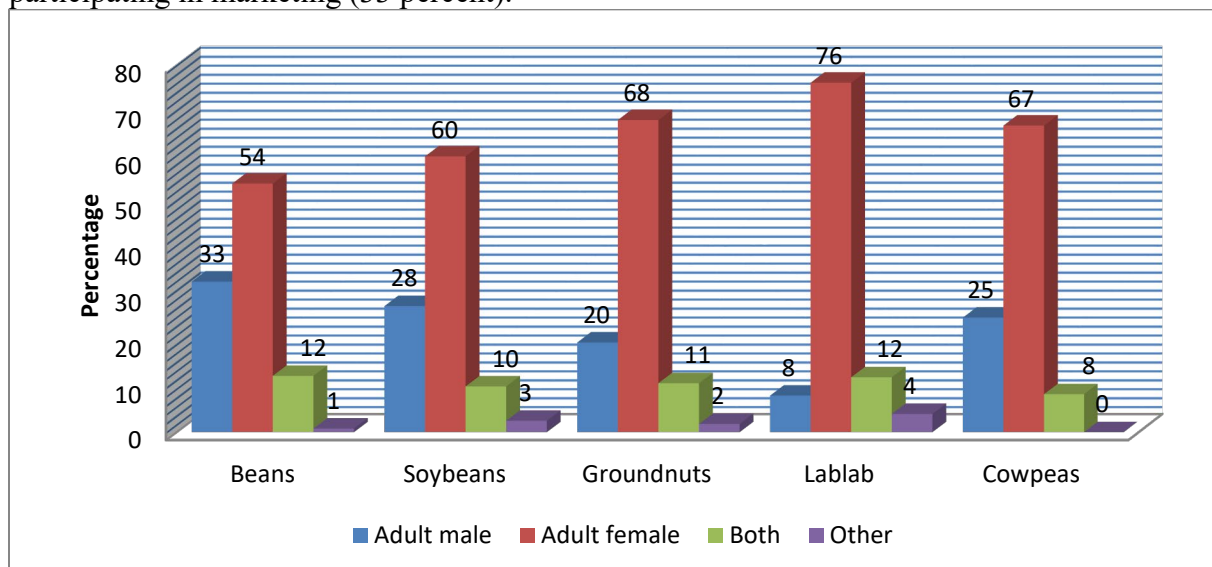
Most of the legumes are sold in the local urban market as depicted in figure 4. Higher percentage of output was sold in local urban markets because of the proximity to the markets is a plausible explanation for the higher market participation in the near local markets. The major urban towns for the consumption are Kisumu and Kakamega. Other upcoming markets are schools as most of the local schools prepare lunch for pupils and the diet mainly consists of grain legumes.



**Figure 4: Main markets to which farmers sold grain legumes**

### *3.4 Market participation by Gender*

Further analysis was done to determine the gender participation in marketing of the legumes. The results on table 5 indicate that across all the five legumes, women participated more in the marketing of the legumes as compared to men. This could be attributed to the fact that legume has always been women's crop hence it is expected that higher percentage of women will participate in the legume value chain. Less than 40 percent of the adult male participated in marketing of the legume. Beans were the only legume that had higher percentage of male adults participating in marketing (33 percent).



**Figure 5: Gender participation in marketing of the legumes**

#### 4. Conclusions and Policy Implications

Progress of smallholder livelihoods needs viable policy interventions that would improve advancement in agricultural commercialization. Generally, it was noted that there has been minimal grain legume processing undertaken. There is need to enhance and diversify legume utilization trends for instance through establishment of simple processing technologies in rural areas. This can be achieved through partnership with interested agencies in provision of simple processors to farmers and collaboration in coaching on the use of the processing equipment. Also, results indicated low value addition practiced by farmers. Promotion of low-cost processing would increase farmer participation along the value chain of grain legume hence increasing their market participation which in turn would enhance commercialization. This can be through partnership between extension service providers and Non-Government Organization at the farm level as well as in grading, packaging, and processing and market promotion. The results have also shown that the percentage of grain legumes grown for commercial purposes is low. This is indicated by the fact that less than 20% of all the grains after harvest goes to the urban market through the brokers. Also most of the buyers are local with no direct markets to processors and exporters of grain legumes. This could be explained by lack of organization of legume farmer into farmer groups and societies as other agricultural value chains such as dairy. The study therefore recommends organization of grain legume farmers into marketing groups that could improve access to formal markets hence better incomes.

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