



Value chain analysis of beans in eastern and southern Africa: Building partnerships for impact through research on sustainable intensification of farming systems

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1. ROLE OF BEANS IN FARM HOUSEHOLD STRATEGIES

The importance of beans in generating incomes for farm families cannot be gainsaid in the three countries of Malawi, Zambia and Tanzania. Beans are considered as a cash crop in many parts of these countries. Beans bring in incomes earliest compared to other crops and thus act as bridging source of incomes before the main crops since they mature earlier and can also be sold at various stages:

- as green leaves,
- as fresh pods and
- as dry grains.

They have potential to generate more incomes if key markets are harnessed through contracts from other countries for the overall development of the economies. Key challenges that may curtail the potential of beans to contribute to farm incomes include inability to store grains for longer periods after harvest due to low information about markets and the need for immediate cash to meet their regular needs; lack of structured markets for beans; planting of multiple crops on the same plots, lack of access to quality seeds (use of grain as seeds), all curtailing the contribution of beans to the farm incomes. In some cases, beans are considered as an extra source of income (secondary to others such as cereals, tobacco) and demand is rising for beans in the market. In some parts of Zambia beans are even considered a high income crop relative to maize especially when output is well achieved (e.g. 3 tons). Beans are increasingly becoming a source of income, in some cases for up to 45% of the households.

Beans are considered as a crop that can mitigate hunger in the three countries. Hunger recurs every year given the cropping cycles (once a year in Malawi and Zambia). Families require stop gap measures for food as they await the main food crops such as maize. Beans play this role better as they are considered as a dependable and complete meal by families. Beans can be planted up to 2-3 times; they are cheap and have high consumption and rank second after maize and third in some places after maize and groundnuts. Beans take a shorter time to mature and have multiple consumptions before the grain is harvested such as leaves and fresh pods and finally the harvested grain. Beans are used as both a relish and a staple food. Thus beans increase better chances of mitigating food security problems. During each period, each farmer tries to acquire some beans in the household though may be mostly mixed beans. On most occasions beans are served as one of the more affordable foods freely to complement cereals and thus can greatly benefit children and the poor in the society. In most institutions in the countries beans are the principal meal that enables the institutions to economically manage their food requirements. In some regions of Malawi, beans are sold to buy maize which is a stable food for most people. In Zambia beans rank second after maize in food security especially in the North Western and Northern Provinces where they are consumed at least weekly or twice a week. In areas where maize, bananas and rice are grown in Tanzania, beans are almost the sole source of protein in many urban areas. In Tanzania, most households ensure that they have enough beans supplies to cover most of the season.

Beans are also consumed as substitutes for meats for the source of proteins. Beans are regularly used by institutions such as hospitals, prisons, schools to generate the required proteins for the consumers. They are served quite often with rice and maize meal. They provide energy for the workforce as well. In urban areas they are consumed in fresh forms such as snap or fresh pods. Though among the populations, the consumption may not be directly related to the need to provide proteins due to low information levels among some of the consumers (in rural areas) on the nutritional benefits of bean consumption, unlike the urban areas where people know the nutritional importance of beans. The early availability of bean based foods among the farm households is important for the nutritional wellbeing of the families. Despite the importance of beans as a relish, there is limited information on its nutritional value; focus has been mainly on the business aspects of the beans. In Zambia beans are frequently used together with other foods such as groundnuts, okra, cassava, maize and rice.

Beans and legumes in general contribute to the sustainable intensification of production systems by consistently contributing to production all year round (supplemented by residual moisture and irrigation). Farmers report that when maize is planted after the legumes, they usually yield better. They also feel that legumes reduce the amount of fertilizer that can be used on maize if planted consecutively with maize. Beans also allow for intercropping with maize and cassava and even with groundnuts and this is widely practiced in areas of limited farm land. Beans thus provide a self-sustaining system as they sustain soil fertility, use less water resources (residual moisture during the winter seasons and irrigation) and thus fit well in the efforts to counter the negative effects of climate change. A number of projects promoted beans as a soil fertility improvement initiative in Malawi, Zambia and Tanzania. Bean biomass can improve soil structure. However, many farmers are not aware of this beneficial effect of beans and other legumes and thus the role remains moderate. Beans are the most commonly intercropped legume with maize in Tanzania with maize and bananas. It provides fodder for animals under the zero grazing systems.

Participation of men and women in bean activities varies across the countries depending on the production systems. In Tobacco growing areas, men involve themselves with tobacco while women are involved with beans and other crops; mostly men are wont to focus on income generating crops and on larger scale. Legumes are considered a communal crop with benefits extending to others in the society while cash crop benefits are usually restricted to the families. Where land is scarce, men are more likely to involve themselves in all crops grown on the farms, including beans (e.g. southern regions of Malawi). On the hand, where other cash crops are present and where land size is not a constraint, women are left to cultivate beans. Additionally, where the focus of the household is to generate incomes, men tend to dominate irrespective of the crop, relative to cases where women are producing principally for family consumption. During winter, beans are grown in pure stand and in this case, men take control of the bean activities but when intercropped, the women take charge of the legumes that have been intercropped in the main crops. Though more seed activities are dominated by men, grain production activities are dominated by women. In Northern and North Western Zambia, there is balanced participation in beans because of the business orientation and cultural considerations of the communities. Women are dominant in Eastern and Southern regions due to the domestic consumption orientation of the beans in these regions.

2. TRENDS IN BEAN PRODUCTION ACROSS AGRO ECOLOGIES

The key regions for bean production in Malawi are in the central region due to availability of land. In the cool areas beans grow much of the year. But in the warmer areas (valleys), beans grow during winter period when it is cooler.

Table 1: Major bean growing areas in Malawi, Zambia and Tanzania

| Region in Malawi | District | rank | |
|------------------|------------------|------|---|
| Central | Dedza, Chizi | 1 | available land, proximity to key market, many promotion activities/organizations, seeds at Chitedze station, beans more traditional to region due to good soils, good climate and good rainfall |
| Southern | Mangoji, Namwele | 3 | many competing crops for small land sizes, grown mostly for food, poor transport, few promoters, winter residual rainfall, priority given to other crops |
| Northern | Nzimba | 2 | poor transport, distance from markets, few promoters, rain-fed, irrigation, priority given to other crops, land sizes is larger |

| Region in Zambia | | rank | |
|-------------------|--|------|---|
| Northern Province | Mpolokoso, Kasama, Mbala, mpika, Luapula | 1 | sufficient rainfall, a tradition as part of the farming system, availability of land, cash/culture if growing, good soils |
| North Western | Solwezi, mumilunga | 2 | good markets, good soils, rainfall |
| Eastern | Lundazi, Chipata, Katete | 3 | good markets |

| Regions in Tanzania | | rank | |
|---------------------|-------------------------------------|------|---|
| southern highlands | Mbeya, Ruvuma | 1 | sufficient rainfall, a tradition as part of the farming system, availability of land, cash/culture if growing, good soils |
| northern zone | Manyara, Arusha, Kilimanjaro, Tanga | 2 | good access to markets |
| Lake zone | Kigoma, Kagera, Lushoto | 3 | good markets |

Source: Field survey 2012

In Malawi, some NGOs specifically promoted beans among the very poor of the farmers with access to suitable land. In most of the cases, beans are planted by smallholder farmers that cannot afford the inputs needed to grow tobacco but can afford some resources to plant beans. This is the common situation in the southern region. However, beans in grown in winter and in pure stand are grown by medium to larger scale farmers that have larger pieces of land. But in Zambia, all farmer classes participate in bean growing such that large scale commercial farmers constitute about 10%, small to

middle level farmers 50%, small scale farmers about 40%. Resource poor smallholders are more likely to grow beans in Tanzania especially in the southern highlands, Kagera, Kigoma and Lushoto regions. In the Northern zone, there is a higher prevalence of the better endowed farmers growing beans.

The common cropping system for beans in Malawi is mixed/intercrop system (consisting of 70% of farmers) with major crops such as maize and cassava, sometimes in groundnuts during summer season. Pure stand is not very common except in those regions that take winter cropping under irrigation and residual moisture (about 30%). In Zambia, the major growing areas are under pure crop, but in the central region, the system is intercrop especially among the smallholders while in northern and Northwestern, this is mainly in pure stand. In some places, the system comprises of about 80% pure and 20% relay crops. For more than 80% of farmers in Tanzania, beans are intercropped with other crops with the rest being under pure cropping system for large scale farmers.

Most farmers in Malawi do not use improved seeds; they resort to recycled seeds or simply grain from the markets. Even for those that begun by using improved seeds, they end up recycling the seed over many years. The use of improved seeds is estimated in the range of 10-20%. There appears to be a high willingness to grow beans among farmers if seeds can be available. For example, one farmer association (GALA) had recruited 75000 to grow beans in 2012/2013 season but is not likely to access the required seeds. The seeds accessed by farmers have been mostly offered via experimentation with research institutions or through the subsidy programs or where farmers are well organized; they are able to acquire some seeds on loan after which they repay in kind to their associations. In general, both improved and recycled seeds are used by farmers especially in Zambia. A major challenge is the availability of foundation seed. Use of improved seeds depends on the level of education among farmers in Tanzania. Generally there is limited promotion activities targeting bean production and marketing unlike other crops that are relatively well promoted.

Use of inorganic fertilizers targeted for beans is scanty, less than 5% having indicated usage. Beans only gain if intercropped with maize which is usually fertilized. No inoculants are used or known among most producers. Only large scale producers use inorganic fertilizers. Fertilizers are mostly used in bean seed production. Middle and lower level farmers do not use fertilizers.

The main draft power in Malawi is hand hoes though in the northern region, some animal power is used. The absence of animal drawn power in the central and southern regions is attributed to animal theft incidences that have been common. In Zambia all types of draft power are used depending on the region and scale of production; hand hoes are most used followed by animal drawn draft power. In central regions tractors are used. In Tanzania, while southern regions have more hand hoes being, northern regions use relatively more animal and tractor power on their farms.

The percentage of farmers that produce a surplus for sales is estimated at about 20%. A breakdown of the numbers would indicate that 10% of the farmers are commercial bean growers and are able to sell more, while the 40-60% of the producers at least sells some quantities that are not necessarily a surplus. About 10-20% does not sell at all in Malawi. However, up to 75% of the households around the country grow beans, mostly consumed at home. Possibly more farmers would grow market surplus if enough

certified seed was available or if a seed bank was available in the production areas to ensure continuous supply of seed to farmers. However, some farmers simply sell due to financial distress rather than having surpluses and will usually resort back to the market to buy for consumption when their economic situation improves. Additionally, if a season is favorable, farmers tend to sell more of the harvests. Sometimes farmers sell the better quality and leave inferior quality for consumption. Part of their storage may end up as seed for the subsequent seasons. Most farmers are more likely to store maize for food and use beans for short term income gap filling. In Zambia, more surpluses are achieved in the Northern Province and up to 80% of the farmers are able to produce a surplus for sale in the east of the country while in the NW and North, production is mostly for sale. But real surpluses may be found in only 30-40% of the farmers. In parts of Tanzania, households sell beans only when they have a pressing financial need. However, at least 50% are able to produce a surplus for markets. In some places, this goes to more than 70%.

Table 2. Proportion of households producing a surplus for sale

| Country | Malawi | Zambia | Tanzania |
|-----------------------|--------|--------|----------|
| Proportion of surplus | 20% | 40% | 50% |

Source: Field survey, 2012

3. TRENDS IN BEAN PRODUCTION AREAS

In the last 10 years there has been an upward trend in area planted with beans in the three countries. This is attributed to availability of organizations that are promoting beans in these areas coupled with new varieties and improved seeds being made available. Better incomes have also been demonstrated to accrue from beans. The seed buy back system by some organizations has also widely contributed to more areas being put under beans. However, there is a serious challenge to this upward trends from various angles such as: other competing crops: beans are a secondary crop whose land allocation may come after other main crops (maize and tobacco in Malawi), beans have also not been widely promoted by many intervention organizations including at the government level and lack of value adding efforts such as processing are likely to pose a challenge to the bean crop in different areas. As such there are reservations that the area under production could be flat rather than rising in Malawi. The availability of market is major factor that may affect the observed trends. An additional factor is the drop in maize production with beans coming in to substitute the maize as well as good income potential and good prices. Tanzania and Zambia have recorded increases in areas under production. New areas under production in Tanzania include Kilindi district. Beans are evolving into a profitable cash crop in response to increased demand by consumers. In addition there is increasing use of new varieties and application of fertilizers.

The yields have also been increasing over the period in Malawi and Zambia due to better varieties, improved seeds and management practices for the crop. The technologies have included technical training on production technologies and practices e.g. planting on pure stand. However, due to erratic rains, rain-fed yields have not been able to consistently increase. Other challenges are weevils and root rot problems. Yield in Tanzania appear to remain flat over the years due to drought challenges.

The key on farm production constraints include:

- lack of seed
- lack of appropriate production technologies and knowledge among the farmers (no training)
- soil infertility and lack of fertilizers
- lack of credit
- limited labor availability
- to erratic weather patterns
- pest and disease infestation especially the rain-fed crop
- lack of markets
- limited extension services
- high input costs

It is difficult to achieve the desired production targets under these constraints. Across the three countries, seeds and credit as well as extension were common constraints. Markets and credit rank highly for Zambia and Tanzania and drought and pests and diseases is a particularly serious problem for Tanzania.

- A resolution to seed related constraints calls for setting up seed banks among the communities, improving on seed quality, distribution and sales policy, especially targeting basic seeds. This would also target organizations involved in seed multiplication and distribution as well as on farm seed production so that they can reach more farmers.
- Training and backstopping as well as mentoring producers would ensure that the technologies are well understood for better uptake. One off training is not adequate to ensure complete uptake of the new practices. Promoting some key farmers in seed production and multiplication and strengthening farmer organizations.
- In the case of erratic rains, irrigation is proposed to mitigate it and for diseases, knowledge about when to best grow beans is required through training and research. Intensification of irrigation would also reduce disease incidences that arise mostly in rain-fed periods.
- Other possible solutions include use of lead farmers to scale up seed activities; increase amount of seeds used in the experimentations so that farmers progress towards full production faster;
- Better linkages to research by farmers; farmers need to be well trained in the use of agro-chemicals for control of the pests and diseases as well; training of agro-chemical dealers to advise farmers on the use of the agro-chemicals; enhance partnerships between research, extension and farmers and embedded services to train farmers by researchers, i.e. build the capacity of partner organizations to reach and serve farmers better.
- Government support through appropriate policies and more extension workers can also contribute to the solutions.
- Commodity aggregation would contribute to alleviate the constraints of market access for farmers.
- Access to credit to acquire seeds and fertilizer can be improved through formation of farmer associations for collective access to credit.

- A multi-channel dissemination approach for equipping and enhancing business skills are likely to ameliorate the challenges in market access.

4. COMMERCIALIZATION OF BEANS

In Malawi, up to 60% of the bean farmers sell some of their crop to markets. Up to 30-40% are sold within a month of harvesting but all sell within six months of harvesting. It is also estimated that at least 10% of the beans are usually sold as fresh pods, especially the beans planted under irrigation or under residual moisture while the rest are sold as dry beans. Thus most beans are sold as dry grain (80%-90%). This has been widely used as relish/vegetables. There has been an upward growth in the volume of beans sold due to certain interventions such as subsidy programs, NGO programs such as buffer funds in the country and new growers taking up bean production as well as increased demand in the market. But the challenges that may reduce the upward trend relate to seed scarcity and weather conditions. Increased sales have emerged in the central region of the country over the last 10 years. This is due to the subsidy program and availing the seed at the right time. In the south, bean sales volumes have been increasing due to high populations, consumer tastes changing and as beans from central regions to south (Zimba). Beans are also increasingly produced in the North (Namwele). For Zambia, at least 70% report selling some of the crop to markets. Not more than 10% is sold fresh form (but could be as low as 5%). But the marketed volumes have been increasing over the last decade due to increased consumption that has increased demand for beans. All key regions (Lusaka, copperbelt have witnessed increased sales of beans, esp in the Northern region. Others are Mbala areas, Solwezi and Mpolokosi. New production areas coming up Zambia. In Tanzania, up to 70% of the farmers at least sell some of their bean produce after harvesting. The prospects are moderate (20-30%) due to droughts and poor markets. However, both domestic and markets from neighboring countries have influenced the increased marketed volumes in Tanzania. Up to 95% of the beans are sold as dry grains while only 5% are sold in fresh form.

Table 3. Proportion of farmers selling some of their bean harvests

| Country | Malawi | Zambia | Tanzania |
|--------------------|--------|--------|----------|
| percentage selling | 60% | 70% | 70% |

Source: Field survey 2012

5. FINAL MARKETS FOR BEAN GRAIN AND BEAN BASED PRODUCTS IN MALAWI

Key actors in the bean value chain in Malawi can be summarized as follows:

Bean producers and their associations represented by NASFAM, GALA among others. GALA works with over 140,000 farmers in Malawi with NASFAM also working with a similarly large number of farmers. These are supplied with seed from seed suppliers of which the above two also participate in addition to private seed firms such as Demeter Seed Company who supply certified seed and other input dealers/outlets. Institutes such as Bunda College and the national research institutions (DARS) also supply seeds to farmers. However this is not the main role of the research institutes. There are some intermediary vendors who buy grain from producers on behalf of large traders some of who are

exporters (Muli Brothers, Export trading Company, Chidzoza Company, RAB processors, SENWES, and Central Poultry Ltd. The main exports are to Tanzania and Zambia. The challenge is to grade the beans to set them apart from the mixtures. There are limited processing activities for beans, mostly biscuits and sweets from beans but this is not substantial by firms such as RAB, DVDP. Open markets constitute the main bean markets. Some actors such as financiers (banks) have shown interest to finance agricultural activities (e.g. Rural Development Bank of Malawi).

Across the three countries the following key actors are identifiable:

Research institutions

- National research institutions, NARS
- International research institutions

Seed production

- Breeders (NARS) and researchers
- Seed certification agencies
- Seed producers (multipliers) (individual/farmer groups/associations)
- Seed companies
- Seed dealers/traders

Bean production

- Individual and contracted farmer producers of grain
- Farmer groups/associations
- Private agribusiness companies

Extension service providers

- Government extension service providers
- NGO and community based extension service providers

Market service providers

- Financiers (banks, micro financiers and SACCOS)
- Market information services
- Insurance services
- Warehousing services
- transporters

Bean marketers

- Bean traders (retail)
- Bean traders (wholesale)

- Bean exporters/importers
- Bean vendors (collectors, assemblers)
- Supermarkets
- Farmer associations/groups

Bean product processors

- Canning
- Packaging and grading

Bean product consumers

- Household consumers
- Hotels and restaurants
- Schools, hospitals and government security institutions (military, prisons, hospitals)

Donors and aid agencies

- Various donors with interest in beans and legumes

Government and extra-governmental organizations

- Government regulatory agencies (trade, quality)
- Regional governmental organizations (EAC, COMESA, SADC)

6. PROSPECTS AMONG MAJOR BEAN MARKETS

The key uses of beans are home consumption and sales of surplus in the markets. An assessment of the consumption of beans in homes immediately after harvest indicates that in Malawi, this constitutes almost all beans produced. More households are likely to consumer more beans in the future by as much as 30-40%. In Zambia the expectations are that 40-50% will consume more beans though growth will also be around 30-40%. In Tanzania, up to 30% of the beans are consumed at the household level and this can be expected to increase by 20-30% in the coming years. Less than 20% is consumed as fresh pods but most is sold as dry beans. Over 20% of the dry beans are exported out of Tanzania.

Table 4. Prospects for future consumption of beans

| Bean products | Malawi | Zambia | Tanzania |
|------------------|--------|--------|----------|
| Bean consumption | 40% | 50% | 30% |

Source: Field survey 2012

Some beans are sold while fresh as pods in different markets. This proportion is mostly unknown but it is likely to be in the range of 5% to 10% of the total production. These consumed volumes are likely to increase by 30-40% in the future periods. However, snap beans are more likely to play an important role though it still has limited markets and production. In Zambia this proportion is only 5% - 10% but the prospects can be increased by up to 50% with proper storage. This part of the bean product is usually considered a temporal product.

Table 5: Prospects for bean commercialization

| | Malawi | | Zambia | | Tanzania | |
|------------|---------|-----------|---------|-----------|----------|-----------|
| | current | prospects | current | prospects | current | prospects |
| Fresh pods | 5% | 40% | 5% | 50% | | |

Source: field survey 2012

Most beans are however sold as dry beans (over 90%) in the Malawi markets with an expected increase of up to 40% in the coming years. Major users of the dry beans include schools, hospital and prisons and other security facilities in addition to the regular open markets. A similar situation prevails in Zambia and Tanzania.

Limited use is made of beans in the animal feed industry in Malawi and such prospects are likely to remain below 1%. Soy bean is more likely to play this type of role in the market compared to beans which remain a human food.

There is also limited processing of beans in Malawi other than a few ones such as biscuits by RAB. More prospects for processing currently lie outside the country in neighboring countries such as Zimbabwe. The future prospects for value addition will depend on promotion activities that target value addition for beans rather than focusing on dry beans only. Processing activities hardly take up 1% of the beans. The prospects can increase with more promotion up to 30% of the current levels. In Zambia processing activities are limited by cost of canning materials (for canned beans). Industrial processing is estimated

at 5% though prospects are quite high. Zambia, unlike Malawi and Tanzania has a bean canning factory, though the factory appears to be not optimally utilized.

Other exports potentials for dry beans in Malawi are to countries such as South Africa, Zimbabwe, Tanzania and Zambia. The potential can be as high as 30-40% with regard to the export markets. Major export outlets for Zambian beans are Angola, Botswana and South Africa. These are likely to increase due to high demand. For Tanzania, up to 20% of its beans are exported with future prospects remaining high. The export corridors in Tanzania include Kenya-Sudan-Somali corridor and Zambia, Malawi and DRC corridor, in addition to the Eastern corridor via the sea ports (Dar es Salaam).

Taking the marketable portion of beans together, it is observed that there is growing demand for beans and currently demand exceeds supply. The challenge is that production is casually approached and varieties are not widely distributed among the farmers. Prices currently appear higher within each country relative to export markets, which could be due to limited local production (especially in Malawi). Farmers usually sell their beans and buy back after a short while. There is need to focus on export oriented varieties and to focus on increasing production to bring local prices down. Currently no specific varieties are being promoted. For example in Zambia the volume of dry beans supplied to supermarkets has increased from 600kg to about 5 tons per month (60 tons per year for one of the supermarkets) in the last two years. There are 28 supermarkets stocking the beans around Lusaka city.

To better achieve the market potential, it would be necessary to double the current marketed volumes and increase production by 50-60% increase in produced volumes to achieve the potential.

Table 6: Current levels of bean utilizations

| | Malawi | Zambia | Tanzania |
|----------------|--------|--------|----------|
| fresh pods | 5% | 5% | 5% |
| dry beans | 90% | 90% | 95% |
| industrial use | 1% | 5% | 0% |
| export market | 5% | 10% | 20% |

Figures not necessarily adding to 100%

Source: Field survey 2012

7. GEOGRAPHIC AREAS AND COMMERCIAL FLOWS OF BEANS

The source of the commercially traded beans (red beans) is Phalombe in the southern region. Other key regions are Nchizi, Dowa, Majinga, Mangoji (under irrigation), Mzimba, Bembeke and Chitipa. Generally the bean regions are the central and southern regions of the country. These are of origin because the regions have received much promotion efforts from NGOs and other organizations over time. In Zambia the key areas are Eastern province and Copperbelt. Market demand and proximity to markets contribute to this observed prevalence. In Tanzania, commercially traded beans come from Arusha and Manyara, regions, there is high demand for the beans due to increasing population and export markets.

Surplus beans within the country ends up in the collective markets in the main urban areas. The markets are mostly informal, not being much organized. Trade is mainly private and a mix of formal and informal. Key markets within Zambia include Lusaka, Livingstone, and Copper belt. Major internal markets for beans in Tanzania include Dar es salaam, Dodoma, Mwanza, Arusha, Zanzibar, all major towns and cities in the country.

The main export corridors for Malawian beans are northern corridor towards Tanzania and southern corridor towards South Africa for certain of the year/season (about 20%). For Zambia main export corridors are Zimbabwe, South Africa, Angola and DRC (Kasumbalesa, Chirundu, Jimbe). Mozambique, Botswana. Import corridors Tanzania. Import corridors are mainly Uganda in the North West of the country.

8. KEY ACTORS IN THE BEAN SUPPLY CHAINS

The main intermediaries in the bean sector are the vendors but these mostly work on behalf of other larger traders such as exporters. Admark, a government marketing corporation in Malawi also plays a role in the marketing system. WFP also plays an important role through a system of warehouses, associations and NGOs across the three countries. In Zambia, these are farmers and fixed establishment traders (through their association). Vendors consolidate production data and undertake market research as well. SACCOs play a role in Tanzania in addition to vendors and other large companies.

The main role of the vendors and other market actors is to offer the farmers a market outlet for their products. Vendors move door to door in search of beans. Some offer warehousing facilities. A system of vendors around the country is used by buyers to source for products and for the farmers selling them. Others access products through a system of associations across the country as well as through mobile phone systems. The vendors are usually equipped with weighing scales when transacting with farmers. Some such as farmer associations (NASFAM, GALA) in Malawi are more interested in ensuring that farmers have a sustainable market for their product, they also carry out branding of the products as well as smoothing out price variations for the farmers and in the markets. In Zambia, main roles of associations are linking producers to markets. Others have agronomists in different regions as well as out grower schemes. Others are vendors and even NGOs who facilitate formation of cooperatives. Some NGOs also buy beans/seeds from producers e.g. in Tanzania. The WFP also plays a key role in the bean market to meet its requirements for emergency assistance in other countries. MVIWAMO is an association of producers in Tanzania and is a major player in the bean markets.

Price negotiations depend on the vendor type. Farmer based associations usually sign contracts with producers in form of purchase agreements after signing the agreements with an identified buyer while specifying the quality of the beans required. They also specify minimum prices to pay the farmer. Payments are post-delivery based on specified quality and quantity. Disputes are kept minimal when the transactions are basically cash (COD). Quality is also assessed at the point of purchase or sale where the buyer ascertains quality of product. But larger buyers such as WFP would normally pay through banks and their contracts are normally standard for all deliveries depending on the principle of buyer. Traders

have farmer contacts. Most contracts are usually implied in nature. Other payments in Tanzania are through the mobile phone system.

Products are delivered to marketing centers or association warehouses by farmers where they are aggregated. Payment for products is mainly cash but a few organized associations use post-delivery payment on specific quality delivered after the buyer confirms contract. Some of the buyers pay through the bank where the farmers have opened bank accounts. The bank may also pay the supplier directly in their accounts. The types of transactions depend on the type of buyer. E.g. WFP would mostly deposit funds in accounts rather than cash. Aggregation is usually at community and district levels. Bean trader association collects directly from the farmers.

Beans are bagged in propylene bags and loaded manually while others bulk store in the warehouses. The warehouses may be centralized or decentralized. Products are loaded by farmers manually and buyers collect their products from the warehouses. Farmers use their own bags. The weights of bags depend on buyers but 50 kg is common for some of them. Some are kept in open air or in tents; bags of 120 kg are used. Traders pay for hired trucks. The bag size in Tanzania is 100kg. Other transport used include on head and animal drought (donkeys) in Tanzania

Grading is rarely used other than ensuring that beans are of a single type rather than being mixed. However, for key buyers, beans are usually sorted. Sorted/single type of beans may be considered as grade 1 while the mixed beans would be considered as a lower grade. Some buyers establish MOU's with farmers on minimum grades acceptable. Otherwise there are no standards within the bean marketing system which are enforced. The market does not specify type, colour or sizes to enforce. Some beans are sold as mixed versus single type.

Intermediaries who are mostly vendors, their roles are defined by their principles and depend on the contracts they have established. Provision of markets and securing of products from suppliers are their main roles. In Zambia, intermediaries are much fewer with farmers preferring to link directly to buyers or acting as intermediaries among themselves to locate supplies on behalf of buyers. Some use intermediaries such as agro-dealers shops, shops etc, especially for seed products. They do bulking and transportation of produce.

Most linkages among the intermediaries are covert or adhoc without defined networks. Most vendors are agents that work for the larger buyers or are sub-contracted by them hence there is not much negotiations with the buyers but transactions are based on commissions they earn. This depends on the costs (cost plus markup) to be covered and assure some margin for profit. The agency system is the most commonly used. Some employ the vendors to work for them. Prices are usually fixed in advance giving little chance for negotiations (K5000/kg) by vendors. For example in the Lusaka market, most of the beans are sold to local traders (60%) while distant traders take 40% (much of which is exported).

In terms of utilization of the beans, processors account for about 5%, traders 90% and direct to consumers about 5% but this varies from year to year. The beans are mostly used as a relish by consumers, for food and used with maize and other staples. Some beans are used for relief (WFP). Some of the beans are processed (baked) in Zambia. Most are used as part of the food basket but other beans

are utilized across the borders e.g. in Angola some beans is used to make facial powder and butter (Lusaka beans). Some of the grains are used for seed.

Vendors connect larger buyers to export markets. Supermarkets and private companies intermediate in the export markets including those deal with seeds (Malawi (e.g. Demeter seeds in Malawi, Kamano in Zambia) and other large scale private traders (e.g. Muli Brothers in Malawi, Export trading group in Zambia and Tanzania).

9. SEASONALITY OF VOLUMES TRADED

There are seasonal variations on quantities traded over the years, which are dependent on the cropping seasons and harvest times. During these times, intermediaries enter the villages to buy beans. While seeds are mostly grown in the winter seasons, grains are usually rain-fed during this period; prices are highest in the period September to December (planting period) while there are lowest in April to mid-June. In between these periods, prices are normal (June to August). Prices drop during the harvest time because most of the farmers need immediate cash to cover their needs and thus sell at the prevailing lower prices. Most producers also do not store beans as they fear post-harvest losses and would rather sell and buy later on for consumption. At later times beyond harvest time, most buyers would have also have left the villages. Most intermediaries buy and keep beans for other bigger buyers just after harvest in the winter season. The prices usually range between MK 50-100 (lowest) to MK100-200 (medium) to about over MK 300 (highest) in Malawi. However, in the main cities (Lilongwe, prices rise to as much as over 400 during October to December months. During the high price months, farmers are usually looking for beans to plant in addition to their regular consumption needs. In Malawi, prices have progressively increased over the last 3 years from lows of 150 in 2010 to a high of 600 in 2012. The current high price is due to currency devaluation and new promotion efforts for legumes by the government.

Table 7. Price variations over the year

| | Months, Malawi | Zambia | Tanzania |
|---------------------|---------------------|---------------------|--------------------|
| low price months | April - June | January –March | June-August |
| medium price months | June- August | April -July | September-November |
| high price months | September- December | September- December | December-May |

Source: field survey 2012

In Zambia, lowest prices are in Jan-March, June-July and highest prices in September- December to February. High prices are recorded as K1 million in 2008 per bag (120 kg) in the dry period, medium prices of 700,000 and lower prices of 250000. (Using local measures the *meda* (about 20kg): ZM 60000 per 20 kg container to 35000 for normal periods). However, prices differ by variety but fluctuations are also caused by rent seeking behavior of actors. In Tanzania, prices are around Tsh 1000 per kg. Low prices occur in July-August, normal prices in September to November and high prices in December to May.

Table 8: Standardized comparative bean prices per kg over the last three years in USD

| | Malawi | Zambia | Tanzania |
|---------------|--------|--------|----------|
| Lowest price | 0.61 | 0.43 | 0.70 |
| Medium price | 1.21 | 1.19 | 0.96 |
| Highest price | 1.82 | 1.70 | 1.34 |

Source: Field survey 2012

10. PERFORMANCE AND MARKET COORDINATION

There is no organized market for beans in Malawi, but the private actors carried the coordination on their own through market committee. The market committees negotiate for prices, source for funds, take charge of real buying, create awareness, securing markets, documentation and warehousing. This is the case for organized private actors as well as farmer associations. Some key market actors include farmer associations such as GALA, NASFAM and Total Land Care (NGO) all of which promote bean production and marketing in addition to vendors. They support farmers under their associations to market their produce through planning and ensuring that there is access to seeds. In Lusaka local city authorities play a role on the coordination of the markets by providing space to trade and levying the traders. Traders themselves also ensure that they have adequate information on their products thus coordinate activities by themselves. Medium and small traders, farmer organizations and individual farmers coordinate market. Other key players have been the ministry of agriculture and cooperatives.

11. FINANCING

Most farmers finance their own planting activities. However, some farmers have access to bank credit as well as special project financing. This also applies to transporting of produce to markets especially when the farmers deliver on their own. Some farmer associations and NGOs usually finance produce collection, or buyers may finance the produce to the terminal markets. They recover their costs through levies that they charge on the produce. When banks finance, some of the payments usually are through banks, which then withhold their loaned funds before paying the farmers or associations. Most activities are self-financed through margins recovery through prices received. Farmers are sometimes financed through SACCOS.

12. TRACKING MARKETING MARGINS

Table 10: Comparative prices for beans at various stages of the value chain

| | Malawi grain | Malawi seed | Zambia grain | Tanzania grain |
|----------------|--------------|-------------|--------------|----------------|
| Farm gate | 0.603774 | 1.132075 | 0.821355 | 0.636943 |
| Local assembly | 0.679245 | 1.396226 | 0.513347 | 0.700637 |

| | | | | |
|-------------------|----------|----------|----------|----------|
| Central warehouse | 0.943396 | 1.584906 | 0.616016 | 0.828025 |
| Wholesale | 1.207547 | 2.264151 | 0.821355 | 1.019108 |
| Retail outlets | 1.509434 | 3.207547 | 1.64271 | 1.783439 |

1 USD = 265 MK, 1 USD= 4870 ZK, 1 USD =1570 Tshs

Source: Field survey, 2012

In the foreign markets where some of the beans end up, prices are internationally determined, for example, about USD 1000-1200 per ton in South Africa.

Beans and maize prices do not appear to be correlated. Maize prices are capped or controlled by the state while bean prices are controlled by forces of demand and supply. Price of maize is 40-60 per kg in Malawi. The changes in the prices of the two commodities appear to be independent.

13. COMMERCIAL DYNAMICS

Marketed beans are growing faster than production in the three countries due to increasing demand mainly in urban areas. There is also increasing demand in other countries coupled with better market information and private sector investments. This should also include nutritional importance of the beans. The increased consumption will persist in the coming years as more people relocate to urban areas. However there will be need to continue disseminating improved seeds for better productivity. Current efforts by the government (presidential initiative) on legumes will impact positively on legume growth in Malawi. Marketed volumes appear to grow faster than production in Zambia due to more consumers. More bean production is likely to take place from improved varieties, fertilizer use and better practices. There are also upcoming foreign markets; however, production is lagging behind market demand. High populations in urban areas, diminishing production and land, limited technologies and droughts restrict overall production volumes.

14. POLICIES AFFECTING BEAN VARIETIES

A number of bean varieties have been released by the national research systems such as Kholepethe, Kabalabala, Napilira, Phalombe, sugar 131, CAL 143, Napilira, kabalabala, NUA59, NUA45, VTT294/4-4, Nagaga, Nkhalira, Kambidzi, Sapatsika, Maluwa for different purposes in Malawi. All are drought tolerant, good for markets and higher yielding, disease resistant and with good cookability. The varieties have been released in the last two decades. Key varieties released in Zambia include Lwangeni, Kalambo, Chambeshi, Lyambai, Kabulangeti, Lukupa, kababala, MAC 51, MAC 53, Solwezi, and Serenje among others. Private company varieties include: PAN 148 (Pannar, Kamano). Some of the improved beans varieties in Tanzania are Lyamungu (85, 90), Selian (94, 97, 05, 06,), Jesca, Cheupe (06), Uyole 96.

Table 11. An example of seed production activities at ASA seed unit, Tanzania

| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|-----------|------|------|------|------|------|------|
| Hectarage | 111 | 110 | 132 | 48 | 111 | 131 |

| | | | | | | |
|-------------|-------|-------|-------|------|-------|-------|
| Output, Kgs | 61000 | 50652 | 34200 | 3200 | 92807 | 69648 |
|-------------|-------|-------|-------|------|-------|-------|

Efforts have also been made in terms of crop management practices over the years. Such as new variety promotion plant spacing and density, time of planting and disease management and fertilizer use. Capacity building has been led by mainly the national research and extension systems. However, most technologies have not specifically targeted beans, rather most target major crops such as maize and Tobacco. Private sector has not been active in disseminating these technologies. New planting and weed control methods have been promoted. Seed rate, time of planting, seed bed preparation, weed control, pest and disease control, seed storage and variety information. Others are inorganic and organic fertilizers and staking options.

With regard to post harvest storage and processing, some training activities have been conducted under the national research and extension system with very limited participation from the private sector other than making storage chemicals available in the market. These efforts have included moisture control, and fumigation, dusting technology, and against dampness and use of hermetic bags over the last 4 years. However, most have also focused on the more commercially oriented legumes such as soya beans. Secure store rooms have been used as well as storage bins and management handling (packaging, pesticides). Currently, a bean processing factory is being built (2012) near the border with Kenya and this is expected to enhance the market for beans in Tanzania.

EXTENSION EFFORTS

Extension services are widely available though the reach by farmers is likely to be lower in some regions (as low as 35%) while in other places it is almost fully covered. Extension sought by farmers is mostly in the form of crop management and storage as well as under the government subsidy program. Others include financial management and leadership especially for farmers in associations. Others are on disease control, chemicals, marketing, among others. But extension has focused mostly on the main crops other than beans. Thus in general, about 60-70% access in Zambia. In Tanzania, about 40% to 50% of producers access government extension services mostly on varieties and crop management practices.

NGO extension is also available to most farmers in Malawi. The lead farmer concept is widely used by many NGOs to reach many farmers through training/capacity building. Up to 70% in some regions have contact with NGO extensionists. They usually address most of the issues across farming such as production, post-harvest, marketing and other cross cutting issues such as gender and HIV. NGOs have short projects and limited contacts with farmers but have focused on specific issues such as seed multiplication in Zambia. About 30-50 % of producers access NGO extension services in Zambia. In Tanzania, NGO extension appears to be very low in Tanzania (less than 10%) among farmers.

POLICIES AND INPUT SUPPLIES

There have been seed multiplication activities under different interventions by governments, different projects and farmer associations. Some credit programs have also been promoted among the associations but these have not been countrywide. These have been regular in the last 10 years but have not focused specifically on beans, e.g. in Malawi, interventions have been spearheaded by NASFAM, Action Aid and World Vision besides the government. A number of farmer associations have organized their own transport schemes and training on technologies. Generally there have been limited schemes targeting beans other than conservation farming by CFU. NGOs and other international organizations in Zambia (ACTESA-COMESA) have schemes that promoted seed multiplication including fertilizer use in key bean growing areas. In Tanzania, ASA carried out a seed distribution scheme in 2005 for beans and a fertilizer and inoculant scheme on 2010 for beans as well. In addition some NGOs such as Faida Mali have also had programs targeting improved seeds for beans in 2011 under ISFM component.

OUTPUT MARKETING AND TRADE

Trade is dominated by the informal private sector in Malawi with no marked restrictions on the movement of products within the country. There are no specific policies targeting beans, however, like for other products that are regionally and internationally traded requirements such as phytosanitary certifications, import documentations/permits, non GMO certifications and other quality specifications (e.g SGS) and other guidance under COMESA and SADC are required for cross border trade. In Zambia, trade is dominated by private traders, some well-organized. No restrictions though procedures are cumbersome. There are some non-tariff barriers too (exports limited to tonnage of 40 per trader). Similar conditions are also observed for Tanzania.

15. OPPORTUNITIES FOR BEAN LED GROWTH

Major markets for beans in Malawi are in South Africa, Zimbabwe, Zambia (sugar beans), Botswana and Tanzania. However, it is necessary that smallholder farmers be linked to these markets in order to benefit from the opportunities. There is need for more market research to fill the current information gap on the markets on the part of farmers. There is also need to organize farmers into producer groups that can access these markets. Opportunities can also be found in targeting key institutions with processed bean products and NGOs as well as others can provide key linkages for the farmers to access the markets, including relevant training on markets. Angola, Botswana, and the DRC Congo also provide good market opportunities for Zambia. Linkages through private companies can help farmers link to these markets. Major markets also lie in the main urban areas and cities. Promotion through advertising in mass media can also be used as well as sub-contracting farmers by well established companies to produce seeds. Having a functional bean /legume platform can also contribute immensely to the promotion of beans across the entire value chain for the benefit of farmers.

CONSTRAINTS TO BEAN LED GROWTH

Major constraints facing the bean sector include

lack of quality seeds, poor dissemination of released varieties, new varieties are expensive, limited outlets for released varieties and use of recycled seeds and use of old production practices.

Non-structured or poorly organized markets coupled by limited sharing of market information by private traders and lack of comprehensive support for farmers by organizations working with the farmers as well as limited bean promotion activities. There is also inadequate supply in the local markets which pushes up prices in the local markets due to weak production systems and low production (yield potentials) of bean.

Lack of processing capacity and lack of value addition activities constrain production s affects the bean sub-sector especially in Malawi and Tanzania coupled with lack of government incentives on processing equipment.

Other key constraints include: poor quality products from other countries and competition.

Pests (weevils) and diseases are also a major problem for bean farmers.

Soil acidity and fertility problems affect many farmers.

Other constraints include erratic rainfall and droughts as well as other climatic effects lead to low technology adoption in Tanzania.

There is limited use of contract farming and prevalence of export restrictions in these countries.

The constraints can be addressed in different ways.

The breeder seed can be out sourced to the private sector and farmer organizations away from the research institutions to ensure that there are enough seeds for farmers in a sustainable way. Seed banks would also contribute to seed availability. Farmer participatory research will help overcome the problem of use of old production methods by involving farmers in new research interventions.

The yield potential of beans has not been reached and could do with more improvements through agro ecological compatibility research. Mapping new production areas for bean promotion and production is also necessary as well as on organically produced beans.

Strengthening farmer organizations and linking them to active bean platforms would alleviate some of the market related problems. Beans as a commodity have not been promoted among the populace. Thus the current market demand is the normal random market demand which could benefit from more variety specific promotion activities. Bean activities have not been aggressive in the countries. Other specific research issues that can help promote beans include varieties that cause no flatulence, and take shorter time to cook.

Targeted funding by government and donors would ensure that only the high impact interventions are funded.

Establishment of a network for bean promotion would be helpful to address some of the challenges.

Irrigation should be promoted to ensure that droughts and erratic rains do not negatively affect production plans.

Incentives for setting up processing industries and removing restrictions on exports would be required by involving of policy makers on taxation matters.

Farmer capacity building also proposed as a possible solution to low adoption of new technologies. Involve farmers in research as well, undertake collaborative researcher with other partners (NGOs), promoting new varieties and technologies per region, examine market tastes locally and internationally, timely provision of seeds.

Breeding quick maturing beans in large quantities would contribute to achievement of quicker impacts among the users.