Status Review of Challenge, Constraints and Needs of Men, Women, and Youth Enterprises in the Bean Value chain in selected countries

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Report: Status review of challenge, constraints and needs of men, women and youth enterprises in the bean value chain in selected countries.

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Abbreviations

SDG	Sustainable Development Goal
PABRA	The Pan-Africa Bean Research Alliance
SMEs	Small and Medium-sized enterprises
IBPMA	Improving Bean Production and Marketing in Africa
CIAT	International Centre for Tropical Agriculture
AGRA	Alliance for a Green Revolution in Africa
TARI	Tanzania Agricultural Research Institute
NGO	Non-governmental Organization
CASA	Commercial Agriculture for Smallholders and Agribusiness

01
Executive Summary

Common bean is the most grown legume in sub-Saharan Africa and contributes to income and food security of smallholder farmers. The common bean value chain offers business opportunities to various actors, particularly women because of their high involvement in production and marketing. The value chain has the potential to contribute to SDGs if opportunities are harnessed through developing and supporting SMEs and entrepreneurs. Nonetheless, challenges and constraints undermine the contribution of the common bean to livelihoods and incomes of actors along the chain. Key challenges are low use of improved seed, weak market linkages, lack of machinery and equipment, limited access to credit by value chain actors, context-specific barriers that undermine women and youth involvement, and lack of storage facilities. These challenges highlight needs for men, women, and youth entrepreneurs. The Improving Bean Production and Marketing in Africa (IBPMA) project responded to the challenges faced by farmers and entrepreneurs in common bean value chain in 31 countries in sub-Saharan Africa through innovative programs. PABRA used the corridor approach to implement the project.

This desk review was conducted to identify needs of men, women, and youth enterprises in bean value chain in countries targeted by the IBPMA project. Specifically, the report aimed to:

- Identify types of challenges and constraints experienced at different stages of the common bean value chain in six selected countries in the nine PABRA bean corridors.
- Better understand gender differences in challenges experienced by entrepreneurs at different stages of the common bean value chain.
- To identify areas of need for men and women entrepreneurs that are central to improving the performance and sustainable growth of bean enterprises.

The review reveals challenges and constraints experienced by men, women, and youth entrepreneurs and SMEs across bean corridors. Financial, technical, capacity, technological and context-specific challenges impede performance and growth of entrepreneurs and SMEs. There is need for interventions in these areas to support SMEs and individual entrepreneurs and strengthen competitiveness of bean value chains.

02
Introduction

Expansion of economic opportunities for women and other vulnerable groups is one of the fundamental tenets of the United Nations sustainable development goals (SDGs). Economic, technological, and political empowerment of women is among the nine targets of SDG 5 – gender equality – which aims to empower women (United Nations, 2015). SDG 10 – reduced inequalities – also targets to reduce income inequalities and promote inclusive social, political, and economic opportunities and equality for different groups of people. SDG 8 – decent work and economic growth – recognizes the importance of creating economic opportunities for all by supporting job creation and full employment via diversification, innovation, entrepreneurship, promoting growth of small-and medium-sized enterprises (SMEs), and trade among other targets. Consequently, global development agencies are continuously considering empowerment as fundamental to women participation and access to benefits of economic development (Pineda et al., 2019). Thus, besides expanding economic opportunities for women, empowerment is also central to erasing gender inequalities and contribution to the realization of other SDGs.

Agriculture is a dominant economic sector globally, especially in global south where most people derive their livelihoods and income. Unlike in developed countries, smallholder farmers cultivating less than five hectares of land dominate agricultural production in sub-Saharan Africa. Smallholder agriculture directly and indirectly employs about 53% of labour force in the region, contributes 17% share of gross domestic product (World Bank, 2022) and accounts for over 60% of the food produced and consumed (Frelat et al., 2016; Giller et al., 2021). Despite contribution of smallholder farms to region's economic development and food security, some smallholder farmers are less likely to succeed in agribusiness, pushing them to seek employment or entrepreneurship opportunities in alternative sectors (Fan et al., 2013). Even so, smallholder farmers with potential to succeed in agricultural value chains confront multiple challenges hampering business growth, employment, economic growth, and food security (Fan et al., 2013). The observations reveal that entrepreneurs are a heterogenous group with differing needs that should be adequately supported.

Agricultural enterprises in Africa yield over 300 billion dollars annually and the amount could even surge to 1 trillion dollars by 2030 with increased farmers' access to critical resources such as inputs and finance (World Bank, 2013). Realization of the potential of agricultural enterprises depends on transformations that seize agribusiness opportunities and eliminate challenges faced by agricultural entrepreneurs. Therefore, transformations in agricultural sector should focus on regional value chains that offer markets for farmers and agri-entrepreneurs that lack capacity to compete in global markets (Barrientos et al., 2015), providing them with platforms they need to gain global competitiveness (Annan & Dryden, 2015).

Women comprise 53 percent of agricultural labour force in sub-Saharan Africa (World Bank, 2022), demonstrating fundamental role they play in growth and competitiveness of the sector. They are the most economically active group in agriculture, spending most time on

agricultural activities than men (SOFA Team & Doss, 2011). However, women entrepreneurs face substantial challenges that obstruct their full contribution to the sector's competitiveness. Furthermore, although women play significant roles at different nodes of agricultural value chain (Quisumbing et al., 2021), they tend to dominate low value nodes and their participation in low compared to men (Coles & Mitchell, 2011). Prevailing societal norms (customary law and practice) restrict women land tenure rights, limiting opportunities to expand their enterprises at different nodes of the value chain (Quisumbing et al., 2021). Therefore, understanding challenges faced by women operating in different agri-food chains is central to identifying needs to be addressed for value chain development.

Common bean (*Phaseolus vulgaris* L) is a major food staple and one of the most grown crops in sub-Saharan. The crop is a major source of income for farming households and plays a crucial in food and nutritional security in rural areas. Common bean is often described as a women crop because of their high involvement in production, marketing, and utilization of beans (Ojiewo et al., 2018). Therefore, increasing opportunities of women entrepreneurs can significantly improve their involvement in the common bean value chain, thereby contributing to empowerment. Nonetheless, women participation in bean value chain is curtailed by constraints, including access to credit, technology and information, machinery and equipment, lack of capacity building, limited access to land, and labour constraints (Owusu & Bravo-Ureta, 2022). Notwithstanding, the increasing opportunities in common bean value chain can be captured by women entrepreneurs and SMEs if their need are identified and addressed.

The IBPMA project responded to the challenges faced by farmers and entrepreneurs in common bean value chains in 31 countries in sub-Saharan Africa through innovative programs. PABRA used the corridor approach to implement the project. The project endeavoured to develop business-based gender-responsive bean platforms and partnership that would create market linkage within bean corridors. IBPMA project also targeted to enable women and youth entrepreneurs' participation in business platforms and enhance their commercial viability (Onyango, 2022). Furthermore, the project aimed to develop business skills of men, women, and youth entrepreneurs, link them to business support services, and avail digital platform to facilitate bean business. The overall goal of the IBPMA project was to deliver climate-smart agriculture to farmers for food security, increased incomes, and poverty reduction.

53%

Percentage of labour force directly and indirectly employed by smallholder agriculture in the region

This report documents highlights the experience by entrepreneurs at different stages of bean values chains. Profiling challenges faced by men and women at four stages of the development of the bean value chain. This report documents challenges and constraints faced by SMEs operating in PABRA bean corridors. Specifically, challenges and needs of men and women operated SMEs in six countries (Cameroon, Kenya, Tanzania, Rwanda, Uganda, and Zambia) are identified. The report also identifies needs of men and women entrepreneurs that should be addressed for growth of bean enterprises.

03
EAREM Bean Corridor

Kenya

Kenya is one of the bean production powerhouses in sub-Saharan Africa, only ranked below its East Africa counterparts Uganda and Tanzania. Approximately 1.15 million hectares of land were under common bean production in 2020, with estimated yields of 0.67 t/ha (FAOSTAT, 2022). This represented a 15% increase in productivity from 0.59 t/ha registered in 2017. Per capita bean consumption in Kenya is estimated at 16 kg per but varies regionally with consumption in western Kenya being as high as 66 kg per person per person (Duku et al., 2020; Mabeya et al., 2021). Despite the increase in productivity, Kenya remains a bean deficit country. Imports are largely from Tanzania and Uganda with Kenya importing about 19% of the total volumes of dry beans traded in East Africa in the first quarter of 2022 (Food Security and Nutrition Working Group, 2022).

Farmers in Kenya face significant challenges at input provision and use stage of the bean value chain. High input cost as reported by Mucioki et al. (2016) is an important constraint to use of improved seed and the cause of overreliance of farmers on informal markets for seed supply. High seed prices are not only a deterrence to use of improved seed but also encourages recycling of seed by farmers. Wambua et al. (2018) reported gender differences in use of farm equipment in Kenya, with significantly more men owning equipment such as knapsack, weighing scale, and ox-plough than women. Lack of equipment by women affected timing of farm operations, quantities harvested, misinformation when marketing, costs and returns from bean production and marketing (Wambua et al., 2018). The article also reports gender differences in fertilizer use.

The susceptibility of common bean to diseases is an important bean production constraint in Kenya. Njoki (2013) found that angular leaf spot disease constrained production of Navy bean in Kiambu county. Land access right and skewed decision making about bean production are other constraints hindering bean production. Gender differences in access and control of income and land explained differences in bean production among male- and female-headed households in major bean production corridors in Kenya (Wambua et al., 2018). Crop infestations with pest such as fly flower, aphids, bean, and thrip among other was reported by Ogecha (2019) as crucial problem limiting up scaling of bean production in western Kenya due to negative implications quality and yields.

Babirye (2019) assessed performance of actors at bean distribution and processing stages of bean value chain in Kenya and established that the supply stage was characterized with several players. However, the processing stages was lucrative but with strong oligopolistic tendencies. Limited access to market-related services and high capital requirement formed significant entry at the bean processing stage. Supply and distribution stages were characterized with low marketing margins due to dismal volumes, high government levies, and inexperience of traders operating in processed products value chain. Studies also reveal that input provision and production stage constraints are transmitted along the chain, affecting

downstream segment such as marketing and processing. For instance, poor quality seed and disease induced production losses result in low tradable volumes of grain and poor grain quality, affecting utilisation of beans by processors (Amongi et al., 2021).

Smallholder farmers in Kenya face multiple post-harvest handling challenges as highlighted by studies conducted across the country. Njoroge et al. (2019) sampled 613 farmers in Eastern Kenya counties and found post-harvest and storage losses as major constraint to bean value chain. 80% of farmer reported pre-drying losses due to insects, rodents, and birds. Despite 61% of farmers using technologies such as hermetic bags and insecticides, they experienced storage losses due to insects and rodents.

The is a significant unmet demand for common bean in Kenya which is attributed to weak market linkages of farmers to formal markets. Spot market transactions dominate with farmers selling to local assemblers, brokers, and traders who dictate prices resulting in low margins. Few farmers participate in organized marketing arrangements due to volume constraint (Wanjala et al., 2019). Spot market transactions do not guarantee quality and price stability, negatively impacting competitiveness of Kenya's bean value chain. Existing collective marketing arrangements are often characterized by weak organizational and governance structures (Wanjala et al., 2019). Chemining'wa et al. (2014) associated the decline in navy bean production in Kenya to collapse in contract farming arrangement between farmers and processors. Marketing challenges undermining navy bean value chain in Kenya include low value addition, processing, producer prices, and farmer access to information.

Uganda

Like other countries in EAREM, common bean is an important legume crops for thousands of rural households in Uganda. The area of land under bean production fluctuated between 2017 and 2020, declining from 606,000 ha in 2017 to 540,000 ha in 2018, 350,000 ha in 2019 and 406,000 ha in 2020 (FAOSTAT, 2022). The fluctuations have had negative implication on yields which have declined from 1.67 t/ha in 2017 to 1.5 t/ha in 2020. Despite the decline in productivity, Uganda remains among leading common bean producing countries in EAREM and in sub-Saharan Africa. In the first quarter of 2022, Uganda accounting for 94% of cross-border trader in dry bean in EAREM.

The root diseases are major bean production constraint in sub-Saharan Africa causing significant economic losses annually. Paparu et al. (2018) established that black root is a major constraint to bean production in all agro-ecological zones. Poor input marketing system and weather vagaries are also bean production limiter in Uganda. Climate change as a constraint reduces quantity and quality of bean harvest, while lack of access to quality inputs exacerbates the problem (Kansiime, 2020). Additional labour unavailability, lack of seed and access to capital, and land constraints limit farmers' investment in climbing beans denying them to take advantage of the better market prices (Marinus, 2015; Ronner et al., 2018).

In Uganda, women dominate post-harvest handling activities, including transportation, drying, threshing, winnowing, and sorting. They spend longer hours performing these activities and lack motorized transport and threshers, resulting in physical losses (Strecker et al., 2022). Post-harvesting losses due to rotting cause quality deterioration. Strecker et al. (2022) reports 10% quality losses due to lack of or inadequate post-harvest equipment. The total economic losses resulting from post-harvest handling was about a third of the produce, highlighting

critical areas of intervention to support farmers reduce losses and gender-based constraints to use of post-harvest technology.

The challenges confronting Ugandan bean value chain are attributed to several missing support services. First, actors in the bean value chain lack access to financial services (working capital) to invest in technology and existing financial products are now well-tailored to different segments of the value chain (CASA, 2020). Interest rates are exorbitant and repayment terms for farmers and SMEs are poor. Lenders consider SMEs as unattractive because of insufficient collateral, high transaction costs for lending, and low returns on small loan taken by entrepreneurs (CASA, 2020). Weak extension system is responsible for farmers' low awareness and knowledge about available technology, marketing, value addition, and processing. Lack of access to business development services limit identification of investible entrepreneurs and SMEs with by service providers. Other challenges facing entrepreneurs are weak enforcement of quality standards and contextual factors such as social norms and gender imbalances.

The Ugandan bean value chain is highly gendered despite common bean being considered a women crop. Men participation in bean value chain is increasing which is attributed the dry beans increasingly becoming a tradable commodity (Nanyonjo et al., 2016). Women participate in most bean production activities and have influence on decisions regarding quantities of grain saved for food. However, they have low marketable volumes because of home consumption. In contrast, men are more visible in marketing and have greater influence over marketing decisions and utilization of returns (Nanyonjo et al., 2016). While men have better access to market information than women and sell to distance markets, most women sell at farmgate to traders offering low prices (Nanyonjo et al., 2016).

Market constraints are highly gendered, with women lacking transportation facilities and incurring higher transaction costs. However, collective action enhances men and women participation in common bean marketing. Accordingly, Nanyonjo et al. (2016) identified the need for capacity building via literacy programs, collective marketing, and infrastructural development as critical pathway of fostering women access to markets and information for equitable benefits.

Tanzania

Common bean is main legume grown in Tanzania, with 7% of arable land under agricultural production allocated to the crop (CIAT & World Bank, 2017). Recent estimates show that 1.34 t/ha of common bean were harvested from approximately 943,409 ha in 2020, a decline from 1,119,826 ha in 2017 (FAOSTAT, 2022). Approximately 60% of dry bean produced in the country is commercialized in the local market, indicating that common bean is a key agricultural value chain in Tanzania (Demissie et al., 2019). Besides, Tanzania is a net exporter of dry beans in EAREM, exporting 48 percent of about 1.2 million tons of bean grain produced annually to neighbouring countries (PABRA, 2022a). Kenya, Rwanda, Burundi, Uganda, Malawi, Mozambique, South Africa, DR Congo, and Zambia are among recipients of Tanzanian dry bean exports (African Farming and Food Processing, 2017). Despite good performance of Tanzanian common bean value chain relative to other countries in EAREM, its profitability is low, especially for farmers and SMEs.

Provision and use of high-quality inputs is a major bottleneck to performance and development

of bean value chain in Tanzania. Most farmers rely on informal seed systems such as farmer-to-farmer exchanges, informal traders, and community-based organizations (Sperling et al., 2020). Seed quality in Tanzania is compromised even before farmers buy from agro-dealers or other formal sources because of weak oversight (Wineman et al., 2020). Farmers are often unable to determine seed quality due to lack of knowledge. Furthermore, repeated shortages (availability constraint) affect farmers' consistency in purchasing seed of improved bean varieties, relying on informal seed supply (Katungi et al., 2019; Sperling et al., 2020).

Common bean is a commercially viable crops in Tanzania but despite this positive outlook, the bean value chain faces several systemic barriers that limit scaling. Limited information about modern inputs and farming practices and inadequate technical knowledge in technology use are critical constraints in Africa (Mehra & Rojas, 2008). For instance, lack of technical knowledge about pest control methods limited farmers use of synthetic pesticides and non-chemical pest methods despite identifying pests as major bottleneck to common bean production in northern Tanzania (Laizer et al., 2019). In addition, seed systems (formal and informal) struggle to meet farmers' and market preferred traits for bean products (Shilomboleni et al., 2019). Other constraints to common bean production in Tanzania are biophysical (poor soil fertility, climate change, and pest and disease) and low use of external inputs resulting from unfavourable socioeconomic conditions of farmers (Letaa et al., 2015). Limited access to critical information about common bean production negates farmer learning and knowledge about new farming practices in Tanzania (Kansiime et al., 2020). Women and young people are more disadvantaged in accessing extension services and mostly rely on own experiences to undertake legume production due to limited array of information sources and ownership of communication assets.

At post-harvest stage, farm level processing of common bean (drying, threshing, drying, and sorting) in Tanzania is not mechanized and almost entirely performed by women farmers. Farmers also lack modern storage structures and technology to store processed and unprocessed crop produce. Pre-harvest and post-harvest handling losses are caused by manual processing, farmers' lack of knowledge and skills to control losses, lack of modern methods for processing and storage, and storage pests (Abass et al. 2014). Field, processing, and storage losses accounted up to 15%, 20%, and 25% of post-harvest losses, respectively (Abass et al. 2014). The article identified training on post-harvest management as a critical need by farmers to address aggravating grain losses at farm-level post-harvest and storage stages.

Unreliable market systems that do not safeguard favourable profit margins for producers cause irregular supply of quality and quantity produce and affects traders with variable capacities (Shilomboleni et al., 2019). Lack of stable market, poor grain quality, poor storage and grading, low prices, inadequate quantities and demand, and high business levies were reported as marketing constraints to yellow bean trade in Tanzania (Birachi et al., 2021; Louhichi et al., 2022). These constraints were highly gendered, with men traders reporting more categories of constraints than women. Other constraints reported by men and women farmers were adulterated grain, lack of access to credit, and delayed payments (Birachi et al., 2020).

Shilomboleni et al. (2019) note that despite increasing levels of financial inclusion in East Africa, farmers, and agricultural SMEs struggle to access formal credit to support value chain activities. Farmers have inadequate working capital to acquire climate-smart inputs and traders and traders and aggregators struggle to pay bean producers in a timely manner. Producers and SMEs remain underserved by the formal financial systems in Tanzania due to

7%

Common bean is a main legume grown in Tanzania, with 7% of arable land under agricultural production allocated to the crop

prohibitive interest rates and collateral security requirements. Lack of financial literacy and limited assets is also a major bottleneck to access and utilization of credit by farmers and SMEs (Shilomboleni et al., 2019).

Rwanda

Common bean is the second most important staple crop in Rwanda, will almost all household in rural areas growing and consuming bean products (Larochelle & Alwang, 2022). The day consumption of bean per person of 164 grams/day in Rwanda is among the highest in the world (Murwanashyaka, 2022), and it is estimated a rural household consumes beans 6 days per week (Funes et al., 2022). The importance of the bean sector in Rwanda is underscored by area of land harvested that has doubled in the last 2 decades from 333,205 ha in 2000 to 647,983 ha in 2020 (FAOSTAT, 2022). However, productivity has been modest in the same period, with yield increasing from 0.65 t/ha in 2000 to 0.68 t/ha in 2021.

The modest growth in yields happens at the backdrop of improved varieties gaining popularity in the country (Katungi et al., 2018). Government, CIAT and HarvestPlus have invested in breeding and promotion of improved varieties in the last decade (Sellitti et al., 2020). Several reasons are provided for the modest growth in bean yields in Rwanda. Funes et al. (2022) study evidence show that farmers allocate large land area to local varieties than improved varieties. Ingabire et al. (2017) found low participation in output market and commercialization as bottlenecks to bean value chain. These challenges undermine entrepreneurship in Rwandese bean value chain.

04
TAZAMA Bean Corridor

Zambia

The Tanzania, Zambia, and Malawi Corridor (TAZAMA) is one of the focus corridors by the IBPMA project. Zambia operates in the corridor that is characterized by large portfolio of market classes of beans: yellow bean, red bean, white pea bean, and large white (Oratungye et al., 2021). Common bean is the second most importance legume in Zambia after groundnut in economic terms but remains underexploited relative to countries EAREM and CAMCOCA in term of production, commercialization, and consumption (Sichilima et al., 2016). For instance, annual per capita bean consumption stands at 10 kg compared to 40-60 per capita in EAREM and CAMCOCA corridor countries. Nonetheless, common bean is critical to addressing food security and nutritional goals in Zambia.

Like in most countries in sub-Saharan Africa, common bean production in Zambia is largely undertaken by smallholder farmers. Production is prone to intermittent and terminal extreme climate change – 60% of bean production occurs in drought prone areas – which reduce grain yields (Kalima et al., 2021). Poor agronomic practices and high investment requirement in modern and improved practices are a major deterrence to improved bean production in the country (Chilipa et al., 2016). Use of local bean varieties, poor soil fertility, low use of external inputs such as fertilizer, and pest and disease also explain low level of bean production in Zambia (Hamzakaza et al., 2014). Furthermore, land and labour challenges are major obstacles to scaling common bean production in Zambia.

The benefits that accrue to bean producers in Zambia are low despite the positive outlook of bean value chain. Samboko (2011) found that bean production was unprofitable largely because of poor yields, land ownership challenges, lack of mechanization, and labour unavailability. For instance, lack of secure land ownership limited investment in sustainable land management practices. Long distance to markets compels producers to sell at low prices at farmgate and informally to middlemen, with prices depending on the negotiation power. Most marketing transaction are done by men. Poor infrastructure disconnects farmers from urban markets denying farmers' access to inputs, information, and formal grain buyers.

Post-harvest losses along the common bean value chain have both economic and nutrition implications. Study by Ellis et al. (2020) show that inefficiencies in Zambia common bean value chain at production, post harvesting, storage, or marketing stages undermined value chain development. The study indicates economic losses amounting to of $269,417 attributed to producer's lack of skills in post-harvest handling. Unfavourable weather conditions, pest and diseases, and inappropriate handling practices and technologies were also strongly linked to post-harvest losses. Ellis et al. (2010) recommended capacity building of farmers in post-handling technology and financial support as critical to enabling producers to manage post-harvest losses.

60%

of bean production occurs in drought prone areas

05
CAMCOCA Bean Corridor

Cameroon

Legumes crops in Cameroon are increasingly becoming a major attraction to farmer because of the relatively higher prices than cereals (Gowda et al., 2008; Tabe-Ojong et al., 2020). Common bean is among the most grown and marketed legumes in Cameroon as indicated by steady increase in land area and yields. Harvested land area under bean increased to 309,036 ha in 2020 from 309,946 ha in 2017 compared to average of 87,589 in 1960s (FAOSTAT, 2022). Yields in the same period averaged about 1.36 t/ha compared to 0.6 t/ha in the 1960s (Tabe-Ojong et al., 2020; FAOSTAT, 2022). The rapid rise in common bean production is partly attributed to increase in demand of the commodity. According to Tabe-Ojong et al. (2020), the demand of legume commodities has spiralled production levels resulting in marketable surpluses as revealed by Cameroon exporting dry beans worth $1.6 million between 2011 and 2018. Consequently, increased production and distribution of beans could increase export volumes from Cameroon, thereby increasing competitiveness of local enterprises.

Despite the positive outlook of Cameroonian common bean value chain, constraints at different stage are a threat to the competitiveness of the industry. At input provision and production stages, Tabe-Ojong et al. (2020) report that although smallholder farmers are not excluded from formal input market, they are more aligned with informal value chain. Consequently, they typically use local varieties sourced from co-farmers and local open markets or use own saved seed, undermining productivity. The level of awareness about improved seed is low and farmers with knowledge about improved bean seed report that technology is unavailable and inaccessible. Further results by Tabe-Ojong et al. (2020) revealed that higher taxes and regulations of formal grain markets discourages farmers and traders from participating. Producers find informal markets attractive because of bilateral bargaining arrangements that opaques transactions from authorities. Existing marketing links are farmers selling to local traders, direct to retailer, through lead farmer, or through cooperatives, direct to agro-processors, exporters, or via contractual arrangements (Tabe-Ojong et al., 2020).

The challenges highlighted at different stages of common bean value chain are similar across countries and bean corridors which is a common script in literature. First, input provision and production challenges can be fixed by focusing on seed as the basic input and driver of agricultural productivity. The impact of other inputs – fertilizer, irrigation, agro-chemicals, and irrigation – and crop management practices can only be realized through improved seed. Birachi (2012) and Nchanji et al. (2021) recommended localized input production as an approach of overcoming input provision constraints in bean value chains. Second, market challenges are disincentive to agribusiness and better linkages to off-takers are required to drive volumes, attract high value actors such as exporters and processors, and link farmers to bean platforms. Grain aggregation at local levels is of strategic importance to value chain development for its role in overcoming market access challenges by farmers (Birachi, 2012). Third, searching for alternative markets for grain is also critical to reducing market risks and influences of informal buyers on returns earned by farmers. Linking producers to processors accelerates processing activities within value chains while creating employment and generating value for smallholder farmers (Kessy et al., 2020).

06
Seed production enterprises

Bean varieties with competitive and highly demanded production and market traits are highly adopted at farm-level and demanded by downstream entrepreneurs. Engaging seed entrepreneurs such as companies and seed producer groups to support formal seed system is the first pathway to addressing farmers limited access to seed of improved bean varieties and low volumes of grain supply in the market (Kessy et al., 2020). However, like other entrepreneurs within bean values, seed production enterprises across bean corridors do not operate at maximum efficiency and potential. They confront multiple challenges and need to be supported to become sustainable seed producing enterprises.

Seed companies confront several economic challenges that obstruct their survival in seed production and commercialization. In a technical paper that focused on seed value chain of legume in EAREM, Ojiewo et al. (2018) identified low margins resulting from low seed prices in end-markets, low incentive of farmers to buy legume seed from formal channels, and recycling of seed as economic barriers to seed companies' investment in seed production and multiplication. For instance, lack of downstream demand due to farmers low purchase of certified seed and unawareness of benefits of using certified seed infringes the ability of seed producers in Kenya to invest and scale seed production (Dalberg, 2019). Seed companies are also constrained be lack of physical resources such as land and irrigation. Compared to cereal crop businesses, legume enterprises in EAREM lack financial resources and machin-

ery, processing, and storage facilities (Ojiewo et al., 2018). The inherent characteristics of legume crops also present challenges to seed companies. Production of legume seed is labour and technology intensive and bean seed is large and weighty, making production of legume seed costly and unattractive entrepreneurs.

Seed producer groups as seed enterprises play a key role in provision of high-quality seed of improved crop varieties in developing countries. Farmer-led seed producing enterprises receive support and capacity development to increase production efficiency. Nonetheless, their growth is impeded by several weaknesses and challenges. Summaries of evidence of access to early generation seeds by farmer organizations and seed companies in Kenya, Rwanda Tanzania, Uganda, and Zambia and other countries in sub-Saharan Africa revealed that seed enterprises encounter challenges receiving foundation seed (De Boef et al., 2016). Dey et al. (2022) study of eight seed producer groups in Uganda and Zambia revealed several seed production weaknesses and challenges: timely access to production inputs (starter seed) and inability to produce own input seed; high input cost; lack of processing equipment and storage facilities; pests and diseases; and lack of timely access to field inspection and certification support services due longer distances.

Although farmer-based seed production is profitable, farmer seed entrepreneurs in some regions of Kenya incur high costs of seed production relative to national average, majorly due to labour constraints and crop management practices (Katungi et al., 2011). Even so, seed companies' cost of seed production is higher than farmer-based seed production, suggesting that contracting farmers would enable companies reduce costs when management practices are efficiently performed. Another challenge to farmer-led seed production enterprises in use of traditional methods and low mechanizations of farm operations. In addition, seed yields for farmer-based seed production are modest because of low input use and adverse effect of climate change (Katungi et al., 2011).

Maize is the primary focus of most seed companies in EAREM and TAZAMA bean corridors, with other important staple crops such as common bean having low seed multiplication opportunities (Das et al., 2019). Few companies in Kenya such as East Africa Seed Company, Bubayi Product Ltd, Kalro Seed Unit, and Drylands Seed Limited multiply and distributed improved bean seed (Mabeya et al., 2021). In Kenya, despite seed companies registering higher productivity and profitability than farmer-based seed enterprises as shown by Katungi et al. (2011), they face multiple challenges that undermine their performance. Farmers continued reliance of informal channels for seed acquisition, weak oversight of formal seed systems, regular stock shortages by agro-dealers, long distance to certified seed stockists, and high seed price are form major bottleneck to seed enterprises in Kenya.

Like Kenya and other countries in EAREM, there are few seed companies (CEDO seeds, Supa Seeds Africa, and Masindi Seed Company Ltd), cooperatives and seed producer groups in Uganda (Ayesiga, 2016). Quality assurance of seed produced by cooperatives and producer groups is a major challenge (Ayesiga, 2016). In addition, seed companies in Uganda have inadequate land and irrigation facilities, relying on out-growers for multiplication thereby exposing themselves to price fluctuations and quality issues. The companies are also characterized by weak governance structures and asset base and therefore unattractive to external funding (Oketa, 2011).

Marketing and distribution challenges faced by seed producer groups include inability to deal

with market fluctuations (monitoring demand and prices changes) and transportation challenges to markets (Dey et al., 2022). Limited knowledge and understanding of seed policy, regulation, and legislation by most farmers and challenges in obtaining group registration as seed producers (stringent conditions) are other important constraints of seed enterprises. Inadequate knowledge in packaging and labelling of seed is another major bottleneck for farmer-led seed enterprises, undermining branding of products and market penetration. Cost of packaging is a major impediment to proper packaging (Dey et al., 2022). In Zambia, indistinguishable differences in grain and seed prices in local markets results in small margins for group-based seed producers.

Rwandese seed systems have over the years faced seed security challenge, depending on seed imports to meet domestic seed demand. Earlier study by Nkerenke (2011) identified several bottlenecks that affected production and multiplication of bean seed in Rwanda. Private seed enterprises in Rwanda had low incentive to invest in production of certified seed because of low attractiveness compared to maize seed business. Investment in bean seed production require huge capital outlay compared to cereals (Nkerenke, 2011). Common bean is also susceptible to pests and diseases therefore costly to produce. Yields obtained by seed producers seldom offset costs incurred (Nkerenke, 2011). Other constraints include land and labour (expensive) constraints, lack of tools and equipment, inadequate post-harvest facilities, limited access to financial services, and lack of governments. Despite challenges, there are success stories that provide lesson for investment in seed enterprises.

Interventions by PABRA, Harvest Plus, and AGRA have stifled seed production challenge in Rwanda. PABRA and Harvest Plus have supported bean breeding initiatives leading to release of 19 new bean varieties, which will open business opportunities for seed entrepreneurs, end dependency on imported seed, improve access to and adoption of improved bean varieties by farmers, and enhance food security and nutrition (Onyango, 2021). AGRA's financial support to the national agricultural research system (NARS) and seed companies has placed Rwanda on seed self-sufficiency path. AGRA has supported private seed enterprises to advance seed production and multiplication capacity. In mainstreaming bean seed system, AGRA support has focused on women-led enterprises, where two women-owned seed companies, Ignite Seed and Rwanda Improved Seed Company (RISCO), have benefited from the grant to produce maize and bean seed (AGRA, 2021; Agrilinks Team, 2021). Local production of high-quality improved bean seed has increased tremendously in the last five years, lowering cost of seed relative to imported seed and increase margins for seed entrepreneurs. This presents a success story for the need of external support to seed entrepreneurs to overcome inherent input and financial constraints.

583%

Zinduka Women Group increased production from 300 kg/ha to 1,750 kg/ha. A 583% increase

Another success story of seed producer groups is Zinduka Women Group in Mbeya district located in southern highlands of Tanzania. The group was formed in 2010 with a focus of empowering women in agriculture through production and marketing of common bean (Kasubiri et al., 2022; Onyango et al., 2022). The choice of common bean was because of the promising business potential of the crop compared to cereals and other legumes. The group was linked to Tanzania Agriculture Research Institute (TARI) that created a learning platform for evaluation and promotion of new technologies which enabled the group to venture into seed production, increasing production from 300 kg/ha to 1,750 kg/ha. External support from TARI also included trainings in row planting and spacing, bean business, good agricultural practices, bean management techniques, and management of group dynamics (Kasubiri et al., 2022; Onyango et al., 2022). Zinduka Women Group has enabled farmers (both members

and non-members) to overcome challenge of limited access to quality seed of improved bean varieties. The group produces and supplies market-demanded bean varieties, diversifying their seed buyer from local farmers to seed grain off-takers, seed companies, NGOs, and TARI.

Post-harvest losses resulting from heavy rain has been a major bottleneck for Zinduka women group but through PABRA support, the group is adopting solar bubble driers to avert losses. Another challenge faced by the group was seed quality assurance due to physical damage to seed during post-harvest handling. Support from PABRA in mechanized threshing is timely in not only enhancing seed and grain quality but reducing drudgery and threshing time (Kasubiri et al., 2022; Onyango et al., 2022) that disproportionately affect women farmers. Other partners are building the capacity of the group through business training and facilitate linkages to services providers. Venture into seed production has transformed socioeconomic status of women and enabled the group to acquire land for expanded production (Kasubiri et al., 2022; Onyango et al., 2022). The group has also contributed to formation and capacity building of adult mixed gender group and youth group, as well as employing members on the youth group as machine operators.

Cameroon formal seed industry is relatively small compared to countries in the EAREM bean corridor, but the private seed enterprises are slowly emerging focusing on multiple crops. Extensive bean research in recent past in West and Northwest regions, the two major bean production hubs, and release of five new bean varieties developed by CIAT under the PABRA program has been a major milestone that is likely to drive seed production enterprises in Cameroon in the future (PABRA, 2015; Bella et al., 2021). However, seed business in common bean value chain remains largely untapped with minimal presence of seed producer groups and private sector companies. Vegetable and groundnut seed enterprises that are widely operational in the country. While there was 7.14% growth in dry bean seed market between 2012-2014 supported by CGIAR has not erased challenges faced by bean producing enterprises. Limited resources, high use of local varieties, inadequate research, and limited knowledge transfer through trainings and technical assistance to community producer groups and private seed companies constrain bean seed enterprises (Mordor Intelligence, 2022).

07
Seed and Grain entrepreneurship

Informal seed channels are important sources of seed for smallholder farmers in sub-Saharan Africa, making informal seed traders key to seed markets. Using a corridor approach to track the flow of yellow beans from production to consumption hubs connected by transportation and distribution activities, Sperling et al. (2021), found that informal seed accounted for between 15 and 40% trade business for traders and retailers in Tanzania, respectively. Trade in seed and grain are inseparable, with most traders dealing in both products. 39% of large seed traders and 17% of seed retailers reported that they traded in improved bean varieties but could not distinguish modern varieties from local varieties and were unaware of names of the varieties. Nonetheless, genetic analysis of samples of seed collected from traders revealed 60% of seed were linked to formal sector and therefore improved. Seed trade had remarkable scale in terms of volumes traded and rate of use of modern varieties.

The traders sourced seed from informal seed sector, with none of the large seed traders and retailers obtaining certified seed or quality declared seed. The seed traders had limited interface with formal seed market. Sperling et al. (2021) further noted that source of seed differed with large traders obtaining from own production, aggregators, and fellow traders, while retailers mainly sourced directly from farmers. This result further reinforces the role of informal entrepreneurs in Tanzanian seed systems. The study also revealed that grain trade (aggregation, retailing, wholesale, and export) was vibrant with ample business volumes of modern yellow bean varieties traded. However, gender differences were observable. While women dominated retail node, sourced grain locally, and sold in local markets, men were dominant in export and aggregation nodes and sourced grain from distance regions and regional markets.

The major challenge to trade in seed and grain is information gaps in new varieties of bean that can stimulate business and meet buyer demand. Another critical challenge identified by Sperling et al. (2021) was variable seed quality and purity concerns, where traders reported mixing of varieties by farmers. The quality problem stems from lack of financial incentives to farmers associated with low prices. Decline in seed and grain quality during storage (storage losses) was another challenge. Furthermore, lack of information about types of markets (domestic and international markets) and variability in markets were constrain seed and grain enterprises. This was attributed to traders' lack of knowledge about market differentiations. Traders were unaware which varieties they needed invested in, how customers need to be differentiated based on seed and grain demand, and inability to estimate and project demand.

Monitoring study by KIT (2020) in Kenya revealed that aggregators in agriculture value chain bulk grain of different crops, including bean grain – no specialization. The study revealed critical areas that aggregator need support to become viable business entities. The capital need of aggregators is not satisfied by formal finance services, have low-skilled workforce, women employees are underrepresented, and own few fixed assets (KIT, 2020). Trading in mixed beans also occurs at aggregation stage of the bean value chain in Kenya. Lack of

knowledge of different varieties and characteristics undermine purity of grain. Few aggregators sort grain supplied by farmers by variety and those who segregate varieties only sort by physical attributes (Dalberg, 2019). Therefore, quality assurance at aggregation is sabotaged by both farmers and aggregators.

In Zambia, small scale traders aggregate bean grain from few to numerous smallholder producers and sell to large traders (wholesalers) mostly from urban areas and cities. Large traders must purchase from either several aggregators to get critical volumes or directly from relatively large producers (Mwansa, 2013). Availability of capital investment to finance procurement of large volumes of grain and related logistics, and storage facilities determines transition of aggregators (small traders) to wholesalers (Mwansa, 2013). This observation indicates that aggregators in Zambia have little cash reserves and assemble little volumes due to capital constraints.

Market oriented farmers in Uganda also face myriad challenges in accessing and profiting from market participation. Lack of unit of measures, use unstandardized weighing scales by traders, and the inability of farmers to use the scales distorts bean grain markets in Uganda (Kansiime, 2020). Local markets are also unreliable in terms of absorbing bean surpluses and prices. Farmers are also unorganized and have poor bargaining power, leading to exploitation tendencies by traders. Mauyo et al. (2010) reported market inefficiency created by high transport costs as a constraint to dry bean cross-border trade between the Kenya and Uganda. Informal and unstructured markets, limited product differentiation, low integration of smallholder farmers into markets, and weak market linkages between smallholders and processors are major marketing challenges in Uganda.

Smallholder farmers are largely unorganized and existing farmers organization have weak management capacity and lack commercial acumen to effectively undertake marketing functions (Commercial Agriculture for Smallholders and Agribusiness [CASA], 2020). Farmers and producer organization have low bargaining power due to limited aggregation capacity and weak relations with large buyers, constraining their ability to exploit lucrative agribusiness opportunities. Access to competitive markets is curtailed by the largely bean trading, lack of contractual arrangements, and poor enforcement of existing marketing contracts. Trade is controlled by few enterprises and largely remains informal. Farmers sell at farm gate to local traders who aggregate the supplies and then sell to medium and large grain traders. Large traders also source bean grain from other traders, aggregating farmer groups, and wholesalers. Like in other countries in EAREM, women dominate retail activities while men transport transportation.

08
Bean Processing

Processing of bean has the greatest potential because of increasing demand for convenience foods and growing awareness of nutritional value of consuming bean products (Aseete et al., 2018). In Kenya, bean processors must navigate numerous barriers, including consumer indifferences, mixed bean varieties from the markets, limited demand for processed products, and broker-led grain markets to seize anticipated opportunities in processed bean products (Dalberg, 2019). Bean processing SMEs in Kenya also confront limited access to grain supplies in a timely manner and incur high transaction costs procuring supplies across borders (Kilimo Trust, 2018).

Nakazi et al. (2019) identified diversified marketing strategy as critical approach to reach potential consumers with information about availability of the products and to create demand. Long cooking time has been a major bottleneck to bean processing (Aseete et al., 2018), but the emergence of pre-cooked bean varieties is increasing interest of processors in Kenya and Uganda (PABRA). However, there are few processors in Uganda, buying only 1% of grain produced in the country, with Nutreal being the main processor of a narrow portfolio of products, mostly flour (Kilimo Trust, 2012). Existing bean processors have low processing capacity and lack financial resource to acquire or upgrade existing infrastructure (Kilimo Trust, 2012). Ugandan SMEs also have weak and unreliable forward linkages to exploit market opportunities (Kilimo Trust, 2018).

09
Gender Dimension in Entrepreneurship

Women are the main economic actors in developing countries as evidenced a surge in number of women entrepreneurs in Africa (MIWE, 2020). However, despite women entrepreneurship in Africa being highest globally, women in the region face considerable challenges in starting and operating businesses. Most obstacles to women entrepreneurship are context-specific because women must navigate social norms that task them responsibilities of taking care of families and solely shouldering household chores (Ojediran & Anderson, 2020). Social norms restrict mobility of women (Sorgner, 2017; Katre, 2018), depriving them entrepreneurship opportunities while excessive workload effectively disengages them from participating in entrepreneurial activities. Furthermore, contextualized factors deprive women access to critical entrepreneurship resources such as land, finances, and technology, as well as business training and opportunities, creating gaps between men and women enterprises (Aikaruwa et al., 2014; Lekhanya, 2017; Achandi et al., 2018). Other literature blames the widespread societal bias against women for underrepresentation of women in funded businesses rather than lack of experience and skills (Wheadon & Duval-Couetil, 2019). The results of context-related barriers are differences in characteristics, behaviour, and needs between men and women entrepreneurs, as well as differences in scale of business operations and outcomes of entrepreneurship efforts (Welter & Smallbone, 2011).

Women business in Africa operate within sectors that are financially constrained and attract less attention from private and government support because of informal nature. This observation is particularly relevant to enterprises operating in sub-Saharan Africa's agricultural sector. Tamirat (2013) observed that there is a continuous exodus of entrepreneurs from the agricultural sector to non-agricultural sector due to financial constraints, negatively implicating region's food security endeavour. Women businesses in the agricultural sector in Africa are disproportionately affected by multiple challenges, including low access to productive resources, liquidity, and information than men enterprises. Self-employed women in agriculture often depend on self-financing due to limited access to formal financing and support. The constraints to women owned and operated businesses in the agricultural sector indicates that entrepreneurship is not gender neutral and needs of women agri-entrepreneurs should be accounted.

Previous literature indicates that entrepreneurship is dominated by men and acknowledges gender as a critical confounding variable for entrepreneurship behaviour (Muntean & Ozkazanc-Pan, 2015; Guzman & Kacperczyk, 2019). These observations mean that entrepreneurship as a set of actions that create new products and services is not cast of static profiles of people and interests (Mwatsika, 2018). Instead, entrepreneurial interests and opportunities vary at individual and group levels, with group level variations showing certain differences in businesses founded by men and women in both structure and individual goals (Kerr et al., 2018). The consequence of gendered entrepreneurial differences are observable patterns in men and women businesses such as concentrations at different segments of value chain, differences in level of business growth and orientation, and business actions and goals

(Klapper & Parker, 2011; Dilli & Westerhuis, 2018). The differences in entrepreneurship orientation, goals, and growth result in asymmetries that have implications on socioeconomic development and gender-held stereotypes that may favour men entrepreneurship and growth over women businesses (Hyams-Ssekasi et al., 2019).

Although women face significant obstacles operating businesses, entrepreneurship is providing numerous opportunities for their economic and social emancipation. Sullivan and Meek (2012) note that women have diverse motivations for venturing into entrepreneurship than men. Some of the motivations for women entrepreneurship is desire to be independent, gain autonomy and for self-actualization which are often informed by work experiences. However, work experiences are short-lived contributors to women entrepreneurship. Instead, new competencies and business intelligence are needed for growth of women enterprises (Ogundana et al., 2021). Access to finance and social support are also key to growth of women-owned SMEs. Perhaps women concentration at lower capital value chains is more motivated by the desire to succeed rather than only because of limited access to resources. Thus, entrepreneurship as means to women autonomy and independency is also a pathway to empowerment.

Like women, youths are also a heterogenous group with differing entrepreneurial intention and potential. Schøtt and Cheraghi (2015) note that young men venture into business much earlier than young women suggesting underlying context-specific barriers. Even so, youth entrepreneurs face multi-faceted and context-specific challenges like those experienced by women entrepreneurs (Ahmed & Ahmed, 2021). Thus, entrepreneurs' needs must be addressed for growth of women and youth enterprises.

10 Needs of Men, Women, and youth Entrepreneurs

SMEs in the bean value chain have immediate and long-term opportunities to contribute to economic growth and empowerment of men, women, and youth entrepreneurs. For these endpoints to be realized, however, multiple gaps in their businesses need to be addressed. The needs of bean SMEs in the three bean corridors require linkages between upstream and downstream actors. CASA (2020) identified levels whose needs have the addressed to strengthen entrepreneurship: smallholder level, farmer-based organizations and SMEs level, processors and exporters level, and sector level. Smallholder farmer levels envision the need to increase productivity and delivery of better-quality volumes of bean to attract better prices and to improve food security, nutrition, and income. Increasing aggregation capacity of quality bean, building sustainable market linkages and business relationships, access to working and investment capital, and establishment of networks of women-owned entrepreneurs are critical for SMEs and farmer-based organizations. Full utilization of available processing and storage facilities and strong business linkages are area that processors and exporters need support. Therefore, an inclusive bean sector would offer opportunities for investment by all value chain actors.

Need for Improved Seed

a) Need for strengthening supply of bean seed in formal markets via wide-scale extension programs, safeguarding of producer prices through policy interventions, and supporting processors and exporters as grain buyers.
b) Need for technical, financial, and equipment support to private seed companies, especially women owned enterprises, to participate in multiplication and commercialization of certified bean seed.
c) Support to farmer-based seed production enterprises (individual, producer group/associations, village-based seed enterprises, and cooperatives) via provision of complementary inputs, development of business plans, trainings in seed production, provision of market information, and technical backstopping and capacity building.
d) Support new women and youth-owned seed enterprises (individual or group) in rural areas in registration, financial incentives, insurance, training in business, and linkages to established seed companies as contracted out-growers.
e) Need for implementing revolving seed loan to popularize market-demanded varieties for widespread adoption.

Financial Needs

Lack of multi-sectoral platforms that promote engagement of key stakeholders to share experiences and best practices impede effective participation of women in entrepreneurship. Adam et al. (2017) identified six entrepreneurship capacity and financing action areas that would empower women entrepreneurs:

a) Need to devolve financial services and capacity building programs to grassroots to

support men, women, and youth involvement in agribusiness.

b) Financial services should embed sustainability strategies by tailoring and adopting products that target farmer cooperatives and women groups.
c) Specialized support should be tailored to women entrepreneurs who attempt but fail to in entrepreneurship pursuits.
d) Increased financial support to viable women-led entrepreneurs to develop new and innovative products and manage risks.
e) ICT-based financial service platforms such as mobile money transfer should be tailored to women to avert high transaction costs and limit intermediaries.
f) Training women and youth on enterprise management and prudent and responsible use of credit.

Capacity Building Needs

The review revealed weak linkages between bean producers and input service providers, weak value chain linkages, and limited production capacity at farm level as important impediment to entrepreneurship. Capacity building needs as summarized from Adam et al. (2017) include:

a) Entrepreneurial education targeting women and youth entrepreneurs to equip them with technical and soft skills in agribusiness,
b) Provision of extension services targeted at women farmers.
c) Supporting producer groups and agribusiness groups to provide extension services.
d) Training and development interventions to strengthen value chain linkages.
e) Collaborations and partnerships between value chain actor to address existing barriers to entry of women and youth into entrepreneurship.
f) Creation and strengthening of farmer organizations to enable economy of scale for group-based SMEs and individual farmers.
g) Support existing SMEs through capacity building to strengthen governance structures.
h) Collective marketing arrangements to help entrepreneurs, village-based enterprises or SMEs reduce market risks.

Post-harvest and Storage Needs

Women are overrepresented at less lucrative nodes of the bean value chain while their participation in downstream nodes is low. Women entrepreneurs need:

a) Training in best practices to reduce gender gaps in post-harvest and storage activities.
b) Business upgrading to increase involvement in processing activities and ensure quality products.
c) Upgrading via improvements in product packaging, differentiation, and infrastructure.
d) Facilitate access to forward financing with future production and processing considered as collateral. This will enable SMEs leverage their assets, increase liquidity, and acquire knowledge, technology, and storage capability.

Transportation, Marketing and Sales

a) The need for direct payments via digital platforms to women entrepreneurs to allow them gain and maintain control of benefits. MFN application is an example of digital payment solutions that has been used effectively by the IBMPA project in Uganda (PABRA, 2021).
b) Need for increasing aggregation of quality bean products by strengthening producer and farmer group aggregation of high-quality grain for commercial off-takers.
c) Need to support SMEs expansion and growth through training in business skills and financial management, innovations, and access to business platforms and partnerships.

d) Enhance downstream links to off-takers and processors to create farmer demand for seed of improved bean varieties.

Women and Youth Entrepreneurs

a) Dissemination of high-quality improved bean varieties and support acquisition of machinery and equipment to reduce work burden for women and drudgery for reduction of gender productivity gaps.
b) Increase access to land, credit, technology, and extension for improved performance and growth of farm enterprises.
c) Need for programs that integrate and empower women and young entrepreneurs in production, value addition, and marketing to tap existing and new opportunities in value chain.
d) Objective improvement in human capital to promote empowerment and women agency in business.

10 References

Abass, A. B., Ndunguru, G., Mamiro, P., Alenkhe, B., Mlingi, N., & Bekunda, M. (2014). Post-harvest food losses in a maize-based farming system of semi-arid savannah area of Tanzania. Journal of Stored Products Research, 57, 49-57. https://doi.org/10.1016/j.jspr.2013.12.004

Achandi, E. L., Mujawamariya, G., Agboh-Noameshie, A. R., Gebremariam, S., Rahalivavololona, N., & Rodenburg, J. (2018). Women's access to agricultural technologies in rice production and processing hubs: A comparative analysis of Ethiopia, Madagascar and Tanzania. *Journal of Rural Studies, 60*, 188-198. https://doi.org/10.1016/j.jrurstud.2018.03.011

Adam, R. I., Osano, P., Birika, J., Ndede Amadi, A. A., & Bwisa, H. (2017). The situation of women in the agribusiness sector in Africa. *Development in Practice, 27*(6), 892-898. https://doi.org/10.1080/09614524.2017.1338670

AGRA. (2021). *AGRA supports the seed system in Rwanda*. Retrieved from https://agra.org/news/wp-content/uploads/2021/03/Success-story-Rwanda.pdf

Ahmed, H., & Ahmed, Y. A. (2021). Constraints of youth entrepreneurs in Ethiopia. *Journal of Global Entrepreneurship Research, 1*, 1-10. https://doi.org/10.1007/s40497-021-00292-z

Aikaruwa, D. B., Sumari, G. A., & Maleko, G. N. (2014). Social functionality of self help groups in Tanzania. *Journal of Business Administration and Education, 5*(2), 99-136.

Amongi, W., Kato, F., Male, A., Musoke, S., Acam, C., Kabwama, A., ... & Mukankusi, C. (2021). Development of white common beans for the processing industry in East Africa: Adaptability, resistance to selected diseases, cooking time and canning quality. *African Crop Science Journal, 29*(3), 401-431. https://dx.doi.org/10.4314/acsj.v29i3.6

Annan, K., & Dryden, S. (2015). *Food and the transformation of Africa: Getting smallholders connected*. Foreign Affairs. Retrieved from https://www.foreignaffairs.com/articles/africa/2015-10-16/food-and-transformation-africa

Aseete, P., Katungi, E., Bonabana-Wabbi, J., Birachi, E., & Ugen, M. A. (2018). Consumer demand heterogeneity and valuation of value-added pulse products: A case of precooked beans in Uganda. *Agriculture & Food Security, 7*(1), 1-13. https://doi.org/10.1186/s40066-018-0203-3

Ayesiga, C. (2016). *Local seed businesses as an alternative route for seed access: Challenges faced in Uganda*. Retrieved from https://n2africa.org/local-seed-businesses-alternative-route-seed-access-challenges-faced-uganda

Babirye, I. (2019). *Value chain analysis of processed common bean products in Kenya*. (Master's thesis). Makerere University, Kampala, Uganda.

Barrientos, S., Knorringa, P., Evers, B., Visser, M., & Opondo, M. (2016). Shifting regional dynamics of global value chains: Implications for economic and social upgrading in African horticulture. *Environment and Planning A: Economy and Space, 48*(7), 1266-1283. https://doi.org/10.1177/0308518X15614416

Bella, S., Madi, O. P., Andison, C., Nchanji, E., Onyango, P., & Kimani, O. (2021). *New bean hub in Cameroon set to meet national and regional food demand in West and Central Africa*. Retrieved from https://www.pabra-africa.org/new-bean-hub-in-cameroon-set-to-meet-national-and-regional-food-demand-in-west-and-central-africa/

Birachi, E. A. (2012). *Value chain analysis of beans in eastern and southern Africa: Building partnerships for impact through research on sustainable intensification of farming systems*. Retrieved from https://cgspace.cgiar.org/bitstream/handle/10568/24878/aresa_vca.pdf?sequence=6

Birachi, E. A., Sperling, L., Kadege, E., Mdachi, M., Upendo, T., Radegunda, K., ... & Buruchara, R. (2021). *Analysis of the yellow bean corridor in Tanzania*. Retrieved from https://cgspace.cgiar.org/handle/10568/115720

CASA. (2020. *Beans sector strategy – Uganda*. Retrieved from https://www.casaprogramme.com/wp-content/uploads/CASA-Uganda-BeansSector-analysis-report.pdf

Chemining'wa, G. N., Kitonyo, O. M., & Nderitu, J. H. (2014). Status, challenges and marketing opportunities for canning navy bean in Kenya. *African Journal of Food, Agriculture, Nutrition and Development, 14*(5), 2072-2087. https://dx.doi.org/10.18697/ajfand.65.12980

Chilipa, L. N. K., Lungu, D. M., & Tembo, L. (2016). Multiple race inoculation as an option in breeding for resistance to C. lindemuthianum in common beans. *Journal of Agriculture and Crops, 2*(5), 45-50.

CIAT & World Bank. (2017). *Climate-smart agriculture in Tanzania. CSA country profiles for Africa series*. Retrieved from https://hdl.handle.net/10568/83482

Coles, C., & Mitchell, J. (2011). *Gender and agricultural value chains: A review of current knowledge and practice and their policy implications*. http://www.fao.org/3/a-am310e.pdf

Dalberg. (2019). *Commercialization assessment: High iron beans in Kenya*. Retrieved from https://nutritionconnect.org/sites/default/files/2020-01/191213_Kenya_Iron%20Beans_Report_vFINAL.pdf

De Boef, W. S., Nagarajan, L., & Pray, C. (2016). *Promoting commercial and sustainable supply of early generation seed of food crops in sub-Saharan Africa*. Retrieved from https://www.agrilinks.org/sites/default/files/resource/files/EGS%20synthesis%20summary%2012122016%20vF.pd

Demissie, T., Groot, A., Duku, C., Budding-Polo, M., Kabuka, G., Nkenja, E., ... & Schonenberg, P. (2019). *Common beans Tanzania: Climate change risks and opportunities*. Retrieved from https://hdl.handle.net/10568/103235

Dey, B., Visser, B., Tin, H. Q., Mahamadou Laouali, A., Baba Toure Mahamadou, N., Nkhoma, C., ... & Bragdon, S. (2022). Strengths and weaknesses of organized crop seed production by smallholder farmer: A five-country case study. *Outlook on Agriculture*, 1-13. https://doi.org/10.1177/00307270221115454

Dilli, S., & Westerhuis, G. (2018). How institutions and gender differences in education shape entrepreneurial activity: A cross-national perspective. *Small Business Economics, 51*(2), 371-392. https://doi.org/10.1007/s11187-018-0004-x

Duku, C., Groot, A., Demissie, T., Muhwanga, J., Nzoka, O., & Recha, J. (2020). *Common beans Kenya: Climate risk assessment. Climate Resilient Agribusiness for Tomorrow (CRAFT)*. Retrieved from https://hdl.handle.net/10568/107723

Ellis, E., Kwofie, E. M., & Ngadi, M. (2020). Economic and nutritional implications of losses and contributing factors along the bean value chain. *Journal of Stored Products Research, 87*, 101582. https://doi.org/10.1016/j.jspr.2020.101582

Fan, S., Brzeska, J., Keyzer, M., & Halsema, A. (2013). *From subsistence to profit: Transforming smallholder farms*. IFPRI. Retrieved from http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/127763/filename/127974.pdf

FAOSTAT. (2022). *Crops and livestock products*. Retrieved from https://www.fao.org/faostat/en/#data/QCL

Food Security and Nutrition Working Group (2022). *East Africa cross-border trade bulletin*. Retrieved from https://www.icpac.net/documents/31/Quarterly_GHA_Cross_Border_Trade_Bulletin_April_2020.pdf

Frelat, R., Lopez-Ridaura, S., Giller, K. E., Herrero, M., Douxchamps, S., Djurfeldt, A. A., ... & Van Wijk, M. T. (2016). Drivers of household food availability in sub-Saharan Africa based on big data from small farms. *Proceedings of the National Academy of Sciences, 113*(2), 458-463. https://doi.org/10.1073/pnas.1518384112

Funes, J., Sun, L., Sedano, F., Baiocchi, G., & Benson, T. (2022). Social interaction and geographic diffusion of iron-biofortified beans in Rwanda. *Agricultural Economics, 53*(4), 503-528. https://doi.org/10.1111/agec.12722

Giller, K. E., Delaune, T., Silva, J. V., Descheemaeker, K., van de Ven, G., Schut, A. G., ... & van Ittersum, M. K. (2021). The future of farming: Who will produce our food? *Food Security, 13*(5), 1073-1099. https://doi.org/10.1007/s12571-021-01184-6

Guzman, J., & Kacperczyk, A. O. (2019). Gender gap in entrepreneurship. *Research Policy, 48*(7), 1666-1680. https://doi.org/10.1016/j.respol.2019.03.012

Hamazakaza, P., Katungi, E., Ryes, B., Maredia, M. K., Muimui, K. K., & Ojara, M. (2014). *Assessing access and adoption of common bean improved varieties in Zambia*. Retrieved from https://cgspace.cgiar.org/bitstream/handle/10568/59768/ZAMBIA%20ADOPTION%20REPORT%20JAN%2020152.pdf?sequence=4

Hoffmann, N., & and Roscoe, A. (2021). *Investing in women along agribusiness value chains. International Finance Cooperation*. Retrieved from https://www.ifc.org/wps/wcm/connect/02c5b53e-420f-4bf4-82bb-6f488ff75810/Women+in+Agri+VC_Report_FINAL.pdf?MOD=AJPERES&CVID=m0JfSbv#:~:text=It%20highlights%20that%20when%20companies,in%20the%20workforce%20and%20management%20

Hyams-Ssekasi, D., Stefan, A., Agboma, F., & Kumar, N. (2019). Determinants of women's entrepreneurial attitude across European cultures. In F. Tomos, N. Kumar, N. Clifton, & D. Hyams-Ssekasi(Eds.), *Women entrepreneurs and strategic decision making in the global economy* (pp. 63-78). IGI Global.

Ingabire, C., Mshenga, M. P., Langat, K., Bigler, C., Musoni, A., Butare, L., & Birachi, E. (2017). Towards commercial agriculture in Rwanda: Understanding the determinants of market participation among smallholder bean farmers. *African Journal of Food, Agriculture, Nutrition and Development, 17*(4), 12492-12508. http://ajfand.net/AJFAND/copyrightstatement.html

Kansiime, M. K., Macharia, M., Baars, E., Rutatora, D. F., Silvestri, S., & Njunge, R. (2020). Evaluating gender differentials in farmers' access to agricultural advice in Tanzania. *CABI Working Paper 16*. Retrieved from https://dx.doi.org/10.1079/CABICOMM-62-8142

Kasubiri, F., Kilango, M., Nduguru, A., Ndimbo, M., Kessy, R., Kalemera, S., ..., Rubyogo, J. C. (2022). *Empowering Zinduka women's group in Tanzania to produce quality bean seed and better their community's well-being*. Retrieved from https://www.agrilinks.org/post/empowering-zinduka-womens-group-tanzania-produce-quality-bean-seed-and-better-their-communitys

Katre, A. (2018). Facilitating affective experiences to stimulate women's entrepreneurship in rural India. *International Journal of Gender and Entrepreneurship*, 10(3), 270-288. https://doi.org/10.1108/IJGE-01-2018-0007

Katungi, E. M., Larochelle, C., Mugabo, J. R., & Buruchara, R. (2018). The effect of climbing bean adoption on the welfare of smallholder common bean growers in Rwanda. *Food security, 10*(1), 61-79. https://doi.org/10.1007/s12571-017-0753-4

Katungi, E., Letaa, E., Kabungo, C., Ndunguru, A., Mukankusi, C. M., Raatz, B., ... & Rubyogo, J. C. (2019). *Assessing the impact of the tropical legumes II & III project on common bean productivity, profitability and marketed surplus in southern highlands of Tanzania*. Retrieved from https://cgspace.cgiar.org/bitstream/handle/10568/105989/TL3%20Impact%20report%20Final%20draft.pdf?sequence=1

Katungi, E., Wozemba, D., & Rubyogo, J. C. (2011). A cost benefit analysis of farmer-based seed production for common bean in Kenya. *African Crop Science Journal, 19*(4), 409-415.

Kerr, S. P., Kerr, W. R., & Xu, T. (2018). Personality traits of entrepreneurs: A review of recent literature. *Foundations and Trends in Entrepreneurship, 14*(3), 279-356.

Kessy, R., Kalemera, S., Kasubiri, N. S. F., Ndunguru, A., Ndimbo, M., Mdachi, M., ..., Onyango, P. (2022). *Making the bean corridor work: Lessons from Tanzania*. Retrieved from https://www.pabra-africa.org/making-the-bean-corridor-work-lessons-from-tanzania/

Kessy, R., Omondi, E., Onyango, P., Rubyogo, J. C., Persley, G., & Yao, N. (2020). *Counting on beans Building bean business investment and strengthening PABRA breeding approach*. Retrieved from https://cgspace.cgiar.org/bitstream/handle/10568/108591/Counting%20on%20beans%20brochure%202%20Mar%202020.pdf?sequence=1

Kilimo Trust. (2012). *Development of inclusive markets in agriculture and trade (DIMAT).* Retrieved from https://www.kilimotrust.org/documents/Development%20of%20Inclusive%20Markets%20in%20Agriculture%20and%20Trade%20(DIMAT).pdf

Kilimo Trust. (2021). *Fostering national and regional trade in agricultural products in East Africa: Impact booklet*. Retrieved from https://kilimotrust.org/documents/2021/REACTS-II_Impact_Booklet.pdf

KIT, 2020. *Kenya outcome monitoring report 2019, AGRA-PIATA Programme*. Retrieved from https://agra.org/wp-content/uploads/2020/12/AGRA-OM-Kenya-Report_FINAL.pdf

Klapper, L. F., & Parker, S. C. (2011). Gender and the business environment for new firm creation. *The World Bank Research Observer, 26*(2), 237-257. https://doi.org/10.1093/wbro/lkp032

Laizer, H. C., Chacha, M. N., & Ndakidemi, P. A. (2019). Farmers' knowledge, perceptions and practices in managing weeds and insect pests of common bean in Northern Tanzania. *Sustainability, 11*(15), 4076. https://doi.org/10.3390/su11154076

Larochelle, C., & Alwang, J. (2022). Impacts of Improved Bean Varieties Adoption on Dietary Diversity and Food Security in Rwanda. *The European Journal of Development Research, 34*(2), 1144-1166. https://doi.org/10.1057/s41287-021-00376-2

Lekhanya, L. M. (2018). The digitalisation of rural entrepreneurship. In S. W. Brito (Ed.), *Entrepreneurship-trends and challenges* (pp. 37-70). Intech Open.

Letaa, E., Kabungo, C., Katungi, E., Ojara, M., & Ndunguru, A. (2015). Farm level adoption and spatial diffusion of improved common bean varieties in southern highlands of Tanzania. *African Crop Science Journal, 23*(3), 261-277.

Louhichi, K., Ricome, A., & Gomez y Paloma, S. (2022). Impacts of agricultural taxation in Sub-Saharan Africa: Insights from agricultural produce cess in Tanzania. *Agricultural Economics, 1*, 1-16. https://doi.org/10.1111/agec.12704

Mabeya, J., Bhramar Dey, Templer, N., Wilcox, M, Odhiambo, C. A., Buruchara, R., Karanja, D and Rubyogo, J. C., (2021). *Transforming last mile seed delivery: Case of high iron beans (HIBs) niche market business model in lower Eastern Kenya: Second Season Study Report.* Retrieved from https://pdf.usaid.gov/pdf_docs/PA00ZG5F.pdf

Marinus, W. (2015). *Opportunities and constraints for climbing bean (Phaseolus vulgaris L.) cultivation by smallholder farmers in the Ugandan highlands: Developing a 'basket of options.* (Master's thesis). Wageningen University, Wageningen, Netherlands.

Mataa, M., Kalima, P., & Lungu, D. (2021). Morphophysiological Responses of Common Bean (Phaseolus vulgaris L.) Genotypes to Water Stress. *University of Zambia Journal of Agricultural and Biomedical Sciences, 5*(1), 1-17. https://doi.org/10.53974/unza.jabs.5.1.611

Mauyo, L. W., Chianu, J. N., Nassiuma, B. K., & Musebe, R. O. (2010). Cross-border bean market performance in Western Kenya and Eastern Uganda. *Journal of Service Science and Management, 3*(04), 501-511.

Mehra, R., & Rojas, M. H. (2008). *Women, food security and agriculture in a global marketplace*. International Center for Research on Women. Retrieved from https://www.icrw.org/wp-content/uploads/2016/10/A-Significant-Shift-Women-Food-Security-and-Agriculture-in-a-Global-Marketplace.pdf

Misginaw, T. (2013). Financial constraints and entrepreneurial activity choice among clients of micro finance institutions in Jimma area. *Journal of Development and Agricultural Economics, 5*(12), 510-518.

Mordor Intelligence. (2021). *Seeds market in Cameroon: Analysis of seeds for sowing, by major crops, production, trade, growth, trends and forecasts (2020 - 2025).* Retrieved from https://www.mordorintelligence.com/industry-reports/seeds-market-in-cameroon

Mucioki, M., Hickey, G. M., Muhammad, L., & Johns, T. (2016). Supporting farmer participation in formal seed systems: Lessons from Tharaka, Kenya. *Development in Practice, 26*(2). https://doi.org/10.1080/09614524.2016.1131812

Muntean, S. C., & Ozkazanc-Pan, B. (2015). A gender integrative conceptualization of entrepreneurship. *New England Journal of Entrepreneurship, 18*(1), 27-40. https://doi.org/10.1108/NEJE-18-01-2015-B002

Murwanashyaka, E. (2022). *Research and development partnerships to strengthen inclusive and demand driven bean value chain in Rwanda*. Retrieved from https://rab.gov.rw/index.php?id=236&tx_news_pi1%5Bnews%5D=741&tx_news_pi1%5Bday%5D=8&tx_news_pi1%5Bmonth%5D=11&tx_news_pi1%5Byear%5D=2021&cHash=b140756c450ddfe9f5f91c3160ae8ee4

Mwansa, M. C. (2013). *Value accruing to Zambia's bean supply chain participants*. (Doctoral dissertation). Kansas State University, Manhattan, Kansas, United States.

Mwatsika, C. (2018). The ecosystem perspective of entrepreneurship in local economic development. *Journal of Economics and Sustainable Development, 9*(12), 94-114.

Nakazi, F., Babirye, I., Birachi, E., & Ugen, M. A. (2018). Exploring retailer marketing strategies for value added bean products in Kenya. *International Food and Agribusiness Management Review, 22*(5), 675-688.

Nanyonjo, G., Katungi, E., Ugen, M.A. Aseete, P., Mugaga, I. J. Ssali, S., & Sengendo, S. (2016). *Gendered Nature of Common Bean Marketing in Uganda.* Pan-African Grain Legume & World Cowpea Conference

Nchanji, E. B., & Lutomia, C. K. (2021). Sustainability of the agri-food supply chain amidst the pandemic: Diversification, local input production, and consumer behaviour. In M. J. Cohen, *Advances in food security and sustainability* (pp. 211-229). Elsevier.

Njoroge, A. W., Baoua, I., & Baributsa, D. (2019). Postharvest management practices of grains in the Eastern region of Kenya. *Journal of Agricultural Science, 11*(3), 33-42.

Nkerenke, M. (2011). *Factors affecting the availability of certified bean seed in Rwanda the case study of Nyagatare district, Eastern province*. Larenstein University, Leeuwarden, Netherlands.

Ogecha, J. O., Arinaitwe, W., Muthomi, J. W., Aritua, V., & Obanyi, J. N. (2019). Incidence and Severity of common bean (Phaseolus vulgaris L.) pests in agro-ecological zones and farming systems of Western Kenya. *East African Agricultural and Forestry Journal, 83*(3), 191-205. https://doi.org/10.1080/00128325.2019.1599151

Ogundana, O. M., Simba, A., Dana, L. P., & Liguori, E. (2021). Women entrepreneurship in developing economies: A gender-based growth model. *Journal of Small Business Management, 59*(1), 42-72. https://doi.org/10.1080/00472778.2021.1938098

Ojediran, F., & Anderson, A. (2020). Women's entrepreneurship in the global south: empowering and emancipating? *Administrative Sciences, 10*(4), 87. https://doi.org/10.3390/admsci10040087

Ojiewo, C., Rubyogo, J. C., Wesonga, J., Bishaw, Z., Abang, M. M., & Gelalcha, S. (2018). *Mainstreaming efficient legume seed systems in Eastern Africa: Challenges, opportunities and contributions towards improved livelihoods*. FAO. Retrieved from https://hdl.handle.net/10568/98358

Oketa, P. (2011). *Growth challenges faced by local seed companies in Uganda*. (Doctoral dissertation). University of Nairobi, Nairobi, Kenya.

Onyango, P. (2022). *Canada's partnership contributes to improved food security and inclusive entrepreneurship in Africa*. Retrieved from https://www.pabra-africa.org/canadas-partnership-contributes-to-improved-food-security-and-inclusive-entrepreneurship-through-beans-in-africa/

Oratungye Kevin, K. E., Rubyogo, J. C., & Onyango, P. (2021). *Improving bean production and marketing in Africa (IBPMA) April 2020-March 2021 Report*. Retrieved from https://cgspace.cgiar.org/bitstream/handle/10568/114043/IBPMA%20%20Annual%20Report%202020-2021%20April%202021.pdf?sequence=1&isAllowed=y

Owusu, E. S., & Bravo-Ureta, B. E. (2022). Gender and Productivity Differentials in Smallholder Groundnut Farming in Malawi: Accounting for Technology Differences. *The Journal of Development Studies*, *58*(5), 1-25. https://doi.org/10.1080/00220388.2021.2008364

PABRA. (2015). *Cameroon releases new five bean varieties*. Retrieved from https://www.pabra-africa.org/cameroon-releases-new-five-bean-varieties/

Paparu, P., Acur, A., Kato, F., Acam, C., Nakibuule, J., Musoke, S., ... & Mukankusi, C. (2018). Prevalence and incidence of four common bean root rots in Uganda. *Experimental Agriculture, 54*(6), 888-900. https://doi.org/10.1017/S0014479717000461

Paul Jr, M., Molua, E. L., Ngoh, S. B., & Beteck, S. E. (2021). Production, consumption and market diversification of grain legumes in the humid forest agroecology of Cameroon. Sustainable Production and Consumption, 27, 193-202. https://doi.org/10.1016/j.spc.2020.10.023

Pineda, J. A., Piniero, M., & Ramírez, A. (2019). Coffee production and women's empowerment in Colombia. *Human Organization, 78*(1), 64-74. https://doi.org/10.17730/0018-7259.78.1.64

Quisumbing, A., Heckert, J., Faas, S., Ramani, G., Raghunathan, K., & Malapit, H. (2021). Women's empowerment and gender equality in agricultural value chains: Evidence from four countries in Asia and Africa. *Food Security, 13*(5), 1101-1124. https://doi.org/10.1007/s12571-021-01193-5

Ronner, E., Descheemaeker, K., Marinus, W., Almekinders, C. J., Ebanyat, P., & Giller, K. E. (2018). How do climbing beans fit in farming systems of the eastern highlands of Uganda? Understanding opportunities and constraints at farm level. *Agricultural Systems, 165*, 97-110. https://doi.org/10.1016/j.agsy.2018.05.014

Samboko, P. C. (2011). *An assessment of factors influencing the profitability of bean production in Zambia*. (Master Thesis). University of Zambia, Lusaka, Zambia.

Schøtt, T., Kew, P., & Cheraghi, M. (2015). Future potential. A GEM perspective on youth entrepreneurship. Retrieved from https://www.theark.ch/media/document/0/gem-2015-youth-report-1438012592.pdf

Shilomboleni, H., Recha, J. W., Ubels, J., Radeny, M. A., & Solomon, D. (2019). *Systemic barriers to scaling private sector driven climate-smart agricultural innovations in East Africa's potato, sesame and common bean value chains*. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Retrieved from https://hdl.handle.net/10568/106887

Sichilima, T., Mapemba, L., & Tembo, G. (2016). Drivers of dry common beans trade in Lusaka, Zambia: A trader's perspective. *Sustainable Agriculture Research, 5*(2). http://dx.doi.org/10.5539/sar.v5n2p15

SOFA Team & Doss, C. (2011). *The role of women in agriculture*. Retrieved from https://www.fao.org/3/am307e/am307e00.pdf

Sorgner, A., & Krieger-Boden, C. (2017). *Empowering women in the digital age*. G20 Insights. Retrieved from https://www.g20-insights.org/wp-content/uploads/2017/07/Empowering-Women-in-the-Digital-Age.pdf

Sperling, L., Birachi, E., Kalemera, S., Mutua, M., Templer, N., Mukankusi, C., ... & Rubyogo, J. C. (2021). The Informal Seed Business: Focus on Yellow Bean in Tanzania. *Sustainability, 13*(16), 8897; https://doi.org/10.3390/su13168897

Strecker, K., Bitzer, V., & Kruijssen, F. (2022). Critical stages for post-harvest losses and nutrition outcomes in the value chains of bush beans and nightshade in Uganda. *Food Security, 14*(2), 411-426. https://doi.org/10.1007/s12571-021-01244-x

Sullivan, D. M., & Meek, W. R. (2012). Gender and entrepreneurship: a review and process model. *Journal of Managerial Psychology, 27*(5), 428-458. https://doi.org/10.1108/02683941211235373

United Nations. (2015). *The 17 sustainable development goals (SDGs) to transform our world*: Retrieved from https://www.un.org/development/desa/disabilities/envision2030.html

Wambua, S., Birachi, E., Gichangi, A., Kavoi, J., Njuki, J., Mutua, M., ... & Karanja, D. (2018). Influence of productive resources on bean production in male-and female-headed households in selected bean corridors of Kenya. *Agriculture & Food Security, 7*(1), 1-8. https://doi.org/10.1186/s40066-018-0236-7

Wanjala, S. P. O., Karanja, D., Wambua, S., Otiep, G., Odhiambo, C., & Birachi, E. (2019). Market arrangements used by small scale bean farmers in Kenya: What needs to change for sustainable trade volumes? *African Crop Science Journal, 27*(2), 119-131. https://doi.org/10.4314/acsj.v27i2.1

Welter, F., & Smallbone, D. (2011). Institutional perspectives on entrepreneurial behavior in challenging environments. *Journal of Small Business Management, 49*(1), 107-125.

Wheadon, M., & Duval-Couetil, N. (2019). Token entrepreneurs: A review of gender, capital, and context in technology entrepreneurship. *Entrepreneurship & Regional Development, 31*(3-4), 308-336. https://doi.org/10.1080/08985626.2018.1551795

Wineman, A., Njagi, T., Anderson, C. L., Reynolds, T. W., Alia, D. Y., Wainaina, P., Njue, E., Biscaye, P., & Ayieko, M. W. (2020). A case of mistaken identity? Measuring rates of improved seed adoption in Tanzania using DNA fingerprinting. *Journal of Agricultural Economics, 71*(3), 719–741. https://doi.org/10.1111/1477-9552.12368

World Bank. (2013). *Africa's Food markets could create one trillion-dollar opportunity by 2030*. Retrieved from https://www.worldbank.org/en/news/press-release/2013/03/04/africas-food-markets-could-create-one-trillion-dollar-opportunity-2030

World Bank. (2022). *World development indicators*. Retrieved from https://databank.worldbank.org/source/world-development-indicators#