Common bean in Eastern and Southern Africa: a situation and outlook analysis

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International Centre for Tropical Agriculture

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ACRONOMYS and ABBREVIATIONS

SNNPR	Southern National Nationality Peoples region
NARS	National Agricultural Research systems
CIAT	Centro International de Agricultura Tropical
FAO	Food and Agricultural organization
DRC	Democratic republic of Congo
ECABREN	East and Central Africa Bean Research Network
SABRN	Southern Africa Bean Research Network
CRS	Catholic Relief Services
ESA	Eastern and Southern Africa
IPMS	Improving Productivity and Market successes
GNI	Gross National Income
EA	Eastern Africa
SA	Southern Africa
ACOS	Agricultural Commodity Supplies
OECD	Organization for Economic co-operation and Development
EIAR	Ethiopian Institute of Agricultural Research
NBRP	National Bean Research Programme
NGO	Non-governmental organization
PVS	Participatory variety selection

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E.Katungi[†], A. Farrow, J.Chianu, L.Sperling and S.Beebe

1.0 Introduction

Common bean is an important component of the production systems and a major source of protein for the poor in Eastern and southern Africa. Although largely grown for subsistence, mainly by women, approximately 40 percent of production is marketed at a market value of UDS 452 million (Wortmann et al., 1999 in David et al., 2000). In recent years, the crop production trend has not kept pace with the annual growth rate (estimated above 2 percent) in population in some countries due to a number of biotic, abiotic and socio-economic constraints (Kambewa 1997; Chirwa et al., Forthcoming and Xavery et al., 2006). Among the abiotic constraints, drought is the major and common across the Eastern and Southern Africa. Drought can be caused by inadequate total rainfall, erratic rainfall distribution, long dry spells and delayed onset and/or early cessation of rains. With global climatic change threatening to exacerbate the drought problem in some parts, rapid population growth and the increasing cost of livestock products, the food and nutritional insecurity in Sub-Saharan Africa is feared to increase.

This has forced researchers from National Agricultural Research systems (NARS) together with the Centro International de Agricultura Tropical (CIAT), to step up their research effort on common bean, which is, strategic in alleviating malnutrition. The intention is to increase yields and stability of the crop in drought prone areas so as to minimize the risks of food insecurity as well as increase surplus for sale. This report contributes to this effort by analysing the trends in production and crop availability to the poor, available technologies and their adoption as well as constraints that limit wide adoption of common bean based technologies. The analyses are largely based on secondary data from four countries namely: Kenya, Ethiopia, Tanzania and Malawi. These countries are not only among major producers of common beans in Africa but

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also experience great fluctuations in yields due to unfavourable weather conditions. In every four years, at least one of these countries experience crop losses due to drought (Xavery et al., 2005; Kambewa, 1997). Furthermore, these countries were selected for the project entitled:"Enhancing Grain Legumes' Productivity, and Production and the Incomes of Poor Farmers in Drought Prone Areas of Sub-saharan Africa and South Asia" of which this study was part.

The next sections describe the general characteristics of the crop, its agronomic requirements, historic usage and distribution. This section also describes the different forms of grain preparation while highlighting the key consumption traits that influence variety choice in the region. This is followed by a discussion of production trends in the last three decades while predicting future trends. The utilization of common bean is then discussed, with emphasis on domestic use and consumption demand. The available technologies, their adoption and constraints to sustainable adoption, and spread of promising varieties are discussed in subsequent section.

1.1. General characteristics

Common bean (*Phaseolus vulgaris L)*, also referred to as dry bean, is an annual leguminous plant that belongs to the genus, *Phaseolus*, with pinnately compound trifoliate large leaves. It is largely a self-pollinated plant though cross-pollination is possible if the stigma contacts with pollen coated bee when extended. Seeds are non-endospermic and vary greatly in size and colour from the small black wild type to the large white, brown, red, black or mottled seeds of cultivars, which are 7-16 mm long (Cobley and Steele, 1976). Common bean shows variation in growth habits from determinate bush to indeterminate, extreme climbing types[‡]. The bushy type bean is the most predominant type grown in Africa (Buruchara, 2007).

1.2. Agronomics

Common bean is a warm-season crop that does not tolerate frost or long periods of exposure to near-freezing temperatures at any stage of growth. Usually high

[‡] The bushy type bean is 20-60 cm tall with most of the pods held above the ground while climbers may grow 2-3 m tall if they have support (Cobley and Steele 1976).

temperatures[§] do not affect it if adequate soil water is present, although high nocturnal temperatures will inhibit pollenation. The crop requires moderate amounts of rainfall (300 – 600 mm) but adequate amounts are essential during and immediately after the flowering stage)[**]. Generally, common bean is considered a short-season crop with most varieties maturing in a range of 65 to 110 days from emergence to physiological maturing (Buruchara, 2007). Maturity period can continue up to 200 days after planting amongst climbers that are used in cooler upland elevations (Graham and Ranalli, 1997 in Gomez, 2004). The crop is not sensitive to soil type as long as it is reasonably fertile, well-drained and does not have conditions that interfere with germination and emergence (Wortmann et al., 1998). In Africa, crop cultivation is concentrated at altitude above 1000 masl, with adequate amounts of precipitation (> 400 mm of rain) during crop growing season and soil pH above 5.5 (**Table 1**). These are the cooler highlands and the warmer mid-elevation areas of East, Central and Southern Africa. However, crop area in low elevation area (<1000masl) has also been increasing following population pressure.

Table 1: Important agro-ecological environment of common bean in Africa

ALTITUDE	Area share (%)	Percentage of beans produced under precipitation of >400mm of rainfall	Percentage of beans produced on Soils with pH >5.5
>1500masl	51.8	80	64
1000-1500masl	42.7	79	89
<1000masl	5.6	NA*	NA*

*Data not available

Source: Modified from Wortmann et al., 1998

1.3. A brief history of crop usage

Common bean contains high protein content, is a good source of energy and provides folic acid, dietary fibre and complex carbohydrates (Platt, 1962, Cited in Edje et al., 1980). Common bean protein is high in lysine, which is relatively deficient in maize, cassava and rice, making it a good complement to these staples in the diet. It is the main grain legume crop grown in Eastern and Southern Africa. Consumption of common bean is high mostly because it is relatively inexpensive compared to meat

[§] At very higher temperatures (>30^0C/84F), the crop can set little seeds or shed many flowers and buds, which reduces yield (Fageria, Baligar and Jones 1997 in Gomez, 2004).

[**] Dry weather is desirable for maturation of the crop and for harvesting but late rains may discolour the beans and lower their grade and market value (Free, 1993 in Gomez, 2004).

(Pachico, 1993). For the poor, common bean plays a strategic role in alleviating malnutrition but other health related functions exist.

Regular consumption of common bean and other pulses is now promoted by health organizations because it reduces the risk of diseases such as cancer, diabetes or coronary heart diseases (Leterme, 2002 in Leterme and Munoz, 2002). This is because common bean is low in fat and is cholesterol free. It is also an appetite suppressant because it digests slowly and causes a low sustained increase in blood sugar. Researchers have found that common bean can delay the reappearance of hunger for several hours, enhancing weight-loss programs.

Common bean is used almost entirely for human consumption but beans require processing before they are eaten to degrade the toxic compound, lectin phyto-haemaglutinin, which would otherwise cause severe gastric upset (Ferris and Kaganzi, 2008). In Eastern and Southern Africa, common bean is important for staggering food supply: leaves, pods, green grains and dry beans. It is consumed as boiled green leaves, green immature pods and/or dry grains. The fresh form of grain is the most preferred because of its fresh flavour, good taste, and requires considerably little time to cook (approximately 40 min). However, fresh beans are difficult to keep, and as such they are consumed for a short time only in season before beans dry. Consequently, beans in Eastern and Southern Africa are consumed as cooked or boiled dry grains, prepared in a wide range of recipes (**Table 2**).

Table 2: Some of the recipes made of common bean across Eastern and Southern Africa

i. In a stew or broth and served with *Ugali,* bananas, cassava, sweet potatoes, sorghum.
ii. Mixed and cooked with a staple food (e.g. whole maize grains), banana, cassava, sweet potatoes etc) and boiled together. This form of consumption is cheaper and quicker to prepare since it uses less fuel energy to prepare as well as shorter time than the stew form. When mixed with maize, it is called G*itheri* in Kenya, *Ngata* in Malawi, *Kande* in Tanzania and is also present in Uganda. *Githeri* is now a growing form of urban food, especially among the low-income class.
iii. Dry common bean can also be soaked, coats removed, boiled and mashed alone like in Malawi to form *Chipere* or in mixture with other foods like milk in Kenya or sweet potatoes in Eastern in Uganda

iv. Cooked as green immature pods and eaten alone or with other foods particularly in restaurants in Tanzania
v. Boiled grain and consumed as snacks or main dish called Nifro in Ethiopia. Nifro made of haricot beans alone or blended with other foods.
vi. Leaves boiled and eaten as spinach

Source: Karel et al., 1980; Njungunah et al., 1980

The form of preparation influences the varieties preferred for domestic use. In Kenya Malawi and Tanzania, beans are commonly consumed as boiled dry beans (either as stew or Githeri), making the varieties with soft grain when cooked, and thin skins more preferred. Varieties with thin soft seed coats are associated with less cooking time and give soft gravy.

Bean pigmentation and size are also important in consumers' acceptance of a particular bean in these countries. Many consumers in almost all the four countries prefer large brownish/purple or reddish colour seeded beans. Reddish colour is normally preferred because of the red colour it imparts to the food after cooking. Nevertheless, trade-off of seed colour with other superior traits is possible in specific locations and there is a variety of seed colour (Wortmann et al., 1998). Consumers also prefer varieties with good flavour. The palatability of leaves is also an important consideration in varieties grown, particularly in southern Highlands of Tanzania (Hillocks et al., 2006) and Central and Northern regions of Malawi (Kambewa, 1997).

2.0 Crop production and distribution

2.1 Common bean distribution

Cultivation of common bean in Africa is widespread, but production (approximately 80 percent of African bean production) is concentrated in 10 countries (**Table 3**). In terms of area, Kenya is the leading producer of common bean in Africa followed by Uganda and then Tanzania (**Table 3**). Malawi and Ethiopia rank eighth and ninth, respectively according to FAO statistics (FAO, 2008) However, in terms of production, Kenya comes second after Uganda, with Tanzania keeping its third position. Common bean yields are higher in Uganda than in Kenya because of a relatively favourable biophysical environment (such as weather condition) in Uganda

compared to Kenya. In the latest figures from FAO for 2007, however, the production in Kenya has moved above 500,000 tonnes (**Figure 1**).

Table 3: Top 10 producers of common bean in terms of area in Africa in 2000-2007

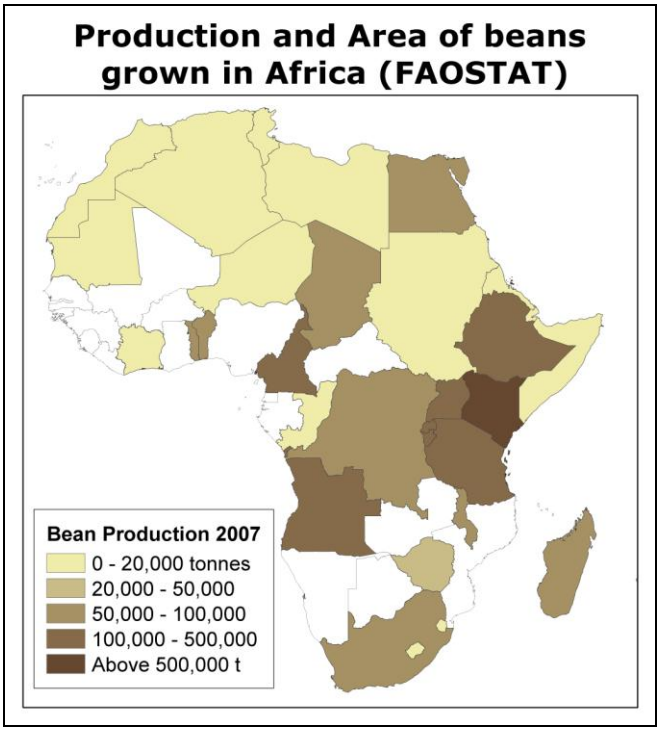
Country	Average area (Ha)	Average production (Tons)
Kenya	910 478	412 381
Uganda	7943 75	478 625
Tanzania	373 125	285 414
Rwanda	340055	231882
Angola	290 391	92 786
Burundi	249 375	229 607
Democratic Republic of Congo	205 958	110 404
Malawi	197 605	87 593
Ethiopia	188 000	143 414
Madagascar	820 96	77 273

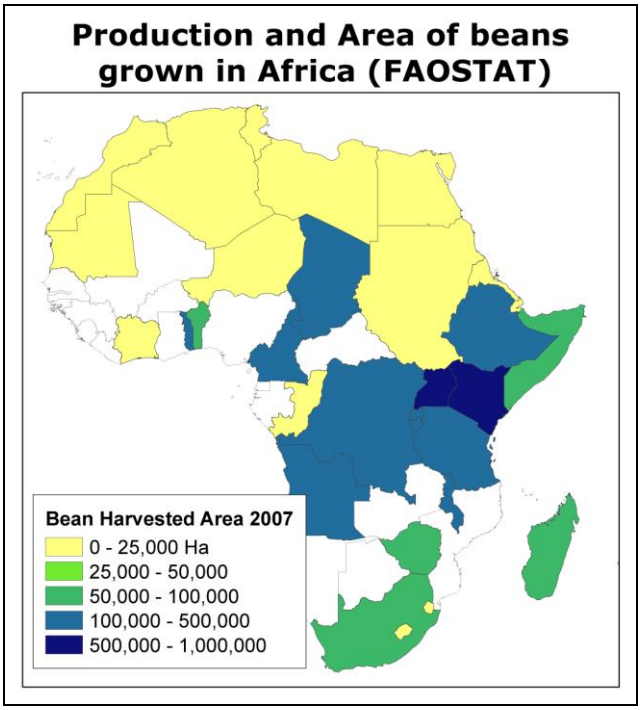
Source: FAOstat at www.fao.org

In Eastern Africa, common bean is grown twice a year, with sowing seasons running from March to April and from September to October, except in parts of Ethiopia where the main growing season is June to August (Rukandema et al., 1981; Wortmann et al., 1998; Ferris and Kaganzi). June and August (Meher seasons) in Ethiopia are wetter months and therefore most reliable while the rain between March and April (Belg season) is considered too unreliable to invest in commercial common bean production[††].

[††] Only 200-300 kgs per timad (equivalent to 625kg / ha) are obtained in March-July sowing season while production increases to approximately 600-800 kgs / timad (1750 kg / ha) in the July-August season (Ferris and Kaganzi (2008)

Figure 1: Common bean production in Africa 2007 (FAO)





In Southern Africa, the main sowing time for common bean is from November to December, with two crops per year commonly grown in the Southern Highlands of Tanzania (Wortmann et al., 1998). Crop production is primarily by small-scale farmers, mainly women, with few commercial farms in Malawi and Tanzania (Kambewa, 1997 and Xavery et al., 2005).

Common bean is also produced in a range of crop systems. About 74 percent of common bean area in Eastern Africa and 57 percent of bean area in southern Africa (Wortmann et al., 1998) are grown under multiple cropping systems[‡‡], mainly in association with maize, banana, roots and tubers, sorghum or millet (Allen and Edje, 1990). The exception is in Ethiopia where white canning beans, which account for about 50 percent of the total, are grown as a sole crop. In Malawi, the crop can also be grown as relay crop after maize; in 'dimba' gardens on residual moisture, under irrigation after a rice crop, and in alleys of tree crops (Chirwa et al., UnPub).

2.1.1 Varieties grown and their spatial distribution

A high degree of diversity (in terms of growth habits, seed shape, size and colour) exists but the most common bean varieties grown in Africa are of bush type with small to medium sized seeds. Bush type common bean is preferred to the climbing type because of it low cost production requirements and convenience for market production[§§]. The climbers predominate the highland areas, where population density is high and land is limiting[***]. The traditional growing areas include: Burundi, Rwanda Democratic Republic of Congo and to a lesser extent in south-western highlands of Uganda, western highlands of Ethiopia, Kenya and Malawi (Wortmann et al., 1998; Allen and Edje, 1990). In recent years, climbers have extended to other countries like Tanzania, Kenya, Angola, and Madagascar as well as expand within the traditional growing countries. Nevertheless, climbing beans still account for a small share of land under beans compared to bushy type. Bushy types are popular in areas where commercial bean production has gain importance because of their early maturing characteristics.

The diversity of common bean seed types in Africa has been reported as massive but varies across the region (Van Rheenen in Njungunah et al 1980; Wortmann et al., 1998,). It is highest (more than 10 varieties) in pure subsistence such as the great lakes region (Rwanda, Burundi and Democratic republic of Congo) and the Southern Uganda and reduces with a higher degree of bean production commercialisation in the

[‡‡] The crop's quick maturity and tolerance of shading have encouraged its widespread cultivation under multiple cropping systems.

[§§] Bushy type beans are less labour intensive and do not need stakes, are early and uniform maturing, which makes them attractive for market-oriented producers.

[***] Climbing bean types are preferred in the highlands because they are potentially high yielding (capable of giving two to four times the yield of bush varieties).

central rift valley of Ethiopia. Wortmann et al (1998) classified common bean varieties into 9 major classes according to colour and size as: pure large reds, medium and small reds and red mottled, Purple, Yellow and tans, cream, navy/white and black. Spatial distribution of seed types in Eastern and Southern Africa (ESA) is a result of many factors but market forces and agro-ecological conditions are major.

The reds and red mottled beans are the most common types due to market preferences. Wortmann et al. (1998) estimated an aggregate area share of about 50 percent for pure reds and red mottled in Eastern Africa and about 27 percent in southern Africa. With the economic growth steadily increasing in most of the sub Saharan African countries but high rate of non-industrial led urbanization, the commercialisation of common bean is expected to grow rapidly in the medium term. Hence, the market preferred varieties would spread further in new areas. However, the current preferred market varieties are less tolerant to the important biophysical constraints (drought and poor soils, diseases) and the predicted effects of global warming on the climate in the region could alter the variety distribution trend.

2.1.2 Common bean distribution in Ethiopia

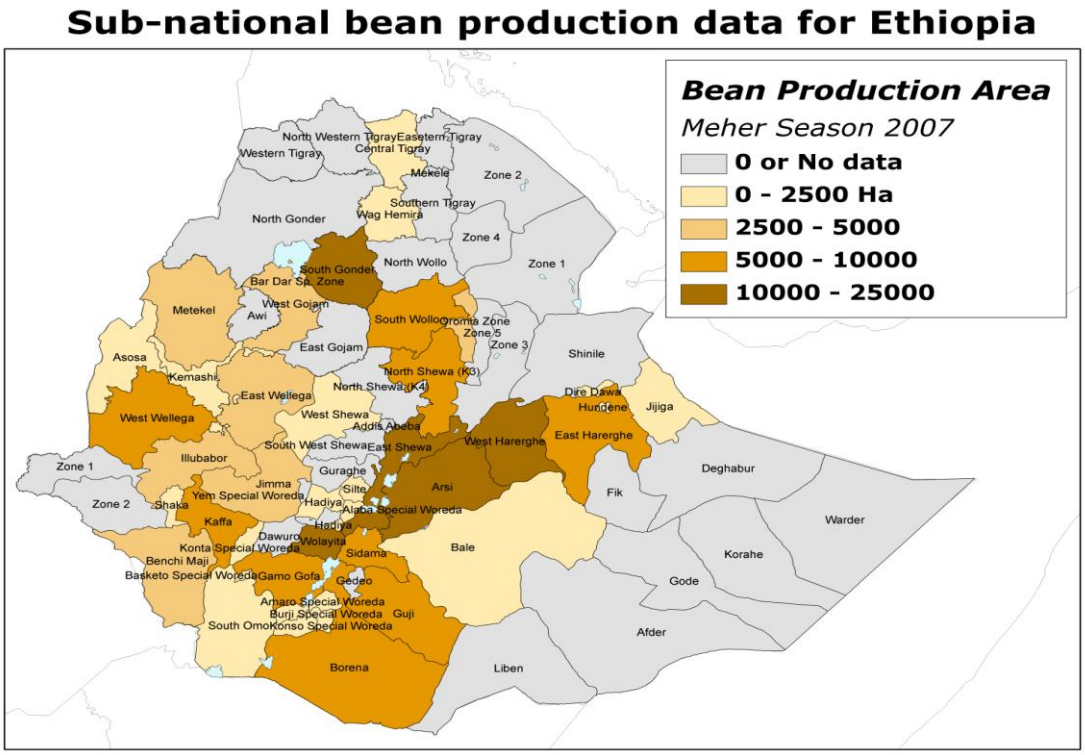
Common bean in Ethiopia is produced in almost all the regional states with varying intensity (**Fig. 2**). Production is concentrated in two regions: Oromiya and the Southern National Nationality Peoples region (SNNPR), which account for about 85 percent of the total national production (**Figure 2**). The remaining 25 percent comes from Afar, Amhara, Tigray, Somali, Gambella and Benishangul-Gumuz (Alemu, 2002). Two use groups of common beans: white canning and coloured food type, are grown. The white beans dominate in the Oromiya region (Northeast rift valley), where more than 95 percent of farmers grow it and account for about 50 percent of total common bean production (Dawit and Bekele, 2005 and Legesse et al., 2006)[†††]. On the other hand, the coloured bean type dominates SNNPR, south of lake Ziway, (Ferris and Kaganzi, 2006).

Farmers in Oromiya prefer white bean because of its earliness, which makes it suitable as a safety crop during the months of October and November when other

[†††] White pea beans are also the dominant pulse grown in the region.

crops are still in the field and not yet mature to provide food (Alemu, 2002). However, area under the white beans depends on rainfall patterns. When rains come late, the risk of growing maize increases and farmers replace maize with beans (Legesse et al., 2006), implying that the area under white beans is likely to be higher when there is rainfall failure in Ethiopia.

Figure 2. Common bean production distribution in Ethiopia, 2007



On the other hand, coloured food types are preferred in SNNPR because of their popularity in the local diet and relatively lower production costs compared to white beans (Legesse et al., 2006). White beans require additional labour for field preparation, keeping away birds as well as purchase seed at planting time. Furthermore, the recent demand for red beans in northern Kenya, associated with drought in these areas, has encouraged production of red beans in this region (Rubyogo, 2005). The varieties within the coloured bean type include the reds, white and black, but the reds are the most important. About 80-90 percent of the area allocated to common bean in SNNPR is designated for red varieties while the white varieties occupy10-20 percent of the area (Ferris and Kaganzi, 2006).

Among the white canning type, the most preferred canning type seed are of oval shaped, with a sparkling white colour and of upright growth habit to avoid damage by

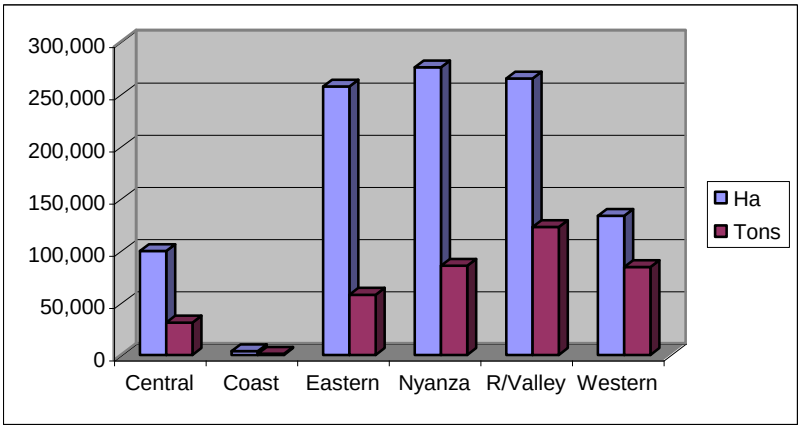
soil and of early maturity. The current popular varieties include Awash 1, Mexican 142 and to a smaller extent Awash Melka (Ferris and Kaganzi (2006). Among the reds, the most favoured include Red Melka, a mottled medium sized red, Red Wolita, a medium sized pure light red, and Naser a small pure dark red variety because of their high demand in northern Kenya.

After liberalization, the white canning varieties had started expanding from their traditional production zones to new areas such as West Arsi and Southern region where coloured food bean types dominate, but this growth was depressed by poor accessibility to bean seed and high demand of coloured beans from Ethiopia by Kenyan importers. Investment in research, dissemination of improved production technologies and increased seed availability and affordability are the main factors that will spur such growth in canning type beans if the prices remain favourable. However, the future expansion of this variety to the Southern region will also depend on the market prospects of coloured beans in northern Kenya where they are currently exported but future market prospects uncertain. The market trend shows a high growth potential for the Ethiopian canning type beans due to their demand on the international market. There is also anecdotal evidence that there is increasing utilization of common bean as food in the central rift valley which could favour the expansion of red coloured types to this region though without significant effect on white canning bean type at least in the short-medium term.

2.1.3 Common bean distribution in Kenya

Common bean production in Kenya is mainly in highland and midlands. About 75 percent of the annual cultivation occurs in three regions namely; Rift valley, Nyanza, and Eastern Province (**Figure 3**). In terms of output, the rift valley contributes the biggest share, accounting for 33 percent of the national output followed by Nyanza and Western province accounting for 22 percent each. Output from Eastern parts of the country and the coast is constrained by adverse climatic conditions.

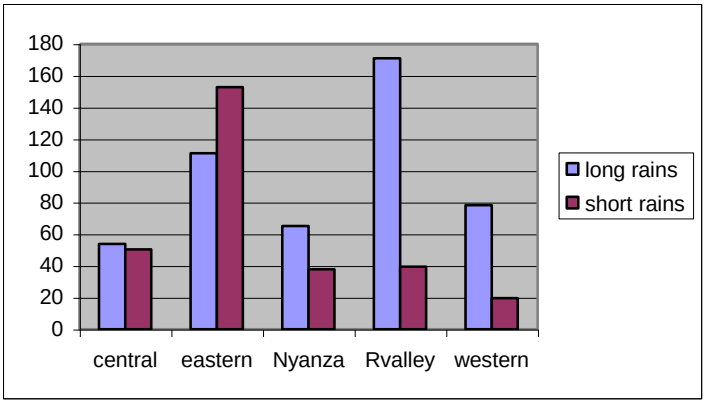
Figure 3. Distribution of common bean acreage and amount in Kenya, 2005



Source: Computed from data from the Ministry of Agriculture published in Karanja, 2006

Although Kenya has two seasons for common bean, a significant number of farmers grow the crop once a year because of adverse climatic conditions (**Figure 4**). The Rift valley and the Western region which respectively produces 33 percent and 22 percent of the national outputs allocates land to common beans once a year, during March-May season (also refereed to as long rains) while farmers in the central and Eastern regions grow twice a year but only 70 percent of the farmers in the Eastern region grow it in the long rains. Almost all farmers in these two regions grow common bean in short rains (October to December) (Per. Comm. with communities).

Figure 4. Common bean average area (000Ha) distribution 1997-2001, by region



Source: Computed from data from the Ministry of Agriculture, published in Spilsbery et al., unpublished report.

An impressive high diversity of common bean seed types exists in Kenya. About 80 different seed types were distinguished in different places of the country in late

1970s(Van Rheenen 1979 in Njungunal et al., 1980), but six are most popular. They included: Red and red/purple mottled (occurring in different local names such as Roseccoco, Nyayo, Wairimu, Kitui etc), Purple/grey speckled (locally known as Mwezimwoja) and Pinto sugars (localy known as Mwitemania). Rosecoco was the most widely grown followed by Canadian wonder type at the time. Rosecoco and Canadian wonder type are high yielding but require heavy rains and high soil fertility to yield well. Consequently, these varieties have been losing area because of increased problem of soil fertility and associated diseases and are being replaced by varieties like large Pinto "sugar bean" locally called "Surambaya" and red haricots that are well adapted to poor soil conditions (W Ronno, R Otsyula and P Kimani, 2001).

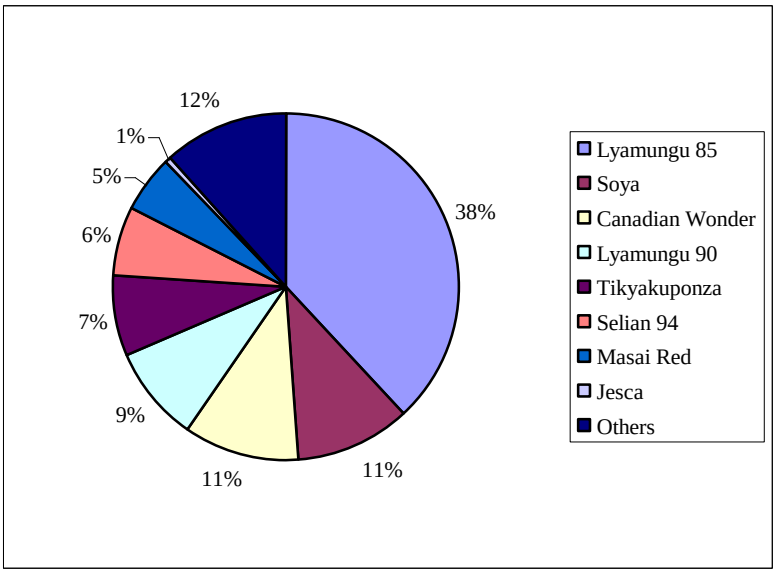
The low input production systems of common bean in Kenya is likely to persist and this will continue to favour the spread of small to medium size varieties, particularly, red or red mottled because of the varieties' preference in making the traditional recipe, *Githeri*. There is a moderate to high growth potential for Githeri due to increased demand from low-income population in urban areas.

2.1.4 Common bean distribution in Tanzania

Common bean cultivation in Tanzania is widely spread but the main production areas are in the northern zone particularly the Arusha region, the great lakes region in the west and in the Southern Highlands. Both local and improved varieties are grown but the most important ones are red, yellow medium sized, and grey spotted types (Wanda and Ferris, 2004). According to the available information, Lyamungu 85, large red/brown Calima type released in 1985, is the most common variety occupying about 38 percent of area under beans in Northern and western Zone of the country (**Figure 5**). The variety is popular because of its high market preference in Kenya where a similar variety has been losing area because of root rot (Wortmann et al., 1998). This is followed by local varieties (Tikyakuponza, Soya and Canadian wonder type), which account for 22 percent of the area under the crop. Soya fetches high prices in the markets and is highly preferred by urban consumers in towns of Northern zone and the coastal town like Tanga, Dar es Salaam and Zanzibar. In Southern highland of Tanzania, orange and yellow bean types, Kablanket and Uyole96 are among the

important bean types and also preferred in the neighbouring countries of DRC, Rwanda and Burundi.

Figure 5. Distribution of common bean varieties in Northern and Western Tanzania, 2004



Source: Own calculations based on data from Xavery et al., 2005

Future varieties

Varieties with a high demand on the regional market such as red mottled, reds and creams are expected to gain preferences by producers due to high market value and the recent promotional efforts in favour of these varieties. In 2000, CIAT together with the two regional networks in Africa, the East and Central African Bean Research Network (ECABREN) and Southern African Bean Research Network (SABRN) together with the national programs in Tanzania developed a bean breeding strategy that focuses on market led-approaches. Tanzania is already successful in production and exporting these varieties in Kenyan. Increases in the regional trade in common bean may further promote the production and expansion of these varieties in the country.

2.1.5 Common bean distribution in Malawi

Common bean is grown throughout Malawi, but commonly in areas between 1000 and 1700 meters above sea level during the rainy season, with mean annual rainfall of

800 to 1500 mm. Studies conducted in 1990s show that Dark red Kidney (locally known as *Chimbamba* and a purple/red mottled (locally called Nyangati) were the most favoured across all regions. Recent studies indicate that *Chimbamba* a large dark red Kidney has been losing area because of increased problem of soil fertility and associated diseases. Regional preference for some other varieties has been reported. For example, dark green is preferred in the Northern region while the south prefers Khaki with purple speckles (Kambwewa, 1997).

2.2 Trend in production of common bean in Eastern and Southern Africa

The trend in the production of common bean was computed for the area, output and yield for each country individually over the periods 1970-2004 using the FAO data, obtained from the FAO Archives available on www.fao.org. FAO data are based on reports submitted to FAO that are frequently incomplete or missing for some years and hence some of the data on the website have been estimated by FAO, with some of the data series obviously generated rather casually. However, the FAO common bean production data are reasonably complete for most of the African countries for 1961-2007 for which analysis across countries and time can be undertaken; and are available at the FAO website. For these reasons, these data have been used in nearly every previous study of common bean production in African countries even though their weaknesses were recognized. In recognition of these problems, production data from Agriculture departments in the study countries, where available, was used to supplement FAO data.

2.2.1 Trend in land area devoted to common bean in Eastern and Southern Africa

Common bean production in Eastern and Southern Africa has been largely extensive rather than intensive. FAO data shows that area under the crop has grown by 20 percent in the last two decades. Area has been growing rapidly in Eastern Africa compared to Southern Africa and the great lakes sub-regions‡‡‡. The share of common bean area in the Eastern Africa sub region grew from 35 percent in 1970-1989 to 47.5 percent in 1990-2007 while it decreased by 7.8 percent in the great lakes region and

‡‡‡ Countries included in the Eastern Africa are Kenya, Uganda, Somalia) while those in great lakes region are (Rwanda, Burundi and the Democratic republic of Congo) and Southern African countries are Tanzania, Malawi and Zimbabwe

6.6 percent in Southern Africa during the same period (**Table 4**). The slow expansion of area under common beans in Southern Africa and the great lakes sub-regions may be associated with relatively high population pressure especially in Rwanda, Burundi, Malawi and Zimbabwe that has made land for agriculture less accessible. Civil wars in the Democratic Republic of Congo and Rwanda in late 1990s disrupted agriculture, which could have contributed to the reduction in area share during the period. FAO data shows that during this time in the two countries, area under common bean was declining at a rate of 2.5-2.8 percent. The climbing bean type, promoted by National bean programmes and CIAT, is being adopted in these countries, particularly in Rwanda, as a response to the problem of high population pressure.

Table 4: Trend in common bean area distribution in the major producing sub-regions of Africa, 1970-2004

	Common bean Area share (%)		Change in area share (%) between the two period
Regions	**Period 1970-1989**	**Period 1990-2007**	**18 years**
East Africa	35.0	47.5	10
Great Lakes	32.	24.3	-7.8
Southern Africa	25.0	19.1	-6.6

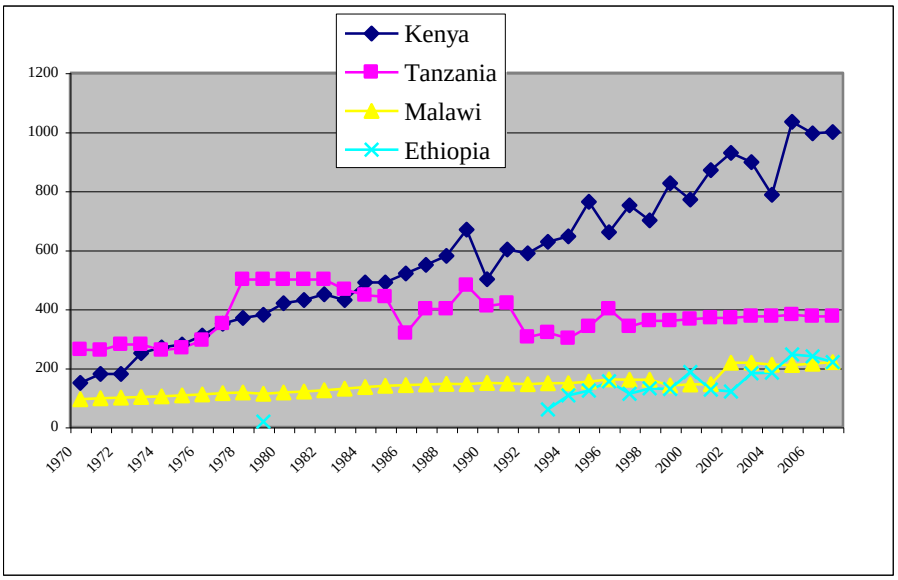
Source: FAO stat at ww.fao.org

In recent years, however, there has been an accelerated growth in area expansion in all countries included in the analysis, but the growth rates differ across countries (**Figure 6 and table 5**). The highest growth rate was experienced in Ethiopia and lowest in Tanzania. In Ethiopia, area grew at a rate of 11 percent per year in 2001-2007, exceeding the average growth rate of 1990s (**Table 5**). Common bean area has more than doubled, increasing from around 60,000 ha in 1993 to 220,000 in 2007 (**Figure 6**). The acceleration in area expansion in Ethiopia is driven by good market incentives following the economic reforms and market liberalization in mid 1990s that enabled many private traders into common bean exportation (Alemu and Bekele, 2005). This demand drive, traditionally dominated by local exporters, has been boosted further, by the recent investment of large companies into the export market in the country as well as development interventions into the crop sub-sector.

During the same period, common bean area in Kenya expanded from about 870,000 ha in 2001 to about 1 million in 2007, growing at an average annual rate of 2.6

percent (**Table 5**). Unlike in Ethiopia, area expansion in Kenya is driven by domestic consumption demand rather than export demand as production remains below domestic consumption levels.

Figure 6. Trend in common bean area (000Ha) in the four countries of Eastern and Southern Africa, 1970-2007



Source: FAO stat at ww.fao.org

Similar trends can be observed in southern Africa with area growing at a rate of 4.3 percent in Malawi and 0.3 percent in Tanzania (**Table 5**). Common bean area in Malawi shifted from 145,000 ha in 2001 to 220,000 ha in 2007, a 50 percent increase in area. Domestic demand is expected to be the underlying factor behind this acceleration in area expansion as the alternative protein sources (i.e. meat and fish) become less accessible (Chirwa et al 2001; Kambewa, 1997). On the other hand, Tanzania has experienced the least growth in area since 2001 with the growth rate increasing from 0.0 percent in 1990s to 0.3 percent in 2000s. The smaller increase in area for Tanzania can be explained by both relatively better yield and uncertain regional demand. Tanzania has a comparative advantage in the production of common bean in the region but regional demand fluctuates with fluctuations in the production of importing countries, reducing its impact on production in exporting countries.

Table 5: Trend in common bean area in Eastern and Southern Africa: 1961–2007

Country	Percent annual growth rate in area			
	1961-2007	1970-1990	1991-2000	2001-2007
Kenya	4.2	5.7	3.5	2.6
Tanzania	1.1	2.3	0.0	0.3
Malawi	2.3	2.3	0.0	7.1
Ethiopia	-	-	9.3	11.1

Source: FOA stat at www.fao.org

2.2.2. Trend in yield

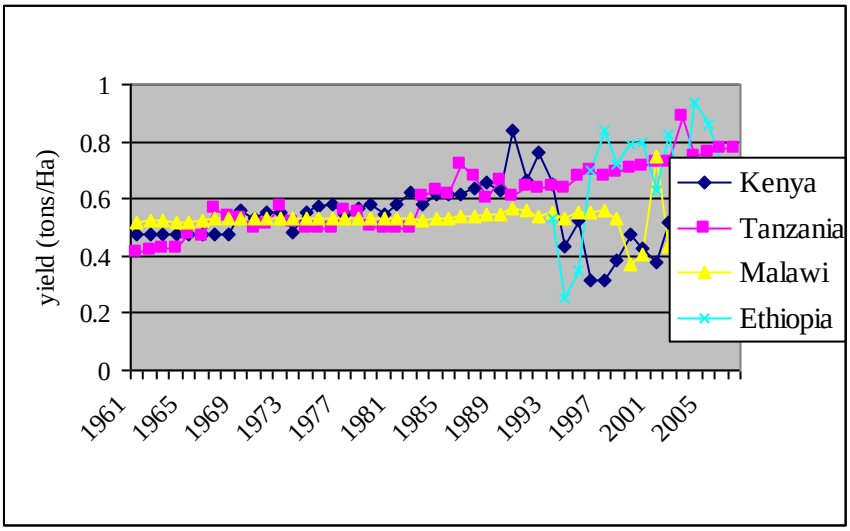
Like many other crops in East and Southern Africa, common bean yield has been growing slowly compared to area in the last 30 years. Estimation based on FAO data, indicates that yield growth rates were positive in 1970-1990 ranging from an average of 0.3 percent in Malawi to 1.4 percent in Kenya and Tanzania; but the trend reversed in 1991-2000 for Kenya and Malawi (**Table 6**). During this period, yield declined at an average rate of 6.8 percent in Kenya and about three percent in Malawi (**Table 6**). The rapid yield decline in Kenya was due to an outbreak of diseases associated with long standing soil fertility decline in major bean producing parts of the country (Odendo et al., Unpub) while low growth rates in Malawi was attributed to a combination of factors that ranged from biotic, abiotic and social economic factors such as lack of seed for improved high yielding varieties and institutional factors (Mkandawire, 1992 and Kambewa, 1997). Kambewa (1997) report that in early 1990s, the government of Malawi changed its policy that originally burred smallholders from growing tobacco and barley, encouraging smallholders with 0.7-1.5 ha of land to shift some resources to production of cash crops, leaving common bean production concentrated among smallholders of less than 0.7 ha that could have worsened the low input production systems of the crop. Since 2001, the two countries achieved a significant impact on their bean sub-sectors from the development and dissemination of disease resistant varieties as well as improvement in the delivery of improved varieties, enabling the yield to recover from a declining rate to zero growth rate (**Table 6**). Malawi recorded yield gains in the last three years and has been able to show an increasing trend. Nevertheless, yield in both countries is still low and unstable, fluctuating between 0.35 ton/ha to 0.54 ton/ha in Kenya and 0.36 ton/ha to 0.75 ton/ha for Malawi, perhaps due to intensification of drought (**Figure 7**).

Table 6: Average yield and its growth rates in Eastern and Southern Africa, 1961-2007

Period	Kenya	Tanzania	Malawi	Ethiopia*
	Annual growth rate (%) in yield			
1961-2007	0.00	1.3	-0.3	-
1970-1990	1.4	1.4	0.3	-
1991-2000	-6.8	1.4	-3.1	11.1
2001-2007	0.0	0.0	0.0	0.0
	Average (tons/Ha) yield in different period			
1961-1970	0.49	0.48	0.52	-
1971-1980	0.55	0.52	0.53	-
1981-1990	0.64	0.61	0.54	-
1991-2000	0.49	0.67	0.51	0.50
2001-2007	0.45	0.77	0.46	0.75

Source: FOA stat at www.fao.org. * Estimates for Ethiopia were based on data from CRS published in Legesse et al., 2006

Figure 7. Trend in common bean yields in the four countries of Eastern and Southern Africa 1961-2007



Source: FAOstat at www.fao.org

In Tanzania, common bean yield has increased steadily from 0.48ton/ha in 1970 to 0.77ton in 2001-2007. The yields are even higher in high potential areas of Southern Highlands like Iringa region where average yield is estimated at 0.93ton/ha (Office of Iringa regional commission). Increase in yield in Tanzania is associated with adoption of new high yielding varieties; developed and disseminated by NARS with CIAT since early 1980 (Xavery et al., 2005). The most popular varieties in the Northern zone are Lyamungu 85 and Lyamungu 90 released in 1985 and 1990 respectively (Xavery et al., 2005). However, in 2001-2007, yield growth has been slow and stagnant in some parts, as Lyamungu 85, the most widely adopted variety, increasingly becomes more susceptible to pests, diseases and drought. In Northern

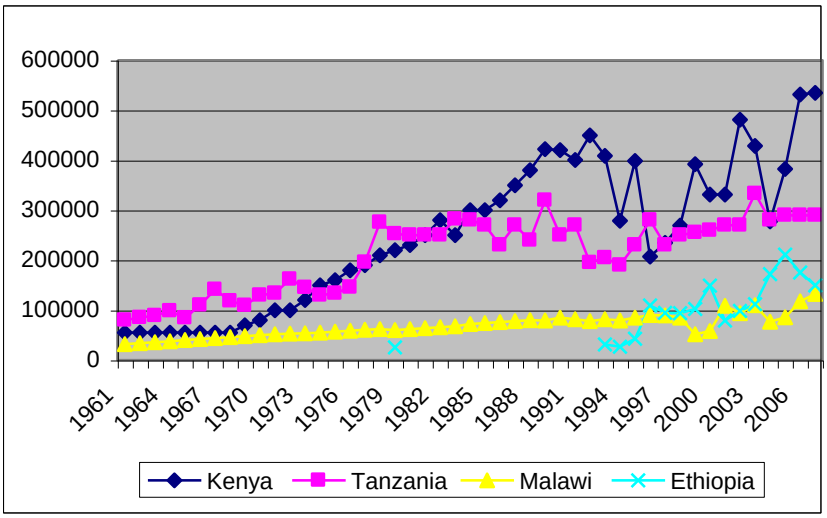
Tanzania, common bean production has been extending to lowland areas, where rains are low and erratic, due to population pressure in high rainfall zones (Xavery et al., 2005).

In Ethiopia, common bean yield accelerated rapidly, at a rate of 11 percent, immediately after liberalization in mid 1990s, but this positive growth did not last long as yields seem to have stagnated during 2000s (**Table 6**). Improvements in farm gate prices that accompanied market liberalization encouraged farmers to improve the quality of seed by buying from better stores and cooperatives. However, the majority of the farmers still lack access to improved high yielding varieties which has slowed down growth in national average yield figures. Furthermore crop husbandry is still poor with a significant number of farmers weeding once or not at all (Legesse et al., 2006; informal discussion with communities). Like in other countries, common bean yields in Ethiopia are very vulnerable to weather fluctuations.

2.2.3. Trend in Production

Despite a relative growth in area for common bean in all the countries since 2001, this growth does not seem to have been sufficiently large to increase production over the previous averages in Kenya due mostly to poor yield. Kenyan common bean production has been volatile with many spikes and dips that cancel out, leaving on average, a zero growth in production over the last 7 years (**Figure 8**). As expected, production of common bean in Malawi has been increasing at a rate of 6.1 percent, because of a significant increase in area (estimated at 7.9 percent). Similarly, the effect of accelerated area expansion during 2001-2007 in Ethiopia resulted in a significant average of 99 835 tons of common bean that exceed the production average of 1990s (**Table 7**), again reflecting the power of market forces in stimulating production in the country.

Figure 8. Trend in common bean production (ton) in the selected Eastern and Southern countries, 1960-2007



Source: FAO stat at www.fao.org

Table 7: Average common bean production and its growth rates in Eastern and Southern Africa, 1961-2007

	Kenya	Tanzania	Malawi	Ethiopia
Period	Annual growth rate (%) in production			
1961-2007	3.7	2.2	1.8	-
1970-1990	6.9	3.6	2.6	-
1991-2000	0.0	5.9	0.0	19.6
2001-2007	0.0	0.0	6.1	7.3
	Average production (tons)			
1961-1970	59000.0	104618.0	41000.0	-
1971-1980	166000.0	182463.0	57500.0	-
1981-1990	343826.9	282456.0	79950.0	-
1991-2000	297012.6	209500.0	69814.0	65112.0
2001-2007	296762.2	202331.0	64252.0	99835.0

Source: FAO stat at www.fao.org. Estimates for Ethiopia were based on data from CRS published in Legesse et al., 2006

2.2.4. Outlook of common bean production in ESA

The outlook for common beans in ESA is reasoned based on the current environment. All countries in Eastern and Southern Africa are experiencing high population growth with the urban population growing faster than the national average. With the economic growth steadily increasing but slow and high rate of non-industrial led urbanization, the low-income urban population that cannot afford alternative sources of protein will increase. The anticipated higher prices for crude oil also mean that the prices of imported goods as well as domestically produced goods including food will increase above previous average. The income share spent on food will increase in poor

countries, particularly among the urban poor and low cost protein source such as common bean will substitute high cost protein source such as meat or fish in the family food expenditure. The outlook is analysed in a context of assumed sustained economic growth, higher global prices for crude oil, contained inflation, constant real exchange rates and unchanged policies.

Generally, the current trend in production suggests that all countries included in the analyses will continue to experience a positive growth in production but this growth will come from area expansion. The exogenous factors stimulating growth will be country specific. In Ethiopia, the export led agricultural commercialisation policy will continue to stimulate growth in production. Since market liberalization and consequent improvement in producer prices, production of common bean, particularly the canning type has been trending upwards. The outlook expects the trend to continue at least in the medium term given the projected higher prices for grains that will affect production of common bean in the traditional export countries. The previous trend on the supply side after market liberalization, lends support to this forecast. Immediately after market liberalization and consequent increase in producer prices in mid 1990s, there was a big leap in production and export of common bean between the two periods. Production increased from the average of 33 831 Mt of bean in 1993/95 to 76 094 Mt in 1996/2000, an equivalent of 224 percent growth due to a combined effect of area expansion and growth in yield (Alemu and Bekele, 2005).

The expansion of area under common bean in Ethiopia is constrained by poor land and credit policies. The current land market limits access to land and will work towards suppressing the expansion of common bean area in the long term. The second force may potentially originate from the competing crops such as maize and wheat whose prices are projected to rise. Even after liberalization and consequent rise of the price of common bean, prices are still below those of most cereals on the domestic market. With the projected price rise for most cereals, this could widen the gap between the prices of cereals and common bean, prompting a substitution of crops on land.

However, the risk consideration suggests that the uncertainty associated with bad weather conditions, which is anticipated to intensify, favour the production of common bean over cereals in Ethiopia, thus could neutralize the competition from

cereals. For example, when prices increased systematically from US$ 200 to US$ 287 in 1993-1995, production responded by 1.1 percent for every additional 1 percent increase in the price. However, in 1995-2000, prices were falling back to towards the level of 1993 and the trend in production reversed from upwards to downwards but the fall in production was less significant compared to the rise, implying that the underlying forces that drive production of common bean upwards are likely to outweigh the forces that will tend to push it down.

In Kenya, current trends of common bean production suggest low to stagnant growth, though demand is expected to continue growing. In the last ten years, production of common bean in Kenya has been growing at a rate of 5.2 percent with the area expansion (at an average rate of 3.3 percent per year) as the main source of this growth. The area is forecast to continue to increase although with some moderation in the rate of increase to below the current rate of 3.3 % in the next 10 years due to land shortage associated with population pressure. The anticipated higher agricultural commodity prices will stimulate production of crops including common bean but this will be achieved by area expansion as the cost of high input such as fertilizer, improved seed will be higher than previously in response to higher fuel prices. The supply response in terms of area to price changes is some how inelastic (about 0.41 percent), implying that price increases may not have large impact in area under the crop. The predicted increases in drought and floods associated with global warming provide a big threat to common bean production in Kenya. This is because most varieties currently grown in the country have low to moderate drought resistance. New pests and diseases are likely to come up with increases in floods. Therefore, research and accessibility of drought/pest and disease tolerant varieties by farmers should be facilitated.

Population growth and regional trade play an important role in the growth of common bean production in Tanzania. As population increases, domestic demand will continue to drive production of common bean in Tanzania. Stacked on top of domestic demand is the projected increase in the regional trade in common bean, with some countries destined to expand their imports. Tanzania is the region's lowest cost producer of common bean and is well placed to increase exports to its neighbouring countries, especially Kenya. Overall, these forces are expected to stimulate production, especially when the agricultural commodity prices are higher than previous averages.

Owing to the growing export demand, low fertilizer use and low yield levels, there will be an incentive to plant more land to common bean. Yield may resume its upward trend as more farmers replace local varieties with high yielding improved varieties demanded on the regional market to maximize their return, but yield growth is not expected to match the rate attained in the previous decade. On contrary, production is expected to continue to decline and domestic demand will exceed production in Malawi. Currently, Malawi imports common bean from Tanzania and Mozambique through informal channels. Although area expansion appears to have accelerated in recent years, it is not expected to grow rapidly due to land shortage.

3.0 Utilization

In Eastern and southern Africa (ESA), common bean is produced mainly for food and canning but the haulms and stalks are used for animal feed or can be recycled as manure in crop production. In Ethiopia, the damaged grains are processed into animal feed (Per communication with Extension workers at IPMS). Common bean also plays an important role in the soil fertility amendment practices of low input farming systems of Africa. In Ethiopia, white bean is considered a break crop in the cereal dominated cropping system and is often planted on fields previously planted to *tef*, wheat, barley and sorghum because farmers believe that the crop does better on soils with low fertility status (*Gonbore*) compared to other crops (Legesse et al., 2006). According to Lagesse et al. (2006), large-scale commercial production has also started to emerge using white beans as break crop to mange soil fertility.

3.1. Food use

Consumption and contribution of common bean to human nutrition in Eastern and Southern Africa is relatively high, due to high population (growing at 2.2-2.6 percent per year) and the low incomes (**Table 8**). Domestic use, mainly as food for human consumption and seed, ranges from 70-100 percent of production depending on the country. It is highest in Kenya, estimated at 100 percent, where domestic consumption demand often exceeds domestic production and lowest in Ethiopia, where production is historically meant for export. Per capita consumption is estimated at 14 kg per year in Kenya, but can be as high as 66 kg/yr in western Kenya (Spilsbury et al., 2004; Buruchara, 2007). Consumption is also higher than national average (estimated at 13

kg per year) in Karagwe district of Tanzania, where common bean is served on every meal (Xavery et al., 2005). In Ethiopia consumption is primarily at farm level, as urban consumers prefer other highland pulses like faba bean and field pea. In Ethiopia, common bean consumption ranges between 1-16 kg per year in Ethiopia (Ferris and Kaganzi, 2008). There is anecdotal evidence that consumption of common bean in Ethiopia has recently been growing.

Table 8: Demographic and economic indicators of growth

Country	Population Million	Population annual growth rate (%)	Per capita GNI US$	Urbanization rate (%)
Kenya	37.6	2.6	530	-
Tanzania	40.4	2.4	350	5.0
Malawi	13.0	2.2	160	6.3
Ethiopia	71.3	2.6	160	-

Source: World bank, 2008

3.2. Trend in per capita availability

When the growth in per capita availability is compared with the population growth, a production gap emerges. **Figure 9** shows that per capita availability of common bean in Eastern and Southern Africa was highest in 1980s. It grew steadily in the 1970s exceeding per capita consumption in 1980s for almost all countries, despite rapid population growth as production during that period grew even faster than population. Per capita availability was growing fastest in Kenya at an annual growth rate of 3.7 percent and lowest in Malawi at a rate of –0.01 percent (**Table 9**). In 1990s, per capita availability declined in most countries as a result of stagnant production relative to rapid population growth (**Table 7** and **Table 9**). The exception was in Ethiopia where production was growing rapidly at an average rate of 19.6 percent, exceeding the population growth rate (2.8 percent) (**Table 7** and **Table 9**).

Since 2000, per capita availability seems to have recovered from a downward trend of 1990s to near upward trend in Kenya, Malawi and Tanzania (**Figure 5**). This recovery was a combined effect of improved production and reduction in population growth especially in Kenya and Tanzania (**Table 9**). However, the improvement in production is still too small and statistically insignificant (**Figure 8**). Furthermore, per

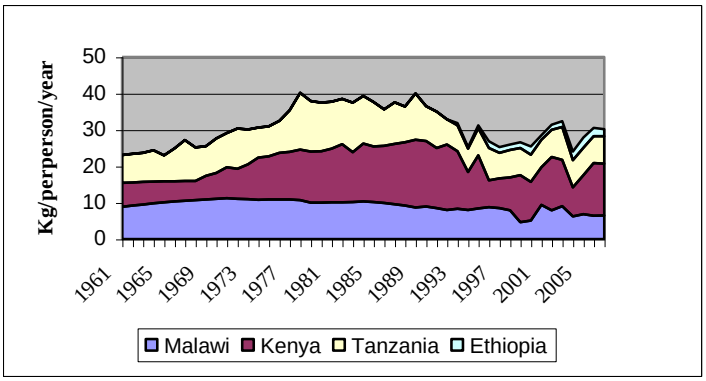
capita availability has become less stable since 2000 in almost all countries, implying an increased risk of food and seed insecurity in the region.

Table 9: Annual growth in Kenyan population and per capita bean availability between 1970-2007

Country	Annual growth rate (%)	1970-1989	1990-1999	2000-2007
Malawi	Population	3.5	1.6	2.2
	Per capita availability	-0.01	-2.9	0.0
Kenya	Population	3.6	2.7	2.6
	Per capita availability	3.7	-7.8	0.0
Tanzania	Population	3.1	3.0	2.4
	Per capita availability	1.3	0.0	0.0
Ethiopia	Population	-	2.8	2.6
	Per capita availability	-	17.8	0.0

Source: FAO data at www.Fao.org and World Bank, 2008

Figure 9. Per capita availability of common bean in the selected ESA, 1961-2007



Source: Computed from FAO data at www.fao.org

3.3. Outlook of common bean consumption demand in ESA

Consumption demand in eastern and Southern Africa is expected to continue growing due to rapid population growth (about 2.5 percent) and low incomes. Although economy is also growing, with GNI per capita estimated at US$ 160 in Malawi, US$ 350 in Tanzania and US$ 530 in Kenya (World Bank, 2008), high non-industrial led urban growth (estimated at 5 percent) and low livestock production, means that the demand for low cost high protein source like common bean is destined to increase even further. The current demand for common bean in Kenya and Malawi already surpasses domestic production and this trend is forecast to continue given high population growth rate, weather turbulence and stagnant-to-declining yields. The demand for common bean will also increase generally due to increase in the cost of living as the prices particularly those for the imported goods are likely to increase due

to increase in fuel prices. Nevertheless, the domestic demand for common beans in Ethiopia is not expected to rise considerably since consumption of common bean in the country is traditionally low and significant only in rural areas where the crop is produced[§§§]. Secondly, with urban populations growing faster than the national average, growth in rural demand will be neutralized by a shift away from common bean as people migrate to urban area.

4.0 International trade

4.1. World exports

Globally, trade in common bean has been trending upwards, with export volume growing from 500,000 tons in late 1960s to 3.5 million tons in 2003. This growth came mainly from the expansion of supplies in Canada, Myanmar and China, the traditional major exporting countries. These countries account for about 80 percent of the world common bean exports in 2006. However, other legumes are often confused with *Phaseolus* beans in the FAO data of Myanmar and possibly China, as well as India. Therefore, these data must be viewed with scepticism, although certainly China is confirmed to be an important exporter of common bean. East and Southern Africa, contributes 3.3 percent of the exports, with Ethiopia as the main contributor accounting for an average of 0.92 percent of the world exports, followed by Uganda (0.49 percent) and Tanzania 0.35 percent (**Table 10**).

Table 10. Exports from selected regions and countries during 2000-2006.

Country/region	Export volume in 2006	Average share of world exports (2000-2006)	Average growth rate (2000-2006)	Average growth rate in prices (2000-2006)
World		-	0.0	5.8
China	747567	24.5	0.0	0.0
Mynamar	667249	27.6	-9.2	-
Canada	309892	9.5	4.3	4.5
Argentina	226479	7.8	-5.1	3.9
USA	354827	10.9	0.0	3.2
ESA	57348	3.3	0.0	-

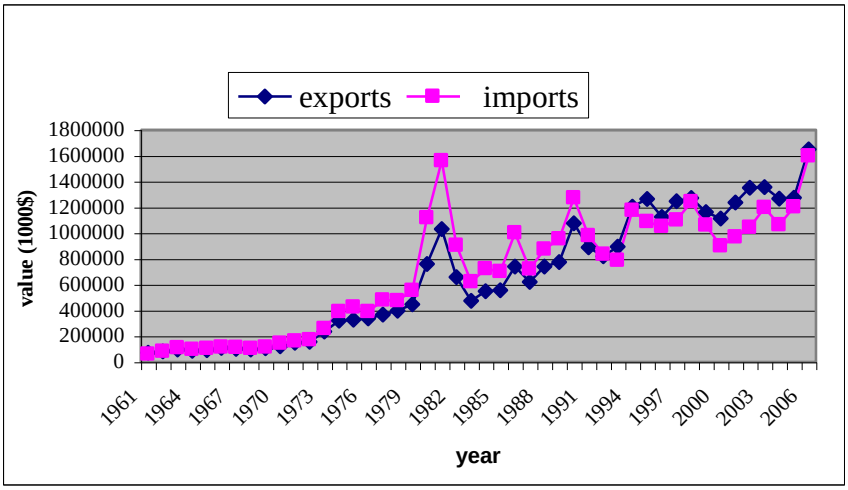
[§§§] Common bean is generally considered inferior as food by the urban dwellers in Ethiopia who are also wealthier than rural dwellers (Ferris and Kaganzi, 2008)

Tanzania	13813	0.35	0.0	0.0
Malawi	3062	0.04	0.0	0.0
Uganda	25269	0.49	0.0	7.2
Kenya	1022	0.08	0.0	0.0
Ethiopia	13191	0.92	16.5	6.1

Source: FAO stat at www.fao.org

Recent trend shows that common bean exports has been declining in Mynamar (9.2 percent), Argentina (5.1 percent) while increasing in Peru, Bolivia, Indonesia, Belgium, Euador, Mexico, Portugal, Djibouti and India. However, the overall growth in these countries has not been sufficient to stimulate an upward growth in world export volumes in 2000-2006, forcing nominal prices to resume their upward trend from stagnation in 1990s in most countries (**Table 10**). The International markets also show growth in value of traded common beans. The value of world traded common bean has increased by three fold, growing from USA $ 500m in 1980 to USA$1500m in 2006 (**Figure 10**).

Figure 10. Global trade in common beans, 1961-2006



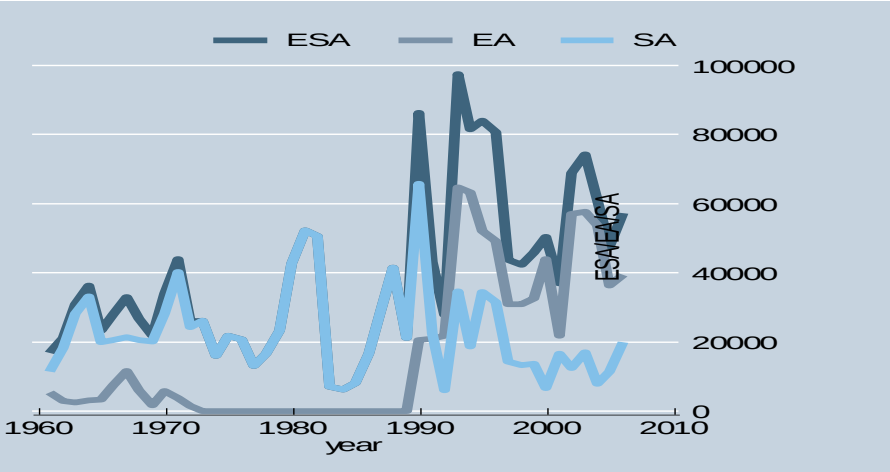
Source: FAO stat www. fao.org

4.2. Exports from Eastern and Southern Africa

Aggregately, export volumes from ESA show a positive trend. Individually, exports are trending upwards for East Africa while that of Southern Africa is trending downward (**Figure 11**). Uganda and Ethiopia are the main exporters in Eastern Africa (EA) while Tanzania, is the main contributor of exports from Southern Africa (SA). In

the last 10 years, Ethiopia registered significant increase in its export volumes compared to Uganda and Tanzania. A substantial export volume from Tanzania and Uganda is informal and often goes unrecorded. Hence, there is possibility that FAO data could underestimate the exports from these countries and these results should be interpreted with caution.

Figure 11. Trend of exports from Eastern and Southern Africa 1960-2006

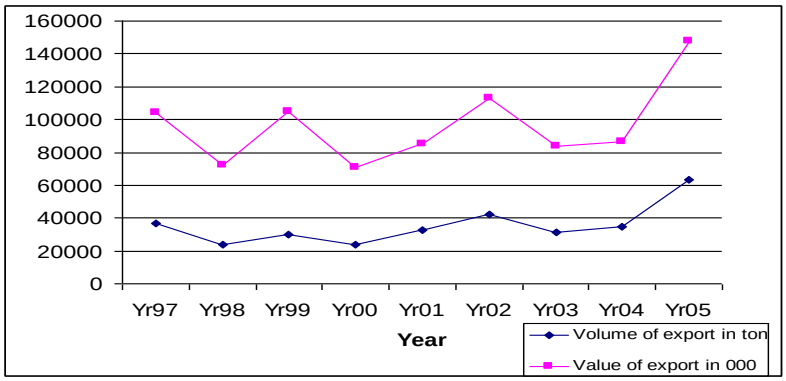


Source FAOSTAT www.fao.org

4.2.1. Common bean exports from Ethiopia

Ethiopia was traditionally an exporter of common bean, but the trend in the growth of export was disrupted by domestic problems during the period of the Derg (Ferris and Kaganzi, 2008), resulting in about 75 percent fall in export volume (Alemu and Bekele, 2005). Poor marketing policies also contributed to this down fall (Alemu et al., 2003). Starting with the market liberalization in mid 1990, both export volume and value have increased significantly exceeding their former levels of early 1970s in 2005 due to improvement in competition and subsequent increase in prices (**Figure 12**)

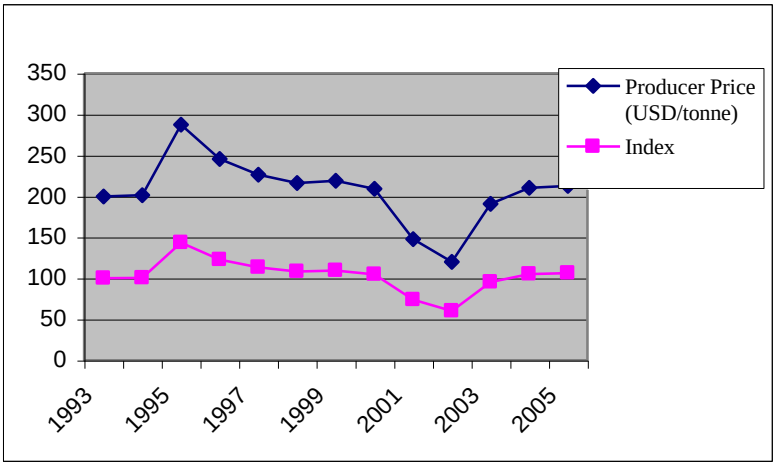
Figure 12: Volume and value of total common bean exports from Ethiopia during the 1997-2005



Source: Legesse et al., 2006

There is now fierce competition among exporters that has pushed up the price of common bean, particularly the white canning type, growing at a rate of 16.2 percent per year between 2002 and 2005. A discussion with exporters reveals that traders expect prices to remain high or increase further because of high demand that currently exceeds the supply by far. While increasing, prices are very unstable due to the seasonal nature of sale, lack of market information and speculation of future price and demand by traders (Legesse et al., 2006). Such price uncertainty reduces the farmers' expected returns from the crop and their consequent investment in production.

Figure 13. Trend in producer price of common bean in Ethiopia, 1993-2005



Source: Computed from FAO data at www.fao.org

The biggest proportion of the Ethiopian common bean exports is the white canning type, followed by the red kidney type that accounts for about 20 percent of exports (Legesse et al., 2006; Ferris and Kaganzi, 2008). The available information also suggests that about 10,000 metric tons of red food type beans are exported per year to

northern Kenya in recent years, but this market depends on the severity of rainfall failure in Kenya (Ferris and Kaganzi, 2008).

The main destination for Ethiopian white canning beans is in Europe, Africa, the Middle East, South Asia and Far East (Legesse et al., 2006). About 50 percent of Ethiopia's bean exports go mainly to Europe, Italy, North Africa and sub-Saharan Africa (Legesse et al., 2006), reflecting the country's location advantage. Ethiopia has time[****] and location advantage over Canada (whose beans enter almost the same time) but Canada's beans are superior in terms of volume and quality. Ethiopia also has a cost advantage in the international market, which has attracted big and experienced international companies into the Ethiopian export market. Two international bean-trading companies, Poortman and ACOS, were licensed to export beans from Ethiopia in the past 2-3 years. ACOS is a growing industrial processor that supplies almost 80 percent of the baked beans in the USA and Canadian markets. The company already has significant investments in Argentina and China but Ethiopia has both time and cost advantages over China. While it takes 9 weeks for sea shipment of beans from China to EU markets, it only takes 3 weeks from Ethiopia and this confers an advantage for Ethiopia, as long as costs remain low. Consequently, Ethiopia's market share in Europe increased from less than 5 percent in 1997-2004 to 7 percent in 2005 (Legesse et al., 2006). Another entrant into Ethiopian bean market is a Syrian based company that set up a new export factory in the country in 2006. Their white beans are destined for South Africa while the red haricot beans are destined for Turkey and Saudi Arabia. South African production is insufficient for the small white canning bean and its imports are mainly from the USA and Canada. As already noted, exports from USA are dwindling, which may help Ethiopia to expand in this market if production continues to grow.

4.2.2. Outlook for common bean exports from Ethiopia

The current signals suggest that the future market prospects of Ethiopian produced common bean are good and the demand is forecasted to increase as the prices of grains on the world market increase. The prices of grains such as wheat and maize are projected to increase in the medium term above their past averages due to the increased demand from industrial use, most notably for bio-fuel production in

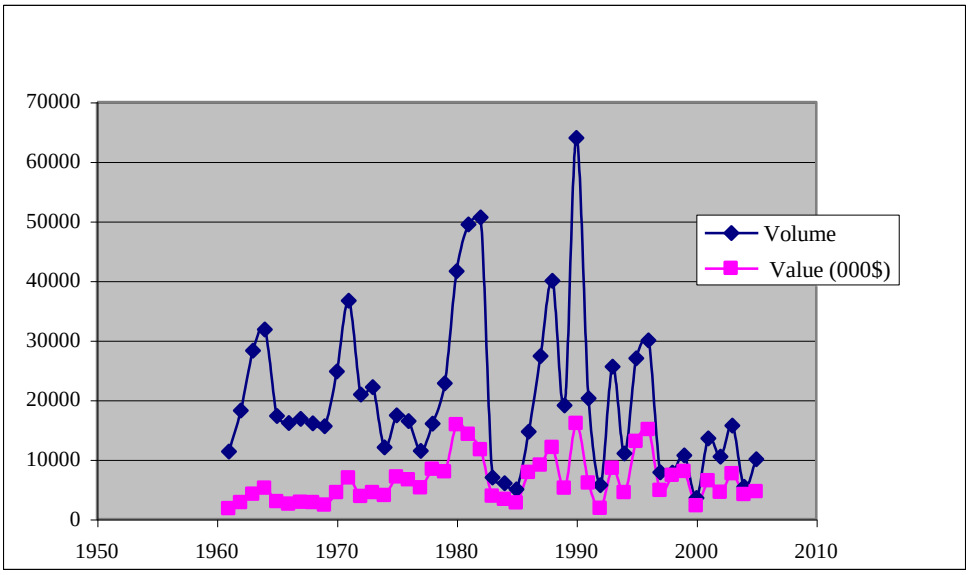
[****] Ethiopian common bean enters the international market one month earlier than beans from Canada.

developed countries (OECD-FAO, 2008). This will drive expansion of land under grains in USA and Canada, the traditional exporters of common bean. Because common bean is relatively low costs, it is likely that many traditional producers will find it cheaper to import rather than produce common bean in the future. Expansion of land under grains is already pushing common bean away from land in USA. The USA based suppliers of common beans on the world market are already looking for new low cost sources of beans for their market and Ethiopia has a high comparative advantage in this market. Therefore, if Ethiopia can retain competitive costs with China, it will be able to make considerable in roads into the European markets that are currently being supplied by Canada and US. The main uncertainty is fluctuations of quality and volumes due to fluctuations in weather that may worsen in the future due to climatic changes.

4.2.3 Common bean exports from Tanzania

Based on the FAO statistics, both volume and value of exports from Tanzania have been declining since 2000 (**Figure 14**), implying nearly stagnant prices for common bean in Tanzania (**Table 10**). Common bean produced in Tanzania is exported mainly in the neighbouring countries (namely Kenya, Rwanda, Burundi, Malawi) with a significant proportion of this volume going through informal trade (Tchale, 2002). In 1996/97, Tanzania informally exported 7978 Mt of common beans (valued at US$ 4.1million) to its neighbours (**Table 11**), constituting 46 percent of total exports at that time. Tchale (2002) asserts that because of the limited scope of monitoring the informal trade, it is possible that these statistics under-estimate the size of informal market. It is also possible that this market may have been gaining importance because of the high transaction cost (i.e. high export taxes, import duties; bureaucratic licensing; registration requirements) within the formal export channels that would encourage traders to opt for the informal channels (Spilsbury et al., 2004; Tchale, 2002).

Figure 14. Export volume and value (000$) from Tanzania, 1961-2006



Source: Computed from FAO data:

Table 11: Informal exports of common bean from Tanzania to regional destinations, 1996/97

Country of destination	Volume (MT)	Value (USD$)
Kenya	2143	741000.00
Uganda	24	8000.00
Malawi	327	117000.00
Zambia	1108	1.12
DRC	4376	2.00

Source: complied from Tchale, 2002

4.2.4. Outlook for common bean on the exports from Tanzania

Tanzania is currently a significant net exporter of common bean in the region with minimal export in the international market, but the country has a potential for exporting common bean to South Africa and India. Common bean from Tanzania are mainly exported to Kenya, Malawi, Zambia and the democratic Republic of Congo. Common bean production in these countries shows a stagnant or a declining trend. This implies that the gap between production and per capita availability will continue to widen, increasing their common bean import demand. Thus, the demand for exports from Tanzania by these countries is expected to increase in the medium term. The current political crisis in the democratic Republic of Congo and the frequent drought in the central and eastern Kenya are other factors that are likely to favour exports of common bean from Tanzania.

On the international market, South Africa is a growing potential market for African producers of white canning and speckled sugar beans. As production in the former export countries particularly USA reduces, South Africa is currently looking for alternative sources. So far, Ethiopia is the only African country that seems to be successful in this market (Spilsbury et al., 2004). Tanzania has a potential to supply this market, and an experience in supplying international markets (i.e. India) but the bulk of trade is through the informal sector and the move to market oriented policies is slow though steady. So without foreign investors to tap this market, the country's ability to meet the high quality requirements in the South African common bean market is limited and could slow progress towards exploitation of this potential.

4.3 Common bean imports

Common bean global imports are more widely distributed than exports with India, Cuba, Mexico, Japan, Italy, USA, Brazil, UK, Venezuela and Netherlands as the 10 top importers of common bean in the world market. In 2006, these countries accounted for 52 percent of imports while ESA accounted for 1.2 percent of imports (**Table 12**). The major importer of common beans in 2006 was India, followed by Cuba, Mexico, Japan and Italy in that order. Among the top major importing countries, import volume is growing at a positive rate in India (18 percent), USA (4.7 percent) and UK (5.7 percent) but declining in Japan (-2.5 percent), Brazil (-8.2 percent) and Venezuela (-12.6 percent) (**Table 12**).

With a share of 3.3 percent of global exports, it is evident that ESA is currently a net exporter of common bean but imports are growing faster than exports. Among the countries included in ESA, Malawi, Zimbabwe and Kenya are the main importers of common bean in the region. Kenya and Zimbabwe account for 0.3 percent of the global imports each while Malawi accounts for 0.09 percent (Table 12). Among these countries, common bean import volume is growing fastest in Malawi (43.2 percent) followed by Kenya (36.5 percent) (**Table 12**). Kenya and Malawi regularly experience severe drought and population pressure has significantly reduced landholding per farm household, resulting in long-standing soil fertility decline and low productivity due to low input farming methods.

Table 12. Volume of common bean imports in the top ten major importers in ESA, 2000-2006

Country/region	Import volume in 2006	Average share of world imports (2000-2006)	Average growth rate (2000-2006)
India	620527	14.5	18
Cuba	138857	5.8	0.0
Mexico	131727	5.0	0.0
Japan	119567	6.8	-2.5
Italy	106836	5.1	0.0
USA	102483	4.4	4.7
Brazil	70064	4.8	-8.2
UK	83626	3.5	5.7
Venezuela	52730	2.1	0.0
ESA	44985	1.2	26.7
Malawi	4065	0.09	43.2
Zimbabwe	20427	0.3	0.0
Kenya	14256	0.3	36.5

Source: FAO stat at www.fao.org

4.4 Domestic pricing and marketing policies

Following market liberalization implemented in late 1980s and early 1990s in most Eastern and Southern Africa countries, the role of the state marketing parastatals in the local and export markets has declined considerably, paving way for market forces to determine the prices. The common bean markets are now free, with a relatively high degree of competition that has pushed producer prices upwards. Traders set their selling prices based on what their competitors charge (competitive oriented pricing policy) and there is a progress towards regional market integration. Nevertheless, traders still have an upper hand in price determination, as they are relatively few with better market information and market intelligence compared to the very many farmers, majority of whom sell immediately after harvest to meet their financial needs. Traders take advantage of low prices to purchase common bean from farmers immediately after harvest when there is abundance. They set prices according to quality, variety, season, and their marketing costs. Unfortunately, farmers are price takers in most cases.

While the domestic pricing is more or less the same across Eastern and Southern Africa, marketing policies that affect common bean sector vary. In Ethiopia, the

government deliberately promotes formal exportation of white beans through investment incentives (such as loans) to local and foreign companies. As a result, more than 20 large stores with a capacity of over 500 000kg have been constructed in the trading centre of Shashamene, generating capacity for marketing (Legesse et al., 2006). Farmers have been organized in large cooperatives, which are now directly linked to licensed exporters, and the common bean supply chain is relatively short. In Tanzania, Kenya and Malawi, the bulk of trade is through informal sector, characterised by non-standardisation of weights and measures. Small-scale traders dominate the rural markets gathering common bean from scattered small-scale producers to sell to larger scale urban-based traders. Farmers learn about market situation through traders, who withhold some information to protect their interests.

Crop protectionism remains an important driver of marketing policies in these countries. Most countries exercise stringent legal requirements for the development, evaluation and dissemination of new commercial varieties to the farming community to protect their producers from poor quality varieties. Other marketing policies are motivated by the need to protect producer prices. For example, Kenya maintains some cross boarder trade barriers to protect its producers[††††]. This marketing policy has contributed to the growth of informal trade mainly from Uganda and Tanzania. For example, it is estimated that about 90 percent of bean imports from Uganda to Kenya takes place through the informal sector (Spilsbury et al., 2004). Although there has been a reduction in trade bans in recent years, informal trade remains favourable because of red tape and costs associated with formal importation (Mauyo et al., 2007).

5.0 Technological, institutional and infrastructure issues

5.1. Available technologies

5.1.1 Varieties

[††††] Removal of trade tarrifs would reduce prices of beans to the Kenyan consumer but also reduce producer price, amidst falling profitability of bean due to declining terms of trade as the price of purchased inputs rise in comparison to that of the dried beans (Spilsbury et al., 2004).

Production of common bean in Eastern and Southern Africa is constrained by a number of pests and diseases, drought, low yield potential of cultivated varieties and poor crop management. The National Agricultural Research Systems (NARs) of Eastern and Southern African (ESA) and their partners responded to these constraints through research and outreach activities on common bean in the last two decades. Considerable efforts have been devoted to breeding and selecting common bean germ plasm, focusing on key regional biotic and abiotic constraints. This is being done while screening for particular common bean types desired in the domestic, regional and export market.

The breeding activities developed and released a large number of varieties in the last two decades. About 10 new varieties were released in Tanzania and Kenya between 1990 and 2004. In Malawi, about 15 common bean varieties have been released since the initiation of the national bean Research program in 1980. The Ethiopian Institute of Agricultural Research (EIAR) released about 23 varieties in 1996-2004 (Muthoni et al., 2007 in Rubyogo et al., forthcoming). Some of the common beans varieties developed and released are presented in appendices 2.1-2.4

An inspection of the characteristics of the varieties developed and released reflects a research agenda that was highly influenced by biophysical constraints and user preferences back home. For example multi-disease resistance stands out as a common feature of most varieties developed and released in the region. Tolerance to low soil fertility is also emphasized in Kenya and Malawi because of declined soil fertility in these countries. The breeding process emphasized the drought escape to address the problem of early ending rains but the problem of intermittent drought, which is also a common problem in these countries, received limited attention perhaps because it was not yet an important constraint or due to its complexity (Hillocks et al., 2006).

The user systems needs have been addressed through several decentralised assessments that engaged farmers to evaluate the potential varieties using their own selection criteria (e.g. total yield, drought tolerance, marketability, taste and cooking time). Variety traits like high yields, early maturity, good taste, low flatulence and fast cooking are popular among many varieties, reflecting their importance in variety acceptance.

5.1.2 Crop management technology

Across east and southern Africa, common bean is largely managed using low external input farming methods but there are variations across countries. Because common bean is primarily cultivated in association with other crops as a secondary intercrop, its management is often not direct to the crop but to that of the primary intercrop. Traditionally, grown for home consumption, less effort was invested in research and promotion of crop management technology. Consequently, the crop has been poorly management, especially in Ethiopia where some farmers do not even weed their common bean gardens. In recent years, however, promotional effort to disseminate good management practice has been growing.

5.2. Adoption of common bean varieties in the selected Eastern and Southern Africa countries

The available information indicates that the breeding research has had an impact on the bean sub-sector in the Eastern and Southern Africa. Varieties developed since 1980s have been widely adopted (Xavery et al., 2005; Odendo et al., Unpub; Andima and Ogecha Unpub) but the adoption process has generally been slow. This is reflected by the fact that varieties popular in these countries were released in 1980s or early 1990s. For example in Malawi, popular varieties like (Chimbamba, Nanyati and Napilira) were released early 1990s. In Kenya popular varieties (Rosecoco GLP2, Mwetamania) were released in early 1980s while the Lyamungu 85, the popular variety in Tanzania, was released in 1985. Similarly, Mexican 142, released in 1972 is still a popular bean variety in Ethiopia (Teshale 2006 in Rubyogo et al., forthcoming) Some studies have examined the diffusion of bean varieties in some countries of Eastern and Southern Africa and found that the key constraint to the rapid adoption of new varieties is low seed availability and accessibility, lack of information about the seed and risk (e.g. Xavery et al., 2005; Chirwa et al., Unpub).

5.2.1 Seed systems

One of the most important constraints farmers face in choosing crops and varieties to plant is the availability and accessibility of seed. Lipper et al., 206 define availability

as having sufficient quantity of seed physically within reasonable proximity and in time for planting while accessibility refers to whether people have adequate information, income or other resources to acquire the seed that is available (Sperling and cooper, 2003 in Lipper, 2006). Lipper et al. (2006) describes availability as exogenous and measurement of the extent of a supply problem while accessibility constraints as farmer specific and captures the demand constraints. The available information suggests that both availability and accessibility are constraining the adoption of new varieties in eastern and southern Africa.

Common bean seed systems in ESA are largely informal, run by community based local seed providers who double as grain dealers. These are usually limited in geographical coverage, meaning that the diffusion rates are slow when small quantities of new varieties enter the local seed channels. Long distance diffusion occurs when farmers exchange seed with their distant relatives, friends and in-laws. However, with the increased commercial transactions, seed exchange and gift giving among farmers has declined in importance (David and Sperling 1999 in Rubyogo et al. forthcoming). Yet, being a semi-subsistence crop, commercial transactions between farmers are rare. Traders who buy common beans from producers after harvest to sell to urban markets are profit maximizers who select varieties that are already demanded on the market, thereby reducing the availability of new varieties on the market at the time of planting.

Market imperfections contribute to this low availability constraint. Because common bean is a self-pollinated crop, the private seed producers do not find it economically attractive to invest in the seed production and delivery of its seed to farmers in an efficient way (David and Sperling 1999 in Rubyogo et al., forthcoming). This has over time resulted into high prices for certified seed, low availability in the farming communities and consequent high prices of certified seed (Mkandawire, 1992) beyond the reach of poor farmers in eastern and Southern Africa.

Earlier intervention to provide seed of newly developed varieties through the formal sector as a substitute to the market has been limited by weaknesses that characterize most institutions in Eastern and Southern Africa: low funding, and lack of capacity to

do so effectively and efficiently (Limbu, 1999; Mussei et al., 2002; Xavery et al., 2005). Low funding of the government researchers constrains their ability to produce and disseminate the new variety seed widely and timely. Second, bean being traditionally a subsistence crop, the agricultural extension had previously played a limited role to popularise use of improved technology such as improved seed, new varieties, fertilizers and crop husbandry. This means that even where seed was made availability, it was not accompanied by adequate information for farmers to evaluate the advantages of new varieties faster and adopt them. The extreme case of this constraint is in Ethiopia, where farmers of common bean have little understanding of the names of the bean varieties they grow (Legesse et al., 2006).

Recent intervention into seed systems

To overcome the problem of seed availability and accessibility, the National Bean Research Programmes (NBRP) and CIAT have adopted a broad based strategy to strengthen the linkages between the formal and informal channels of seed multiplication and distribution. The strategy generally includes: production of foundation seed by the National agricultural Research Systems (NARS), informal seed multiplication using farmer groups and NGOs; informal seed distribution using grocery shops, rural traders, extension agents, health clinics, and NGOs; intensified publicity through promotional materials like posters, leaflets, brochures and radio messages; and informal outlets such as farmers, NGOs, extension agencies, village traders and various other institutions (Rubyogo et al., In press).

Borne in CIAT, the strategy was formulated and discussed with all stakeholders in each country (Rubyogo et al., In press). In Malawi the strategy was implemented under a project in 1995-1998 (Chirwa et al.,Unpub). The strategy was later extended in Ethiopia in 2003 when the Ethiopian Agricultural Research Institute at Melkassa Agricultural Research center together with CIAT entered into partnership with a four NGOs namely, Catholic Relief Service (CRS), World vision, Self help international and the Bureau of agriculture and Rural development) to promote common bean production in the rift valley through demonstration of new varieties, management practices and seed multiplication and distribution activities (Rubyogo et al., In press; Legesse et al., 2006). This partnership has been growing and by 2006, 26 organizations directly and 130 indirectly were involved in seed delivery (Rubyogo et

al., In press). An extensive collaborative work by CIAT through East and Central African Bean Research network (ECBREN), the National Bean Research Programme (NBRP) and extension service providers was also initiated in Tanzania to organize on-farm demonstrations of new varieties and disseminate seeds of the varieties, soon after release.

Based on the available information, high rate of success was achieved using this strategy in making bean seeds available to farmers and adoption of new varieties in areas where the strategy has been piloted (Chirwa et al., Unpub; Xavery et al., 2007; Legesse et al., 2006). Experiences from Malawi published in Chirwa et al., (Unpub), indicate that use of small seed packs plays an important role in adoption of new varieties because they are more affordable and potable, making it easy to reach many farmers in the rural communities. With the provision of seed related information through posters and other products, farmers showed willingness to try several varieties when the investment cost is minimal. However, the profit margin remains low to attract the private sector, implying that the public sector may continue funding the seed dissemination strategy if new varieties are to reach farmers at rates above current average. Secondly, the national seed demand in these countries still exceeds the supply, implying that there is still need to support this strategy both in terms of promotion and innovation to increase availability and reduce price of seed to be able to meet this demand.

5.2.2 Constraints within the grain market

Seed availability and inaccessibility is part but perhaps not the only explanation for slow adoption of newly released varieties. The available information points to the constraints in the grain market as a possible additional explanation. At a time when commercialisation of beans is gaining importance, farmers would want to allocate their limited resources to the production of varieties that are highly demanded in the grain market. Information provided in Mussei et al., 2005 supports this view. The authors found that the farmers, who experimented with the new varieties, did not keep significant quantities of seed for the next planting even when they generally found

new varieties good and had access to seed from their harvests[‡‡‡‡]. Instead, 74 percent of the seed kept for the next planting among these farmers was of the varieties that were popular on the market, which partly explains why farmers may take long experimenting with new varieties. This highlights the need to promote new varieties on the grain market so as to accelerate their adoption by farmers. While there have been efforts to promote the seed of new varieties on the seed market in recent years, there is no evidence that there has been market promotions targeting consumers and traders of grains.

5.2.3 Technological characteristics

Demand side constraints can also originate from technological limitations rather than lack of awareness by market agents. For example in Kenya, low adoption of newly developed common bean varieties has been associated with their low market demand (Spilsbury et al., 2004; Rachiers et al.,Unpub). According to Spilsbury et al. (2004), new varieties have failed to penetrate the market because they lack characteristics demanded by consumers. Involving traders and net consumers in the process of variety evaluation might help in overcoming such constraints. There is scanty information to show that traders and consumers have been fully involved in the participatory variety selection (PVS) in the country. In Kenya, the high import of varieties implies that newly bred varieties will not only compete with locally produced but also with those imported from neighbouring countries which are often attractive to consumers. In Ethiopia, some varieties such Awash Melka have received low popularity due to their dull colour compared to the varieties such as Mexican 142 they were meant to replace. The market preferred colour is sparkling white.

5.4. Socio economic and institutional constraints

Socio-economic problems and institutional weaknesses are recognized as some of the constraints that limit agricultural productivity in sub-Saharan Africa. Examples of socio-economic issues that constrain agriculture and common bean production in particular include: declining terms of trade, financial constraints, poor market access, while institutional constraints include land tenure systems, limited role played by agricultural extension in promoting new common bean varieties and crop

[‡‡‡‡] Based on the understanding that most farmers keep their own seed, the amount of seed kept for next planting was a good proxy for the adoption of new bean varieties

management in general, imperfections in credit market that exacerbate financial constraints and trade restrictions.

5.4.1. Declining terms of trade

The declining real terms of trade were one of the negative consequences of liberalization of the agriculture in most ESA countries. Government subsidization of inputs was removed after liberalization, with consequent increase in the prices of purchased inputs such as fertilizers, improved seed and pesticides. This has been reported in almost all four countries as limiting use of fertilizers (**Table 13**). With declining soil fertility, farmers have been forced to replace high yield varieties with varieties that are relatively tolerant to poor soils. For example in Kenya, there are reports, which indicate that Rosecoco GLP2 is being replaced by small haricots and GLPx92 (Mwetamania).

Table 13: Fertilizer consumption (100 grams) per hectare of Arable land in ESA

Country	Fertilizer consumption (100 g) per hectare Arable land
Malawi	839
Kenya	310
Ethiopia	151
Tanzania	18

Source: World Bank, 2008

5.4.2 Financial constraints

The financial constraints as used in this report refer to lack of money and productive assets, exacerbated by lack of collateral to secure credit from formal financial institutions. Most farmers in Eastern and Southern African countries are poor and lack cash to purchase inputs such as chemical fertilizers, improved seed and/or hire labour. The problem of poverty is further deepened by the recurrent drought and other forms of natural disasters in these countries that increase the risk, further lowering the use of improved but high cost technology. The significance of drought on adoption of technologies can easily be demonstrated by examining the effect it has on the productive as well as non-productive assets of the vulnerable farm households. Vulnerable households respond to the devastating drought in order to mitigate the effects of drought by selling their productive and non-productive assets (Webb et al., 1992 in Nieto et al., forthcoming). Productive assets like oxen and family labour are a

major means of production in ESA. The lack of oxen to implement the recommended technology is one of the production constraints cited by farmers in the Eastern Kenya for failure to practice good timely planting (informal discussion with farmers). Also many households respond to drought effects by supplying their family labour either locally or outside their communities to mitigate the effects of drought. All these issues interact to constrain the adoption of available technologies. More over, planting coincides with the time when most households have run out of their food reserves and must purchase food from the market for their immediate survival.

5.4.3 Imperfect credit markets

Financial institutions in developing countries particularly sub-Saharan Africa are often confronted by informational problems that constrain their ability to distinguish between potential borrowers and monitor loan utilization effectively (Bardhan and Udry, 1999). Because of these problems, commercial financial institutions tend to charge high interest rates and demand high collaterals, which small farmers naturally lack. Consequently, access to credit by small farmers who are; primarily the common bean farmers in ESA is currently and will continue to be limited at least in the medium term. For example, in Tanzania, out of thousand holders, five get agricultural credit (Limbu, 1999). The problem of collateral is even worse in Ethiopia where the government owns land and selling and buying of land is restricted.

5.4.4 Poor access to markets

Since economic liberalization, the private sector has made progress in achieving efficiency of agricultural marketing in ESA. Trade has become more competitive, marketing costs and margins have reduced, and grain markets are more spatially integrated (Morissey and Leyaro, 2007). However, limited access to information on market opportunities, and higher input prices are still problems that reduce profits and discourage production (Isinika et al., 2005, p.209 in Morissey and Leyaro, 2007). Various authors mention lack of information as a constraint to decision making in Ethiopia (Ferris and Kaganzi, 2008; Legesse et al., 2006). Lack of market information is being addressed in some countries through use of market information services (Ferris and Kaganzi, 2008), though still at low scale. Formation of farmer associations /cooperatives is expected to lower unit cost of inputs. Consequently, the liberalization policies in agriculture from the mid 1980s have seen a shift back towards

cooperatives, but the sector has failed to respond to the challenges of liberalization. Although necessary to reduce the current transaction costs in agricultural marketing, the cooperative sector suffers from weak managerial and advocacy skills, a lack of financial resources and a weak institutional structure (especially in that they are not accountable to members) (Morissey and Leyaro, 2007). These weaknesses are likely to slow down progress towards achieving an efficient agricultural marketing system required to lower per unit cost of inputs.

5.4.5 Land tenure systems in Ethiopia

In 1975, the land in Ethiopia was nationalized. This policy has resulted, among other things, lower land productivity and small holding size. Lower land productivity is caused by farmer reluctance to invest in good land management practices for fear that land will be redistributed (Zerihun, 2002 in Alemu et al., 2003). The land policy also restricts the selling and buying of land, which has limited the use of land to satisfy collateral requirements by newly emerging private banks, limiting small farmers to rely, for credit, on government-owned specialized financial institutions. Restrictions on selling and buying also distort the land markets and constrain those who would want to expand their production of bean on large scale. Overall, the land tenure system constrains the availability of credit by small farmers who dominate the Ethiopian agriculture.

5.4.6 Institutional constraints

In ESA, high farmer: extension ratio and small budgets characterize the extension systems, rendering them inaccessible by small farmers. These constraints limit the role played by government extension in promoting new varieties and other common bean based technologies. Another barrier to rapid diffusion of new varieties is strict regulations on germ plasm transfer. The current germ plasm development in Ethiopia as with other countries in Eastern Africa is a slow process. It takes up to 8 years for a new variety to be tested, certified and distributed (Ferris and Kaganzi, 2008). This delays the accessibility to new beneficial varieties by farmers. New approaches should be investigated to accelerate the introduction of beneficial genetic materials.

Globalisation and the creation of common market for Eastern Africa currently under formulation create an additional risk to the common bean sub-sector in Kenya and

hence adoption of new technologies. Currently, Kenya is uncompetitive in the regional market for common bean because of relatively high labour costs and low productivity (Spilsbury et al., 2004). As a result, it is a major regional importer of common beans. Varieties imported (Calima types) from the neighbouring countries have a high demand on the Kenyan market meaning that new varieties developed to overcome the existing production constraints must be able to out compete those imported on the market for them to be adopted.

6.0 Conclusion

The research report presents a situation and outlook for common bean in four countries of Eastern and Southern Africa using secondary information. The analysis shows a situation characterized by big opportunities as well as challenges for development of the common bean in the region. There are trade opportunities for both export within the region and outside. Kenya and Malawi show a huge potential for import market that can be tapped by their neighbours, particularly Tanzania, Uganda and the great lakes region. The challenge to fully exploit this market, however, is presented by high transaction costs associated with very small volumes of production scattered among very small producers within each country and poor road infrastructure. This has resulted into low farm gate prices, discouraging investment in quality assurance technologies that would boost trade beyond the region. Only Ethiopia has been successful in the international market because of its location advantage and low cost of production relative to its competitors (i.e. China and Canada) but improving and retaining the quality of grains at farm level remains a challenge for exporters. There is need for research to find innovations in reducing transaction costs and increase market access by farmers to encourage further production growth. Dissemination of information and training farmers on standard measures in specific markets is also important for enhancing market access.

The predicted increase in the consumption and demand for cereal and oils in the next decade might favour the growth of common bean production in the region as common bean in the traditional exporting countries faces stiff competition from cereals and oil crops. Biodiesel demand will account for a significant proportion of that growth. This is likely to shift land from production of common bean into production of such crops highly demanded on the market. Even if such demand may spill over to ESA, the

expansion of area under cereals, say maize may be associated with increase of area under common bean since the two crops are always grown in association.

The FAO data has shown that common bean production has been increasing as a result of population growth and non-industrial led urbanization growth, but this growth came from area expansion. Expansion of harvested area can occur because more land is cleared for cultivation or because the land is used more intensely. Common bean is generally a short season crop, giving two bean harvests per year in most countries. However, production constraints are a key challenge that should be addressed, especially in the technology development and seed systems. While most biotic and abiotic stresses have been previously managed through breeding, climate change is anticipated to cause new outbreaks in pests and diseases that require a vibrant research sector to counteract such changes. Drought is currently the most important constraint in some countries like Kenya and the adaptation of varieties to predicted global warming is urgent. The ability to meet these challenges will require increases in the investment of research and capacity building in the region, which is currently low though varying across countries.

Market imperfections in the seed market present a scenario of slow diffusion and adoption common bean varieties in the region. The on going experiments with decentralized seed production and small packages across the region suggest that interventions into the market to correct for these imperfections has a huge potential of overcoming the problem of new variety seed availability and accessibility to many farmers and could accelerate adoption of new varieties. Public –private partnerships will be critical in the success of improving seed availability to farmers.

Finally, there is a relatively favourable institutional environment for investing in common bean production across the region but the policies on germ plasm development and release inhibits quick technology spills in some countries. There is need to invest efforts in advocacy for policy change to facilitate quick delivery of new varieties desirable on the market to farmers.

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Appendix 1.0. Common bean varieties developed and released in Eastern and Southern Africa since 1970s

Appendix 1.1: Some of the common bean varieties released in Ethiopia since 1970

Year of release	List of Varieties	Bean Types	Important Features
1972	Mex-142	Export beans	Good canning quality
1990	Awash –1	do	Good canning quality and high yield
1999	Awash melka	do	Good canning quality and Anth. Tolerant
2005	AR04GY	do	Good canning quality
2006	STTT – 165-92	do	Good canning quality and early
2006	NZBR-2-5	do	Good canning quality and early
1990	Roba –1	Food beans	High yield, good for shiro & kik
1996	Atendaba	do	High yield
1996	Gofta	do	High yield, rich in Fe & Zn
1996	Ayenew	do	High yield
1998	Beshbesh	do	BSM resistance, High yield
1993	Melkie	do	BSM resistance, High yield
1999	Zebra	do	High yield adaptation to Central rift valley
1999	Gobe rasha	do	High yield, adaptation to humid tropics
1974	Red wolaita	do	Adaptation to all part of the country & preferred color
2003	Naser	do	High yield & early
2003	Dimtu	do	High yield
2006	RAB-484	do	High yield & preferred color by farmer
2006	XAN-310	do	High yield & preferred color by farmer
1999	Tabor (A-788)	do	
Not released	DOR-794 AFR-703	do	
2003	Omo-95 (RWR-719) Ibbado (AFR-722)	do	
Not released	OBA-4 XAN-319		
Recommended in 2004	AFR-702 RAB-585		
2005	RWV-482		
Not released	BRC-10		

Source: PABRA, 2007

Appendix 1.2: Common bean varieties released in Kenya since 1980

Released	Cultivars	Origin	Selected characteristics
Early 1980s	Rose Coco GLP 2	Uganda bred cv. K20	Large red/purple mottle Calima. Widely adapted above 1000m. Moderately tolerant haloblight, BCMV, anthracnose; susceptible ALS and root rots.
Early 1980s	Canadian Wonder GLP 24	Uganda bred	Large dark red kidney. Adapted above 1000m but not to excessive rainfall or drought. Moderate resistance to ALS, haloblight, NBCMV, anthracnose; susceptible to rust, root rots. Good cooking time and taste.
Early 1980s	Mwezi Moja GLP 1004	Kenyan landrace	Medium purple speckled
Early 1980s	Mwezi Moja GLP 1127	Kenyan landrace	Medium purple speckled. Resistant to BCMV (I-gene) and anthracnose (are gene); moderately to haloblight and ALS.
Early 1980s	Mwitemania GLP X92	Kenyan landrace	Attractive large Pinto. Resistant to haloblight, moderate to ALS; susceptible to rust, anthracnose, BCMV. Currently replacing others where affected by root rots. Fast cooking.
Early 1980s	GLP 585		Red haricot – susceptible to root rot & stem maggot
Pre-release 1985 Registered 1998	KAT B 1	Locally bred	Medium yellow/green rounded
Pre-release 1991	KAT B 2	Locally bred	
Pre-release 1985 Registered 1998	KAT B 9	Locally bred	Medium red rounded
Pre-release 1993	KAT X 16	Locally bred	Medium purple speckled (Mwezi moja) type), rounded, heat-tolerant
Pre-release 1992 Registered 1998	KAT X 69	Locally bred	Very large Calima type (65-69g/100 seeds)
Pre-release 1992	KAT MM	Locally bred	Light purple mwezi moja, adapted semi-arid highlands 1800m
Pre-release 1993 Registered 1999	KAT X56	Locally bred	Red Canadian Wonder kidney, heat-tolerant
Pre-release 1994	E1	Locally bred (Univ Nairobi)	Cranberry type, very large seeds
Pre-release 1994	E7	Locally bred (Univ Nairobi)	Cranberry
2006	E8	Locally bred (Univ Nairobi)	Calima type
Pre-release 1994	M23	Locally bred (Univ Nairobi)	Calima type
Pre-release	Umubano	Mexican landrace: CIAT bank acc. G2333; via Rwanda	Red. Climber
Pre-release	Flora	Mexican landrace Flor de Mayo. CIAT genebank via Rwanda	Large pink. Climber
Pre-release	Vunikingi	Guatemalan landrace: CIAT bank acc. G685; via Rwanda	Medium red. Climber
2006	KK 8	SCAM-80CM/15	Calima, market type. Resistant to root rot; also to some ALS races.
2006	KK15	MLB-49-89A, bred in DR Congo	Medium black. Root rot tolerant. Also resistant ALS; susceptible ascochyta.
	KK 22	RWR 719, bred by CIAT/ISAR and introduced from Rwanda	Small red. Root rot resistant, BSM and low-P tolerant
2006	E2	University of Nairobi	
2006	E4	University of Nairobi	

Released	Cultivars	Origin	Selected characteristics
2006	E7	University of Nairobi	
2006	M18	University of Nairobi	
2006	M22	University of Nairobi	
2006	L36	University of Nairobi	
2006	L41	University of Nairobi	
2006	MAC34	CIAT cross	
2006	MAC64	CIAT cross	
2006	MAC13	CIAT cross	

NB: SS = Seed Size: (Small <25g, Medium 25-40g, Large >40g weight per 100 seeds). Seed Colour: *CIAT Standard Methods,* Scale 1-9. W Ronno, R Otsyula and P Kimani revised the list of varieties released, in May 2001
Source: Kenyan Seed company in Spilsbury et al.(2004) and PABRA data, 2007

Appendix 1.3: Common bean varieties released in Tanzania since 1980

Year released	**Cultivar**	**Origin ID Code**	**Seed type**
2004	Uyole04	7068/2	Medium cream
2004	BILFA-Uyole	CIAT	Medium Calima
2003	Uyole03	DRK124	large sugar
2003	Urafiki	Kabanima x GN	Medium dark red kidney
2003	Wanja	A197	large Kakhi
1999	Uyole98	Bred at Uyole	Medium orange
1998	Selian97	TMO110 X PVA782	Large dark red kidney
1997	JESCA	CIAT bank acc. G 14369	Large purple rounded
1997	EP4-4 (ROJO)	CIAT bank acc. G 14369	Medium dark red
1996	Njano	*Introduction = EA1 2525*	Medium orange
1996	Uyole 96	CIAT introduction	Large dark red kidney
1994	Selian 94	Tanzania local selection	Medium pink with red spots
1994	Uyole 94	Tanzania (=Red kasukanywele)	Large cream/dark red
1990	Lyamungu 90	CIAT bank, Colombia bank G 5621	Large red mottle, Calima type
1990	Ilomba	Local line	Small brown
1990	Uyole 90	CIAT	Medium cream/brown stripe
1990	SUA 1990	G 5476	Small beige
1985	Lyamungu 85	CIAT bank (=T23)	Large red/brown Calima type

Source: Compiled from information of CIAT, 2005 in Hillocks et al., (2006); Wanda and Ferris, (2004).

Appendix 1.4: Common bean varieties released in Malawi since 1980

Year of released	Variety names	Source/origin of the variety	List of abiotic and biotic constraints to which the variety is tolerant/resistant
2002	Kabalabala	CIAT	Small white canning type, resistant to black root rot and BCMV and adaptable to poor soils
2002	Kholophethe	CIAT	Large cream speckled, resistant to ALS and CBB and is adaptable to low soil fertility conditions
2005	BCMV-B4	University of Malawi	Medium Cranberry, resistant to BCMN and Bean Common Mosaic Necrotic Virus (BCMNV)
2005	BCDO (19)	University of Malawi	Medium cranberry, resistant to BCMN and Bean Common Mosaic Necrotic Virus (BCMNV)
2005	BCMV-B2	University of Malawi	Small brown, resistant to BCMN and Bean Common Mosaic Necrotic Virus (BCMNV)
1993	Chimbamba	Local landrace	Large red kidney
Not released	Nanyati	Local landrace	Cream with red speckles
1995	Napilira	CIAT	medium red mottled, resistant to angular leaf spot, Halo blight, anthracnose, rust, common bacterial blight and Powdery Mildew. Tolerant to low soil fertility (low N and P)
1995	Mkhalira	CIAT	Small tan/khaki, resistance to angular leaf spot, anthracnose, rust, and common bacterial blight. Tolerant to low soil fertility (low N and P) and drought
1995	Maluwa	CIAT	Medium red Speckled, resistance to angular leaf spot, and common bacterial blight. Tolerant to low soil fertility (low N and P) and drought
1993	Kalima	CIAT	Large red mottled, resistant to rust
1995	Saptsika	CIAT	Large Dark Red Kidney
Not released	Kablanketi	local landrace	Purple
Not released	Nyauzembe	Local landrace	Green
1995	Kambidzi	CIAT	Small khaki with brown stripes, resistance to angular leaf spot, rust, and common bacterial blight. Tolerant to low soil fertility (low N and P) and drought.
Not released	Kamtaugzeni	Local landrace	Unknown
Not released	Yellow	Local landrace	Yellow
Not released	Namagwetsa	Local landrace	Unknown
1980	Namajengo	CIAT	Small red
1995	Nagaga	CIAT	Resistance to angular leaf spot, Bacterial common mosaic virus, and common bacterial blight. Tolerant to low soil fertility
Not released	Tsekemere	Local landrace	Unknown
Not released	Usiwawantha	Local landrace	Unknown
1980	Kanzama	Local landrace	Medium red, resistance to angular leaf spot, Web blight, anthracnose, rust, common bacterial blight and scab
Not released	Khunguikocha	Local landrace	Unknown
Not released	Solwezi	Local landrace	Unknown
1980	Kamtsiro	Local landrace	Black small seeded
Not released	Magwelero	Local landrace	Unknown

Source: PABRA, 2007 (Compiled by Muthoni and Barungi and Revised by Chirwa, 2007)