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GENDERED SEED PRODUCTION AND DELIVERY MODELS ACROSS 10 COUNTRIES IN SUB SAHARAN AFRICA

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LIST OF ACRONYMS

| | |
|--------------|---|
| FAO | Food and Agriculture Organization of the United Nations |
| NARS | National Agricultural Research Systems |
| NGO | Nongovernmental organizations |
| PABRA | Pan African Bean Research Alliance |
| SPSS | Statistical Package for Social Sciences |

EXECUTIVE SUMMARY

The study was conducted in 10 African countries where 166 bean seed production and delivery actors were interviewed. The survey intended to document various production and delivery models used across the regions, the extent to which they involve and benefit women and vulnerable groups, the extent to which they promote availability and access to high-quality seeds, and examine the measures put in place to ensure high-quality seeds reach last mile farmers.

The study participants were nongovernmental organizations (NGOs), national agricultural research system (NARS), seed companies and farmer seed producer groups. Purposive sampling was used due to the limited number of bean seed actors along the chain ready to provide information on their activities. Data was collected using the surveyCTO platform and it was managed and analyzed using the Statistical Package for Social Sciences software (SPSS), version 20.

Most actors along the bean seed chain are primarily led by men. The most common production models practiced by the actors are contract farming, seed production cooperatives/groups and seed multiplication and distribution. To a small extent, the actors also utilize a community-based seed production model. The most notable delivery models are direct sales, followed by agrodealer networks and seed fairs and exchanges.

The involvement of women and vulnerable groups in both the production and delivery models was found to be satisfactory at a rate of approximately 70%. In addition, the models were found to promote seed availability to men and women when they needed it at the right point and time. Furthermore, the analysis indicates that the models were inclusive increasing access to high quality been seed which was beneficial to women and vulnerable groups. However, the leadership of the seed actors is dominated by male at approximately 69%, which means that a significant number of women have no power to make key decisions along the seed value chain

Been seeds provided by production and delivery models were found to be affordable. However, 19% of the bean seeds provided by the production models were considered to be either expensive or very expensive, whereas 26% of those provided by delivery models were also reported to be expensive or very expensive. This is consistent with the cost of seed, which was 16% and 17% higher for the production and delivery models, respectively.

The main goals of production models are; ensuring availability of high-quality seeds and increasing productivity. While the primary goals of delivery models are; access to high-quality seeds access, profitability/market expansion, increased productivity, inclusivity and the promotion of rural/local economies. Both production and delivery models were reported to be effective at realizing the set goals at 73% and 69% respectively.

The most notable programs/policies that have been put in place by delivery models to ensure that farmers afford seeds include flexible payment terms, bulk purchase discounts and credit schemes. In addition, both production and delivery models have enacted measures such as inspections, training, certification, testing, feedback mechanisms and traceability to enhance the quality of seeds as well as helping them in realizing their goals.

In conclusion, the most common production model among the actors is contract farming with the exception of the national agricultural research system (NARS) partners who prefer seed multiplication and distribution models. On the other hand, the commonly adopted delivery model among the actors is direct sales except for the NGO partners who mainly utilize seed multiplication and distribution and agrodealer network. To a large extent, production and delivery models encourage active involvement of men and women in their activities. Additionally, these models are considered beneficial to both genders. However, it should be noted that leadership positions across the actors are dominated by male in contrast with their female counterparts. Furthermore, the models are beneficial and not primarily empowering women and vulnerable groups. This means that, to a great extent, females do not participate in making key decisions along the value chain. The main goal of production

models is to make high quality seed available as well as increase productivity. Similarly, delivery models' primary goal is to provide high quality seeds, increase productivity and make profit. The production and delivery model actors have principally put in place measures such as inspection, certification and training which helps them to effectively achieve their goals. Furthermore, the actors have put in place programs such as subsidies, flexible payment terms and bulk purchase discounts to increase their effectiveness in realizing their goals.

The authors recommends that, to continue realizing the inclusivity of women and vulnerable groups, a multis-takeholder approach geared towards women's empowerment should be considered for both production and delivery models. Additionally, a key cross-cutting issue is the lack of women in leadership positions so there is a need to establish mechanisms and strategies that will support women's involvement in leading bean seed entities. Women should be supported to effectively participate in contract farming. It is important to strengthen and expand the agrodealer network since they play an important role in the distribution of seeds.

1.0 INTRODUCTION

The common bean (*Phaseolus vulgaris L.*) is the main feature of the daily diet for many households in sub-Saharan Africa. Rich in insoluble fiber and protein (Larochelle et al., 2017), these twin attributes contribute to the better nutritional status of the poor households in rural and urban areas (Nchanji and Ageyo, 2021). In Eastern, central and southern Africa, the role played by common bean in improving nutrition and food security of many households in both rural and urban settings is critical (Buruchara et al., 2011).

Beans are mainly grown by smallholder farmers. In the food value chain, the first most important link to food security is seed (Galiè 2013). Unlike other crops such as maize, to a greater extent, the private sector has not adopted bean seed production and delivery because of the conventional practices of the majority of the farmers who plant recycled varieties. This hinders an increase in bean productivity due to the low adoption of new/ improved varieties despite the efforts of scientists and partners to bring forth these varieties. Due to the low demand for improved bean seed varieties, the private sector is not willing to engage in the production or delivery of these varieties because of low profit margins. The challenge of the private sector is creating stable bean seed demand given low profit margins (Neate and Guéi, 2010).

It is estimated that the contribution of seed quality to a crop's total production is approximately 15-20% and largely influences the response of other efficiently managed inputs (FAO, 2018). Seed systems are the vehicles through which farmers obtain good quality seeds from the new crop varieties they want and need. Effective seed systems have the potential to increase production quickly and economically. Seed systems can influence food security by improving the availability, access to and use of improved varieties that increase the productivity and resilience of food crops (CGIAR, 2023).

Advocacy has been done by researchers and development partners about inclusivity, innovativeness and gender sensitive distribution channels, in partnership with the private sector to reach all farmers with good quality seeds and varieties (Farnworth et al., 2024). These delivery channels address undesirable norms and unequal access to improved seeds (Bossuet, 2020). However, limited access to seeds of improved varieties by smallholders is an impediment to productivity in sub-Saharan Africa. Limited supply, availability and access to bean seeds are likely among the most constraining factors for achieving crop productivity. Although bean breeders have produced several climate-smart bean varieties, the rate of adoption and variety turnover remain low, yet crop breeding is perceived as an important pathway for increasing yield potential and adapting small-scale farmers to climate change (Marcho et al., 2020). Additionally, farmers may not be well informed about the various options available to them or may be reluctant to experiment with new varieties. These challenges threaten production and can compromise the ability of individuals to meet their own food, nutritional, and income needs (CGIAR, 2023).

Ineffective seed supply and delivery systems mean that smallholder farmers often recycle seeds or use older varieties, leaving them more vulnerable to pests and diseases. Recycled seeds that are often obtained from the informal outlets is commonly used by smallholder farmers in developing countries at an estimated percentage of 60-80% (Vernooy, 2016).

Small-scale farmers, especially women and other disadvantaged groups, are particularly vulnerable to climate-related challenges, such as more frequent and severe droughts and erratic rainfall. The improved varieties distributed through informal seed systems don't reach women farmers on time (Hanif and Sperling, 2017). Due to women's restricted movement, it is impossible for them to access improved varieties which are not available in the local input outlets (Kramer and Galie, 2020).

Also, trust of the delivery models is gendered, for instance, in Malawi, males had no issue acquiring potato seed from beyond the village, whereas females focused their efforts on obtaining seed from fellow farmers within their communities. This was partially due to the women's apprehension that their spouses would hold them accountable if the harvest failed due to substandard seed (Mudege et al. 2016b). Seed access is determined through availability of information, mobility and networks of women and men, and affordability. According to Puskur et al. (2021), access to seeds on time is critical for the farmers because it influences not only the harvest, but also related decisions. Mudege et al. (2020) reported that involving women in seed production and management at the community level gives them access to varieties that addresses their needs, generates extra income through employment, and contributes to women empowerment. In communities, women obtain quality seed through alternative channels, including seed exchanges, informal labor supply, labor swaps, monetary loans, seed loans, and gifts. (Lukonge et al. 2015, Mudege et al. 2015, McGuire and Sperling 2016).

More economic opportunities can be created for women through seed systems (Kandiwa et al. 2018) contributing to women empowerment (Puskur et al., 2021). Additionally, gender equality and empowering women are essential elements to food and nutrition security (Agarwal 2018). Consequently, it is important to understand the interrelationship between the two: gender and socioeconomic differences in seed and food security must be understood to target seed interventions effectively (FANRPAN, 2011).

Therefore, there is a need to understand the key common bean value chain actors and document gendered seed production and delivery models by diverse chain actors in Africa. Furthermore, there is a need to assess the extent to which women and vulnerable groups participate and benefit from production and delivery models.

2.0 APPROACH AND METHODOLOGY

The main objective of the study was to understand bean seed value chain actors. The study intended to document the gendered seed production and delivery models used by diverse value chain actors in 10 African countries implementing the Seed Equal project. The study area was split into three regions, Central, Eastern and Southern Africa. The Eastern African countries included Kenya, Rwanda, Burundi, Ethiopia and Uganda. The southern Africa block consisted of Zambia, Zimbabwe, Mozambique and Eswatini while Cameroon represented the central region. The targeted value chain actors varied according to the different countries.

In total, 166 actors were interviewed across the three regions. There was no limitation in geographical location; rather, the study purposively tracked and interviewed actors who were willing to participate in the study. The actors included NGOs, seed companies, national agricultural research organizations, and farmer producer groups. Other intermediary actors such as agrodealer outlets, aggregators/middlemen and traders did not participate in this study.

Table 1: Sample distribution across countries

| | NGO | Seed companies | Seed Producer groups | Research Organization | Total |
|-------------------|-----------|----------------|----------------------|-----------------------|------------|
| Kenya | 0 | 5 | 2 | 2 | 9 |
| Rwanda | 2 | 11 | 5 | 2 | 20 |
| Burundi | 2 | 0 | 5 | 2 | 9 |
| Zambia | 0 | 3 | 33 | 1 | 37 |
| Zimbabwe | 2 | 9 | 2 | 1 | 14 |
| Mozambique | 0 | 8 | 3 | 8 | 19 |
| Cameroon | 3 | 0 | 5 | 2 | 10 |
| Ethiopia | 2 | 4 | 5 | 5 | 16 |
| Uganda | 3 | 6 | 7 | 1 | 17 |
| Eswatini | 3 | 6 | 5 | 1 | 15 |
| Total | 17 | 52 | 72 | 25 | 166 |

2.1 The study intended to answer the following questions:

1. What are the production and delivery models employed by the various actors?
2. To what extent do the production and market delivery models encourage the involvement of women, and are they beneficial to women and vulnerable groups?
3. To what extent do the production and market delivery models promote the availability of and access to affordable high-quality seeds for both men and women?
4. What are the goals of the seed production and market delivery models?
5. What measures are employed to ensure the production and delivery of quality seeds?

2.2 Data collection and analysis

A structured questionnaire was developed by the Alliance and IRRI team and administered to the various actors involved in common bean seed production and delivery. Country partners were trained and guided on data collection ethics, as the consultants could not fly to all the countries. We worked with national agricultural research staff that are affiliated with the Pan African Bean Research Alliance (PABRA) program and have collected similar data over the years. The questionnaire was programmed and uploaded to a digital platform called SurveyCTO. Data quality checks were also conducted as the data collection progressed. The quantitative data collected was subsequently downloaded, cleaned and analyzed using the SPSS statistical software package. Descriptive analysis was used to compute frequencies, means, and percentages. This analysis helped provide a clear and concise overview of the data, making it more interpretable and informative.

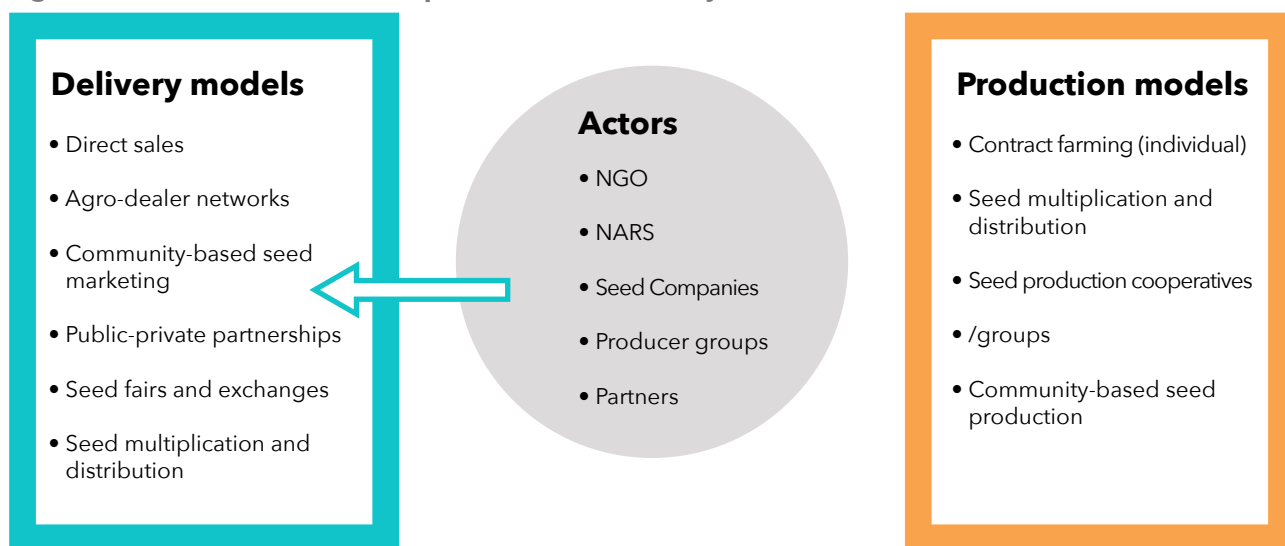
3.0 RESULTS AND DISCUSSION

3.1 Characteristics of bean seed chain actors

As indicated in figure 1, the bean seed chain actors analyzed were seed companies, farmer producer groups, NGO partners and NARS partners. To a great extent, seed companies work closely with farmer groups in production and delivery of bean seed. The farmer groups partnered not only with the seed companies but also NGO, NARS, and other government institutions such as the ministry of agriculture to produce and deliver bean seed. On the other hand, NGO and the NARS collaborates with other NGO, farmer groups and other government institutions. The seed companies are mainly formal by nature, meaning that they are officially established entities that have codified rules and procedures on producing and distributing seed. However, a study by McGuire and Sperling (2016) shows that farmers access 90% of their seed from informal systems. There is a common misconception that uncertified farmer-managed systems produce inferior seed. In contrast, a substantial proportion of wheat seed samples generated by farmers in Ethiopia and Syria exhibited comparable levels of physical purity and germination to certified seed samples (Bishaw et al., 2012). Another study in Tanzania also revealed that retail traders sell good quality seed in the market (Birachi et al., 2020).

The producer groups are primarily farmer based, while the seed companies are predominantly private. The NGO partners are predominantly local, with only 28% of them being international. The analysis indicated that the majority of the farmer groups had mixed genders in terms of their composition (95%). At least 85% of the actors and partners involved in bean seed production use different models. Seed companies dominate (80%) in delivering the seeds, NGO closely follow suit at 72%, NARS at 64% while farmer groups participated in seed delivery at 45%.

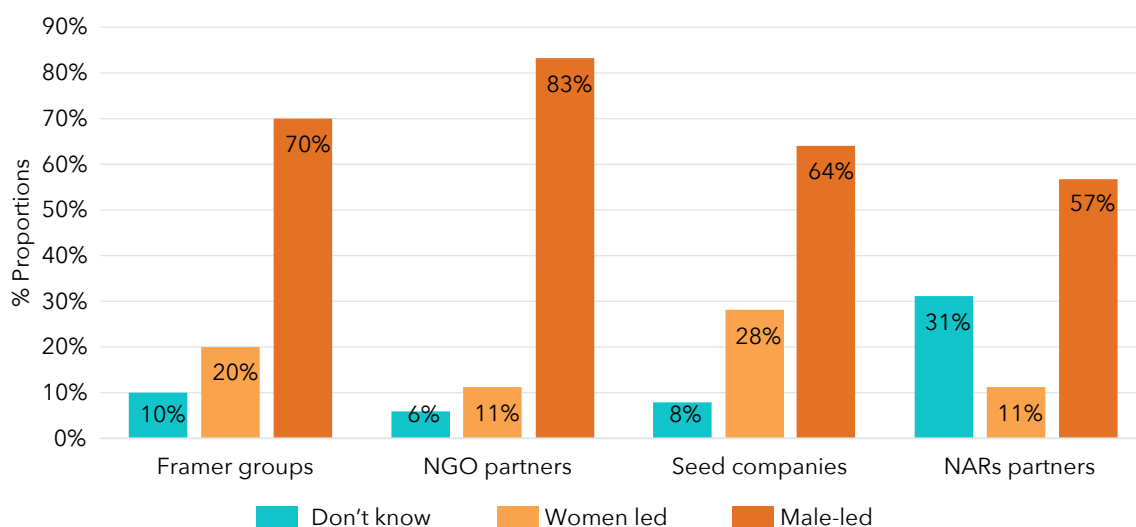
Figure 1 : Actors involved in seed production and delivery models



3.1.1 Leadership of actors who participate in bean seed production and delivery

The leadership of all actors in the bean seed value chain is dominated by male. As shown in figure 2, partners that work with NGOs lead at 83%, bean seed farmer groups are male-led at 70%, seed companies at 64%, whereas those who worked with agricultural research institutions were 57% male. On average, approximately 17% of the actors and partners that participated in bean seed production and/or delivery are female. These findings are consistent with those of Vice Versa (2017) who stated that, to produce commercial seeds, a producer needs more land and capital; however, there are limitations for women to access capital and assets, which hinders them from investing in the agricultural sector (Nanyonjo and Nchanji, 2023).

Figure 2: Leadership of bean seed production and delivery actors, % proportions



3.2 PRODUCTION MODELS USED BY BEAN SEED CHAIN ACTORS

The seed production actors and partners across the countries utilized different seed production models based on their practicability, country dynamics and nature. It was noted that the majority of the actors used contract farming, seed production cooperatives/groups and seed multiplication and distribution as their preferred models of production as shown in figure 3. To a small extent, all the actors also utilize a community-based seed production model. Contract farming reduces market uncertainty, improves access to inputs, knowledge, services, and provides higher income (Holtaland, 2017). According to Simmons et. al. (2005), one way to increase seed production especially with the help of the private sector is the use of contract farming. The author argues that contract farming can reduce transaction costs and solve market imperfections (e.g. credit constraints, information gathering, infrastructure, storage, etc.) in linking smallholder farmers to market. With regard to the impact of contract farming, the existing literature has found positive effects on food security (Bellemare and Novak, 2017), and rural transformation (Arouna et. al., 2021) access to markets, credit, technology, information and factor inputs (Ton et al., 2018), and technical efficiency of production, reducing transaction costs, and reducing production risks (Bellemare and Bloem, 2018). Contract farming has increased in many countries because of its significant advantages such as saving transaction costs and mitigating market risks (Gray and Boehli, 2005; Bellemare et. al., 2013).

For actors who employed the contract farming production model, the main reasons cited were twofold. First and foremost, seed companies, for instance, lacked adequate land to practice commercial large-scale seed production to satisfy the demand for high-quality seeds; second, actors such as research organizations lacked the requisite labor force or manpower to engage in large-scale seed production on the large tracts of land they owned or leased. For those who practiced their own production, breaching contract terms by farmers was the main reason why they did not engage in contract farming. The most prevalent breach of contract was the sale of bean seeds outside their contractual terms to third-party players in the seed sector

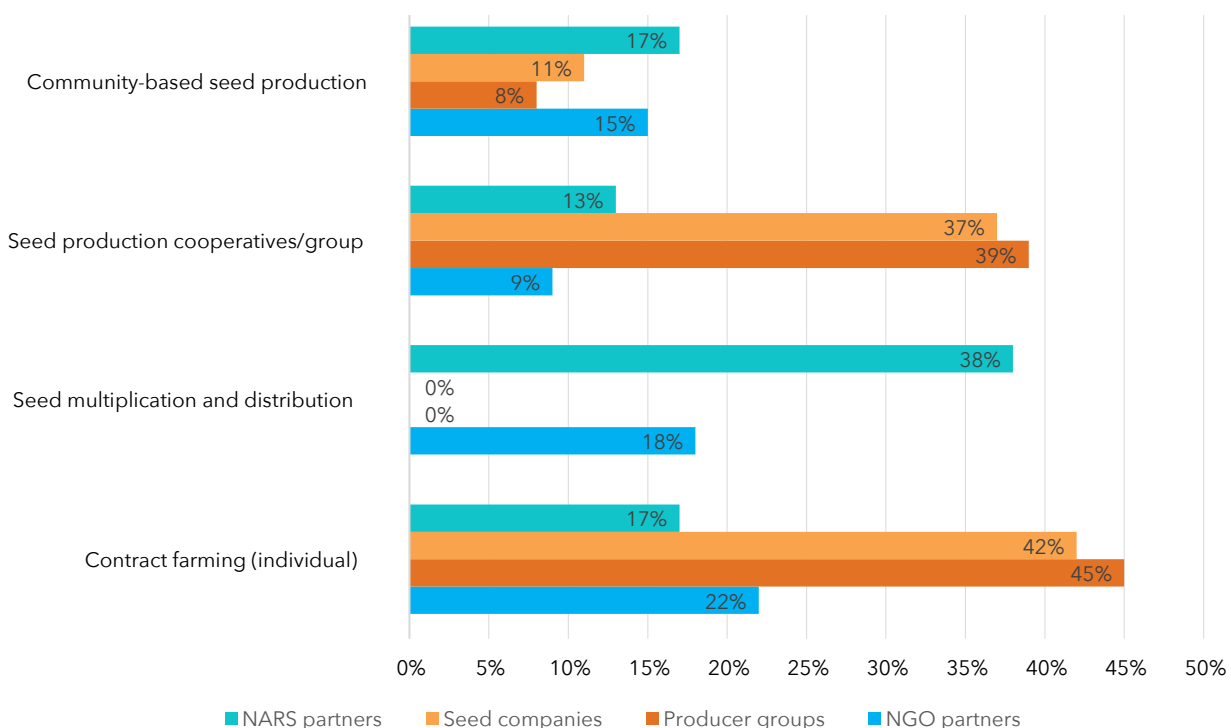


Figure 3: Production models, segregated by production actors, % proportions.

3.2.1 Inclusivity of bean seed production models

3.2.1.1 Involvement of women and vulnerable groups in bean seed production models

Ensuring the empowerment of seed systems entails three key components: firstly, the representation of both

male and female farmers in decision-making processes concerning the operations of seed systems; secondly, the provision of equal opportunities for men and women as seed users and producers; and thirdly, the ability of women farmers to formulate strategic decisions pertaining to their access, utilization, and benefit from seed systems(Puskur et al.,2021).

The seed production models used by production actors significantly enhanced the active involvement of women and vulnerable groups. The results indicated in figure 4, shows that 77% of the respondents considered the extent to which production models encourage the active involvement of women and vulnerable groups to be either satisfactory or very satisfactory. This is consistent with a seed credit model study that was conducted in Uganda which revealed that men and women farmers had equal access to seed, even though the quantities of seed obtained were determined by factors such as ability to repay and plot size. While women had greater access to improved seed than men, men received a greater amount of it on average. This can be explained by the fact that men own more acres of land than women (Nanyonjo and Nchanji,2023). On the other hand, 23% reported that the production models were either moderate, slightly satisfactory or unsatisfactory with regard to the participation of women and vulnerable groups. Most groups where agriculture is practiced, especially in rural areas, are composed of women; thus, the majority of the group members are women. These groups have a common interest in agricultural production. Most agricultural development partners prefer working with groups rather than individuals due to collective action and therefore working with these groups improves agricultural production (Tallam,2016). In addition, most cooperatives involved in agricultural production have a membership that comprises mostly women even though men might hold the leadership positions of the cooperatives.

Contract farming can be considered slightly participatory since farmers are recruited based on their land size and ability to finance good agronomic practices essential for seed production. Farmers who fulfill these requirements are recruited irrespective of their gender. However, it is important to note that most production resources, such as land, are held by men, but the majority of agricultural workers are women. Studies by Brewin et.al. (2018), show that in Africa only 10-30% of contract farmers are women, yet women do a substantial amount of work in contract farming arrangements. Sometimes up to 70% of the labour requirements are supplied by women. Oduol and Mithöfer (2014) also show that where the value chain is well developed and the returns are high, women dominate the production stage while men tend to own the fields, make decisions on sales, and control revenues. This highlights the need to support women to effectively participate in contract farming, to the same extent as their male counterparts.

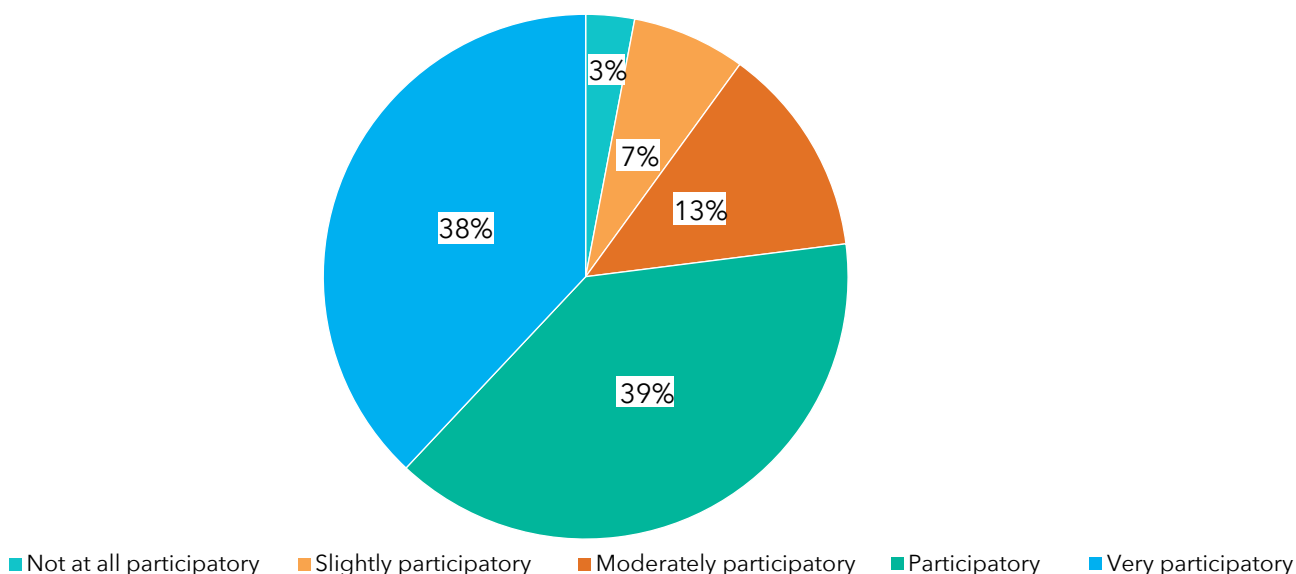


Figure 4: The extent to which the production models encourage active involvement of women and vulnerable groups, % proportions

Furthermore, the analysis indicates that the benefits derived from production models for women and vulnerable groups are consistent with their level of participation. While, 77% of the production models were considered to be either very beneficial or beneficial to women and vulnerable groups, 14% of the production models were noted to be moderately beneficial to women and vulnerable groups, with 7% of the models being slightly beneficial. Two percent of the models were considered not to be beneficial at all. Key findings from a 2018 Feed the Future Mozambique Innovations (FTF INOVA) study agrees with these finding by indicating that agrodealer businesses and business networks are male dominated but more women are hired in the business entities thus, improving their livelihoods. The study showed that the industry recognized women as being trustworthy, hard-working, and good at dealing with clients, thus, most actors invested in female agro-agents, input distributors and retailers to effectively target the last mile farmers, particularly women who face restrictions on their mobility and time (FTF INOVA,2018).

3.2.1.2 Seed availability at the required point and time

Availability of quality improved seed is the ability of women and men farmers to get seed from the right place and at the right planting time (Kramer and Galìe,2020). Availability of seed is influenced by the type of delivery channel or seed system. Although formal seed system actors frequently maintain skepticism regarding the quality of seed sourced from farmer-managed systems, the majority of farmers are more likely to place their trust in seed produced and supplied by their peers rather than seed purchased from commercial actors (Puskur et al.,2021). To a greater extent, seed production models promote seed availability to men and women when required at the right point and time across countries. As shown in figure 5, 78% of the models portrayed a good and very good distribution of seeds, hence promoting availability. This is in line with a seed credit model study carried in Uganda by Nanyonjo and Nchanji(2023) which revealed that women and men had equal opportunities in accessing seed even though the quantities were determined by other factors such as land size and ability to pay.

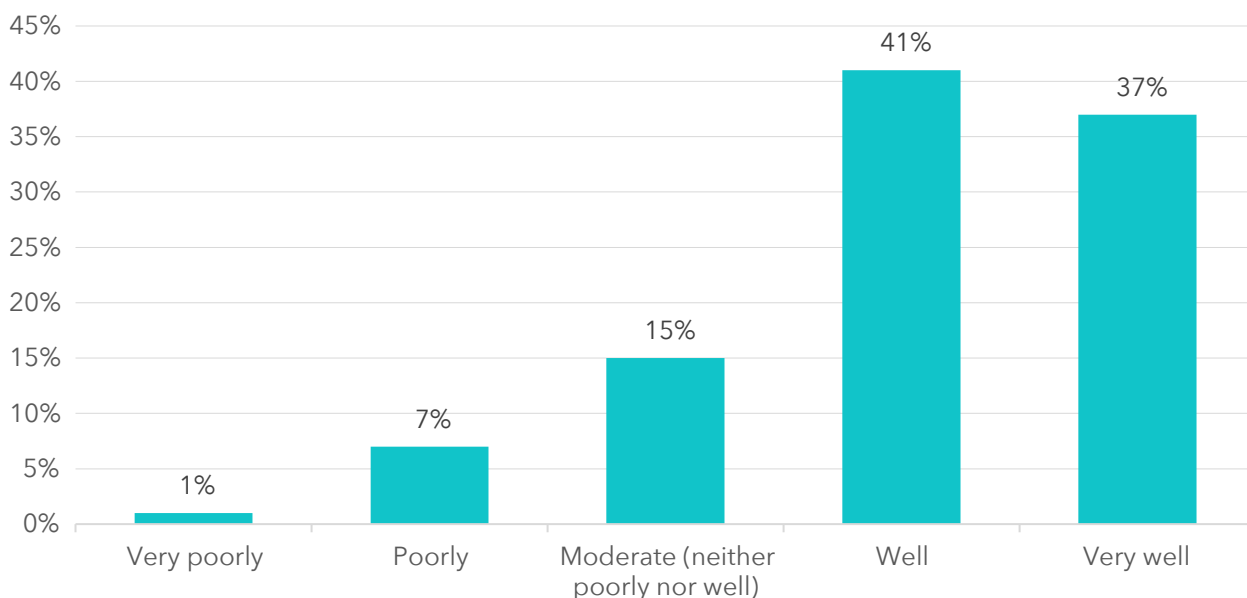


Figure 5: Seed availability at the required point and time, according to the production models

3.2.1.3 Affordability of the seeds provided by seed production models

Affordability refers to farmers' capacity to purchase seed at an affordable price, which might vary depending on the market (Puskur et al.,2021). Both quantity and quality of seed use is majorly constrained by lack money to purchase the seeds by the women (Mudege and Torres 2017).

As indicated in figure 6, approximately 19% of the production models across the countries were considered to be producing either expensive or very expensive seeds. However, the seeds provided through the majority of the production models were affordable (38%), with 11% being very affordable, while others were indifferent and were neither affordable nor expensive (31%). The affordability promoted by the current models increases the purchasing power of farmers and ensures that they obtain value for their investment in bean farming. Affordability of seeds is not gender-neutral. A significant barrier for women is the inability to afford seed, which has a negative impact on the quantity and quality of seed production (Mudege and Torres 2017). It increases women’s reliance on farmer-managed systems and hinders their ability to purchase seed from formal systems. Data in Figure 6 shows that NGO production model can result in more affordable seeds, while for the producer groups, it contributes to more expensive seeds, this might mean that farmer groups need more training on reduction of production cost of seeds to make them more affordable. A cocoa study conducted in Ghana indicated that producer group membership significantly impacts technical efficiency and yield (Donkor et al., 2023)

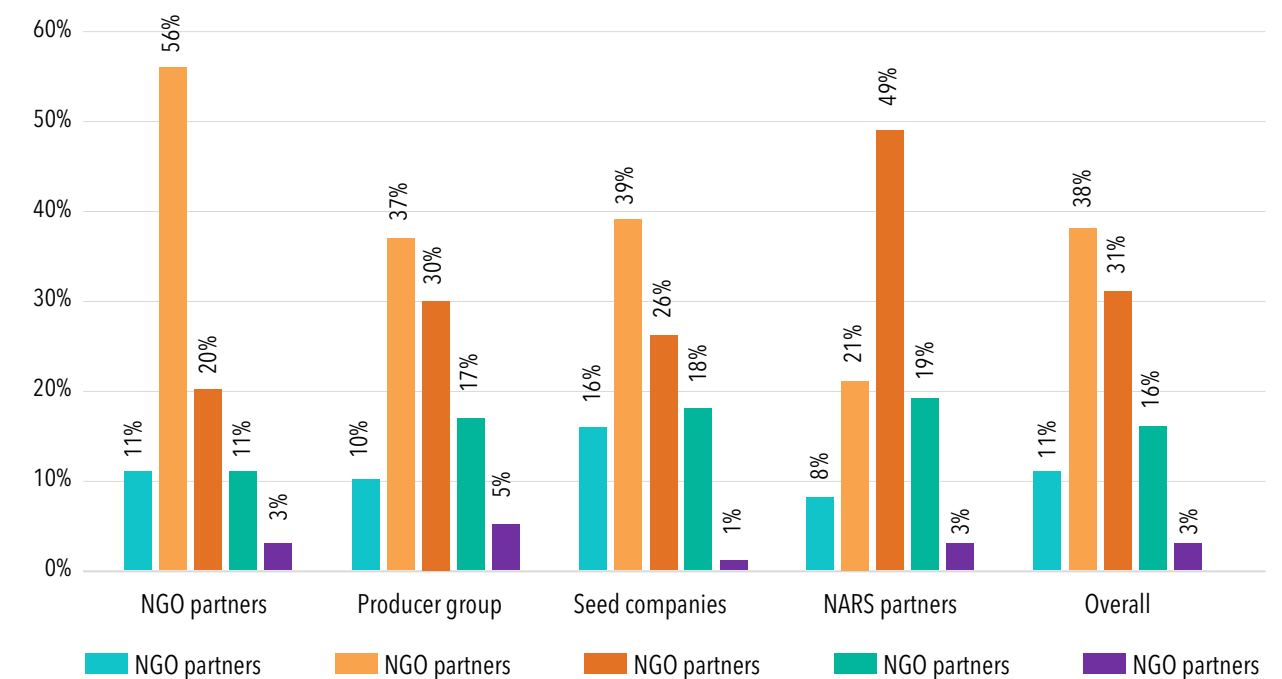


Figure 6: Affordability of the seeds provided by the seed production models, % proportions

3.2.1.4 Cost of bean seed produced through production models

The cost of seeds produced through the highlighted production models by the actors across the countries was highly noted to be somewhat less expensive (45%) as shown in figure 7. However, for some (24%) of the production models, the cost of bean seed was reported to be approximately the same as that of other models used by other seed chain players within their respective countries. In particular, 5% of the bean seeds available through the production models were noted to be very costly.

These findings indicate that most of the production models adopted by actors ensure that farmers have a better chance of purchasing seeds that are relatively cheaper without constraining their economic capabilities.

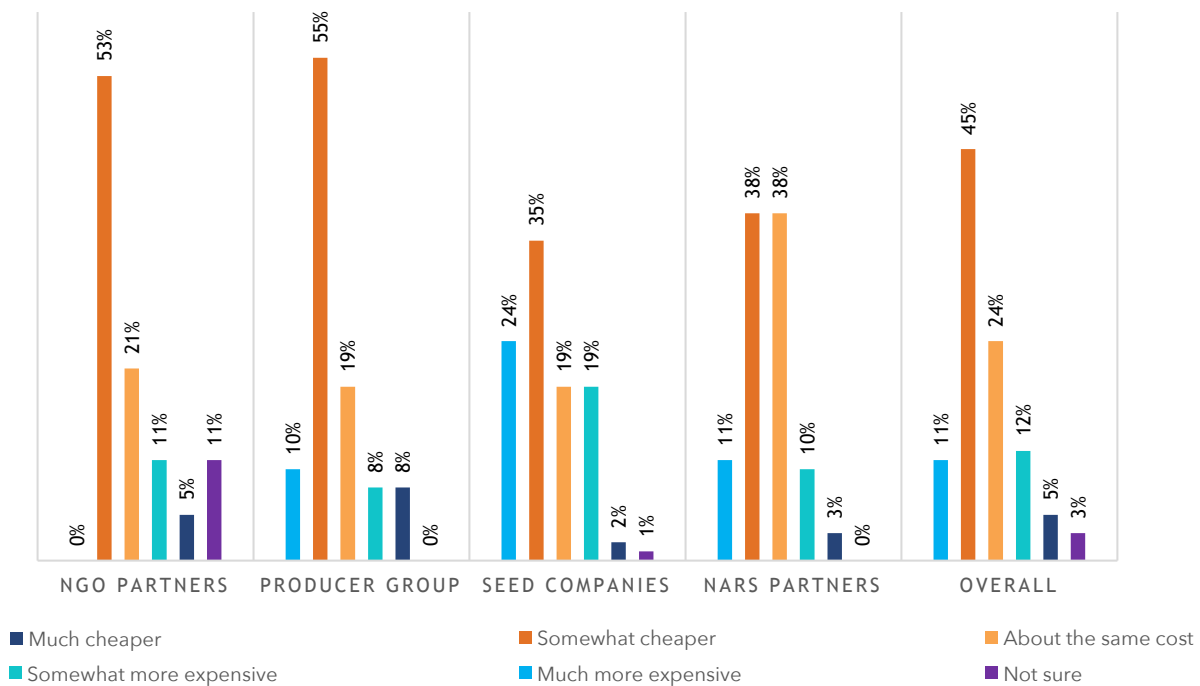


Figure 7: Rating the cost of bean seeds produced through production models, % proportions

3.2.2 Goals of the bean seed production models

Across the different countries, the actors had set various production goals that drove their daily activities and ensured customer satisfaction. Overall, some of the production model goals across the countries included ensuring high-quality seeds and increasing productivity, both reported at 84%. Other goals of the actors included promoting rural/local economies (67%), inclusivity (58%) and profitability (54%).

The primary goal of the production models used by NGO partners is to increase productivity (85%), while that of producer groups, seed companies and NARS partners is to ensure high-quality seeds, as shown by 91%, 87% and 77%, respectively. However, it was also interesting to note that the seed companies were highly aimed at promoting rural/local economies (78%) through employment and stimulating the local business environment compared to other actors. The seed companies prefer engaging women to carry out farming activities on their farms because they consider them not only available but also affordable labor. In African agriculture, women make up between 60 and 80 percent of the labor force (FAO, 2011).

Additionally, the results showed that the NGO partners strongly promoted education and training since they ranked highly at 59% compared to the other actors, which shows that they were interested in promoting literacy among the farmers regarding good agricultural practices. This finding is in agreement with those of Puskur et al. (2021), which indicated that women farmers' attendance at training sessions often is contingent upon navigating gender norms imposed by family and community.

3.2.3 Effectiveness of bean production models in achieving their goals

The production models used by the actors were highlighted to be effective (73%) at achieving the set goals. Some of the models (22%) were considered to be neither effective nor ineffective. This shows that the models were farmer centered and had the priorities of the farmer considered despite aiming at profitability. This was done through increasing farmers' access to quality seeds and training resulting in more income and improved livelihoods. Disaggregation by actors indicates that the production models adopted by NGO partners (80%) and producer groups (79%) were effective at achieving their goals. Additionally, the production models used by seed companies (70%) and NARS (64%) were found to be effective. These results are in agreement with a case

study that was carried out in Uganda. According to Nanyonjo and Nchanji (2023), the seed credit model, which was implemented as a strategy to address the gendered seed access gap, has proven to be effective in diminishing the previously significant gender disparity in seed availability among smallholder common bean farmers in Uganda. The model facilitated the provision and accessibility of improved quality seed to both male and female producers, resulting in tangible advantages. Farmers who previously encountered difficulties procuring loans from peers or purchasing substandard seed are now assured of having access to superior seed.

3.2.4 Measures put in place to ensure the quality of seeds available under the production models.

Quality refers to the outstanding characteristics of a seed that can impact its performance. Good seed viability depends on both physical features (size, weight, color) and genetic quality (Puskur et al., 2021). To ensure the production of quality seeds, most of the actors had several measures put in place to drive their success. Some of the common measures used across the countries included inspections (90%), training (84%), certification (77%) and testing (74%). Other measures noted were traceability and feedback mechanisms, both recorded at 50%.

As shown in table 2, disaggregation by actors indicates that the NGO partners embraced the training (91%) component as the most suitable approach for ensuring the production of quality seeds, while the producer groups, seed companies and NARS partners adopted inspections as the most efficient method of ensuring quality, recorded at 95%, 94% and 86%, respectively. Interestingly, technical assistance was also used as a measure to ensure the quality of the produced seeds by 2% of the producer groups and seed companies.

Table 2: Measure put in place by production models to ensure production of quality seeds, % proportions

| Measures | NGO partners (%) | Producer group (%) | Seed companies (%) | NARS partners (%) | Overall (%) |
|-----------------------------|------------------|--------------------|--------------------|-------------------|-------------|
| Certification | 65 | 85 | 75 | 81 | 77 |
| Testing | 70 | 89 | 69 | 69 | 74 |
| Inspections | 86 | 95 | 94 | 86 | 90 |
| Training | 91 | 83 | 85 | 76 | 84 |
| Traceability | 58 | 62 | 42 | 37 | 50 |
| Feedback mechanisms | 62 | 57 | 45 | 35 | 50 |
| Technical assistance | 0 | 2 | 2 | 0 | 1 |

3.3 DELIVERY MODELS USED BY BEAN SEED CHAIN ACTORS

According to Puskur et al. (2021), seed delivery channels are a critical component of seed accessibility and can be classified into three overarching classifications, commonly known as “types of seed systems”: the formal national public seed system; the informal farmer-managed or community-based seed systems; and the formal commercial seed distribution networks. A significant divergence in the delivery models was observed among the actors. An array of delivery models were adopted by the different actors across the countries, with direct sales noted as the most predominant model used by 37% of the actors as shown in figure 8. Direct sales aim to considerably shorten the seed distribution chain by allowing seed producers to market directly to the buyers, thereby reducing both the direct and indirect transaction costs of distribution.

Other models commonly used included agrodealer networks and seed fairs and exchanges, which were recorded by 17% and 15%, respectively. Private sector seed businesses are important players in the commercial seed delivery chain through formal wholesale and retail agrodealers; they supply popular hybrid varieties of vegetables and grains that farmers request each planting season. The seed supplied in this channel is branded and certified. In farmer-managed or community-based systems (informal), seed is acquired from local markets and/or traded through social and local networks, these networks are frequently moral economy-based (Bates

et al. 2011, Schöley et al. 2017, Suma and Großmann 2017). The seeds are typically uncertified, not labeled, or quality declared (Puskur et al.,2021).

Disaggregation by actors indicates that in addition to direct sales, to some extent, NGO partners also utilize seed multiplication and distribution (20%), seed fair and exchange (18%) and agrodealer networks (20%) as their main delivery models. On the other hand, seed companies use the public-private partnerships model (17%) along with direct sales. In addition to direct sales, producer groups and NARS partners also use agrodealer networks (27%) and seed fair and exchanges (19%), respectively. Agrodealers continue to play an important role in the distribution system of improved seeds and other inputs, enabling farmers living in the rural areas to access productivity enhancing tools and technologies. For instance, most seed companies reach farmers in Kenya through agrodealerships (Erenstein & Kassie, 2018). Because of the very dispersed markets and poor infrastructure in rural areas, the direct sales of seed companies in their own shops is very limited and most of their seed is sold through agrodealer networks (Erenstein & Kassie, 2018; Langyintuo et al., 2010).

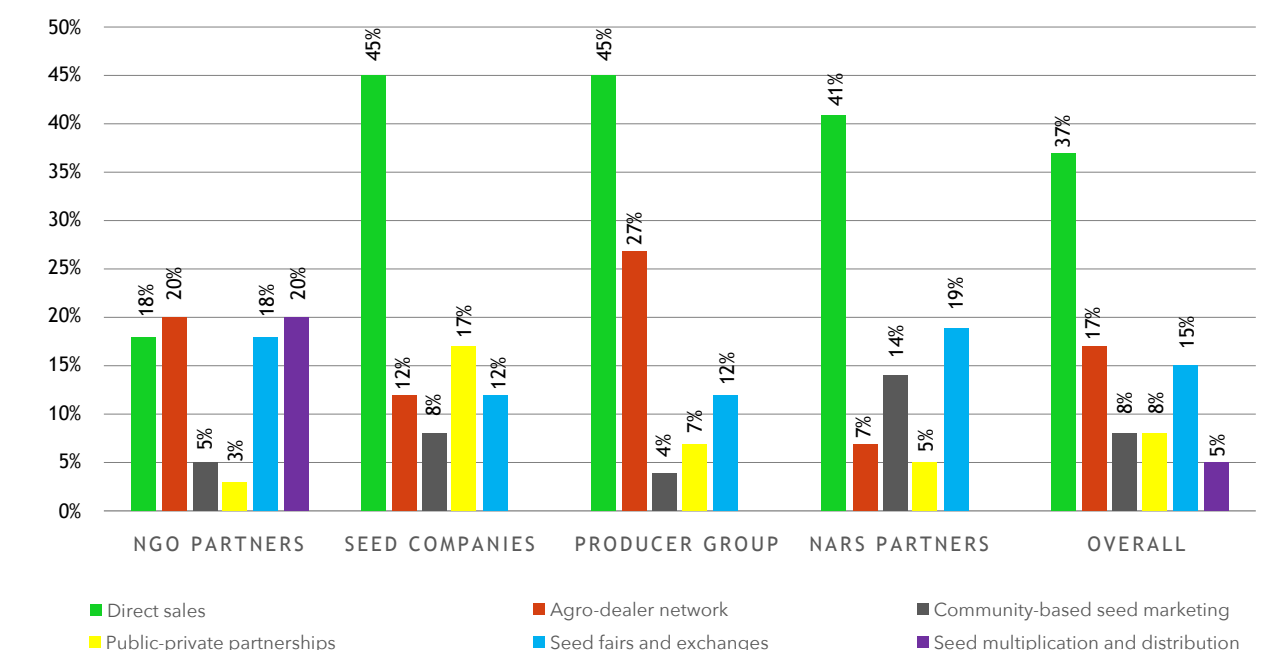


Figure 8: Delivery models utilized by bean seed chain actors, % proportions

3.3.1 Inclusivity of Seed Delivery Models

3.3.1.1 Involvement of women and vulnerable groups by delivery models

Women and vulnerable groups often seek empowerment and engagement in different agricultural activities. The analysis in figure 9 indicates that 69% of the models were either participatory or very participatory. According to the data provided by the actors across the different African countries, the models promoted participatory (41%) and active involvement of women and vulnerable groups to a significant extent, which made them part of the bean seed chain. Moreover, 28% of the respondents considered the delivery models to be very participatory, involving women and vulnerable groups. However, it is worth to note that, even though women participate in various activities of the delivery models, their roles and decisions aren't principal, they are either recruited as assistants or co-owners without much power to determine the entities' key operations. For instance, a study conducted by Bayesian consulting group (2016) revealed that, in Kenya, there are more men than women in agrodealership business with 63% and 37% being male and female respectively. This could be considered fairly participatory and thus, consistent with these findings.

Owing to the strengthened, active and participatory involvement of women and vulnerable groups in the delivery models, the models were either beneficial or very beneficial, as reported by 70% of the actors across the countries. This has aided in boosting their income and enhancing their resilience to the everchanging agricultural dynamics exacerbated by climatic changes.

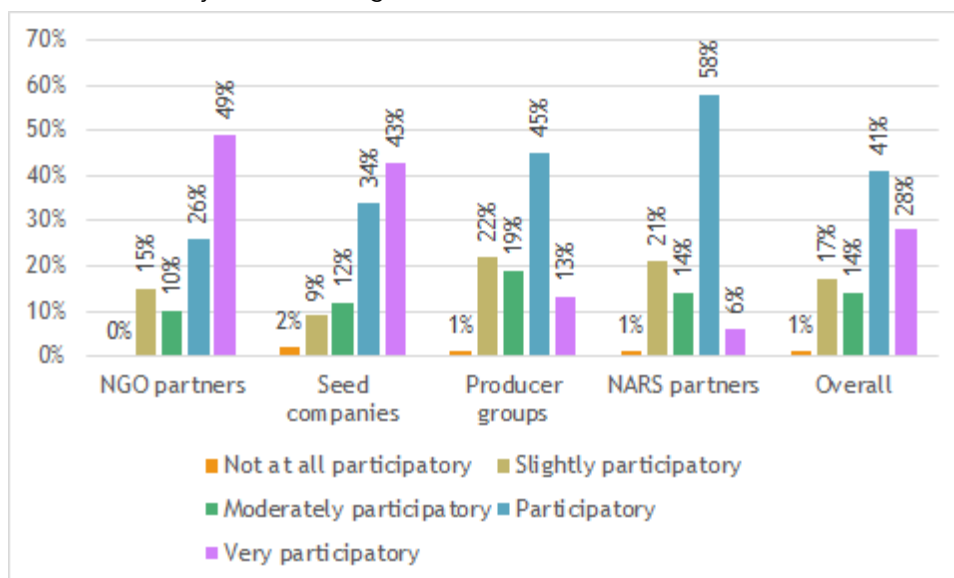


Figure 9: Extent to which the delivery model encourages active involvement of women and vulnerable groups, % proportions

3.3.1.1 Seed availability at the required point and time

Availability pertains to the tangible presence of an adequate quantity of seed in a suitable location and time, with particular emphasis on seed of preferred crops and varieties (Puskur et al., 2021). They further asserted that it is important for farmers to obtain quality seed on time, for increased productivity, food security and income. Furthermore, women and men's ability to access seeds at the right planting time and convenient place is enabled through the availability of quality seeds (Kramer and Gali'e, 2020). The delivery models utilized by most of the actors across the counties were highlighted to provide better availability of seeds to both men and women when required and at the right time, as shown by 77% of the models. The models performed well (44%) in terms of seeds being available at the right place and time. Moreover, 34% of the delivery models performed very well in ensuring the availability of these seeds to the farmers.

Furthermore, the delivery models used across the countries were reported to promote inclusiveness in accessing affordable quality seeds among the majority of the actors, as reported by 78% (either the model was good (45%) or very good (33%) inclusive). Furthermore, 14% of the delivery models were considered to be moderately inclusive, whereas 7% reported that the models were poorly inclusive.

3.3.1.2 Affordability of the seeds provided by the seed delivery models

Seed pricing affects the purchasing power of farmers over time, and they are often made to incur more costs during the planting season when the prices are too high. With the current delivery models adopted by the different actors, it was noted that 19% and 7% of the delivery models were expensive and very expensive respectively, with 33% providing seeds that were neither affordable nor expensive as shown in figure 10. A significant percentage of the models (31%) provided affordable seeds, while 10% were reported to be very affordable. It is important to note that some seed companies have resulted in the deliberate packaging of seeds in smaller packages than what has been previously on the market. These smaller packages are then delivered through direct sales and agrodealer networks, making the seed affordable for smallholder farmers, especially women

and vulnerable groups. These findings coincide with those of McGuire and Sperling (2016) and Kandiwa et. al. (2018), which showed that small packages positively influence the purchase of seeds by women and young farmers.

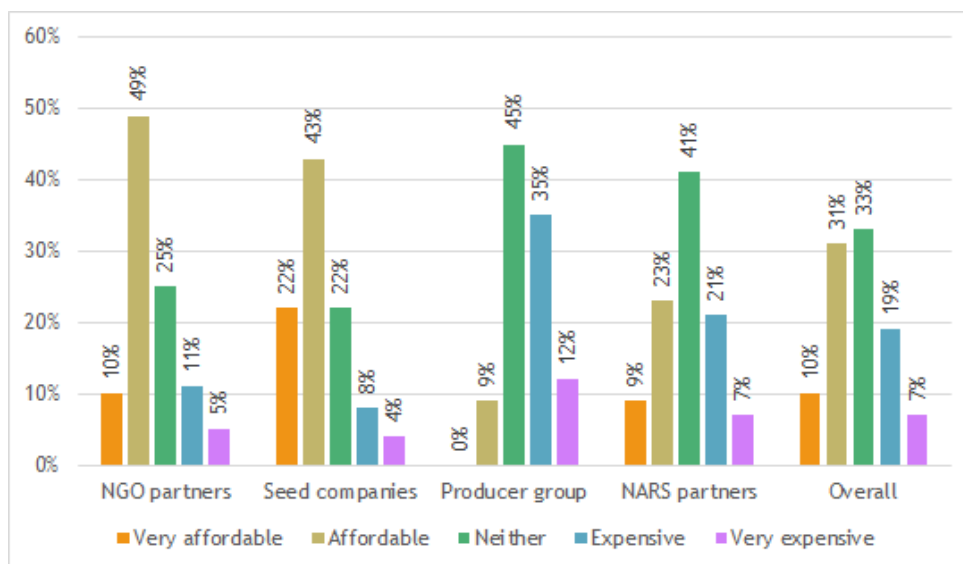


Figure 10: Affordability of the seeds provided by the seed delivery models

3.3.1.3 Cost of bean seeds delivered through seed delivery models

It was also noted that the majority of the seeds provided through the delivery models were somewhat cheaper (38%), while the cost was considered to be about the same (28%) as that of other delivery models. Sixteen per cent of the models were reported to be much cheaper as reported above, the availability of small quantities of seeds has made it possible for the farmers to afford the seeds to some extent. Across the different countries in Africa, 14% and 4% of the models were reported to be somewhat more expensive and expensive, respectively.

3.3.2 Programs/policies to help farmers afford seeds supplied by seed delivery models

The promotion of more affordable farm inputs, especially seeds, can be performed using different approaches, including credit schemes, aid or insurance, which eventually enhances the capacity of farmers to purchase seeds on time or at their convenience. Across the countries covered by the project, different actors noted a myriad of programs and policies enacted to help farmers afford the seeds supplied via the highlighted delivery models, but the most outstanding programs included flexible payment terms (32%), bulk purchase discounts (29%), credit schemes (22%), seed aid (11%), seed exchange programs (11%) and voucher programs (11%). In addition to the aforementioned programs and/or policies, it is worth noting that some of the NGO partners used project funding (3%) to help promote the affordability of the seeds among the farmers. This finding concurs with studies by McGuire and Sperling (2016) and Kandiwa et. al. (2018), which revealed that small packages, promotion as well as presentations in the local markets, all positively affects the purchase of seeds by young and women farmers.

Disaggregation by actors shows that NGO partners have mainly put in place bulk purchase discounts (33%), credit schemes (30%) and subsidies (28%) as a means of supporting farmers in affording beans supplied by their delivery models. In contrast, seed companies have mainly implemented programs such as subsidies (59%), flexible payment terms and credit schemes (32%), and voucher programs (30%). The farmer producer groups mainly used flexible payment terms (41%) and bulk purchase discounts (37%), whereas the main NARS partner programs put in place to support farmers in obtaining affordable bean seeds under delivery models like bulk purchase discounts (33%) and subsidies (31%).

3.3.3 Goals of bean seed delivery models

Goal setting drives the success of any organization or firm since the goals provide a clear path upon which every actor/player will walk through the entire process toward success. Realistic goals help organizations realize their mandate and ensure quality service delivery and hence customer satisfaction.

Across the countries involved in the project, some of the notable goals of the delivery models included ensuring high-quality seeds (72%), profitability/market expansion (64%), increased productivity (63%), inclusivity (59%) and promoting rural/local economies (58%). Other common goals noted were sustainability (37%), partnership and collaboration (31%), education and training (30%), climate change adaptability/risk management (27%), policy influence (25%), technological innovation (22%) and diversity (20%).

Disaggregation by actors indicates that the NGO partners' main goals are profitability/market expansion (74%) and ensuring seed quality (69%). The goals of seed companies are to ensure high-quality seeds (82%), increase productivity (75%) and promote rural/local economies. Furthermore, the producer groups' main objectives are high-quality seeds (81%) and profitability/market expansion (80). The NARS partners' targets are profitability/market expansion (63%) and high-quality seeds (55%).

3.3.3.1 Effectiveness of delivery models in achieving their goals

The attainment of set goals requires the utilization of proper and effective systems as well as the availability of human resources that are properly motivated to work and drive the success of an organization or company.

Among the actors across the different countries of study in Africa, it was noted that the delivery models used by most of the actors were effective (37%) in achieving their set goals, with some reported that they were very effective (32%). Some delivery models (29%) were considered neither effective nor not effective. Actor based analysis indicates that the delivery models that are used by NGO partners and seed companies were found to be effective at 77% and 78% respectively. Further, the delivery models utilized by producer groups and NARS partners were reported to be effective at 64% and 57% respectively.

3.3.4 Measures for ensuring the quality of the seeds distributed via delivery models

Quality factors of production, including seeds, promote good harvests among farmers since the plants are well suited to the different climatic conditions and will have better bulk produce. Ensuring the quality of seeds produced is a major goal of most seed producers and was also highly ranked as the most common goal among the seed actors in the project countries. Table 3 indicates some of the measures enacted by the majority of the actors to ensure good quality of the bean seeds included inspections (71%), certification (70%), training (66%), testing (64%), feedback mechanisms (55%) and traceability (54%).

Notably, the NGO partner's main measure of ensuring the delivery of quality seeds is training (77%), while the main measure for ensuring the delivery of quality seeds through the NARS is certification (80%). Conversely, the main measure put in place by seed companies and producer groups in facilitating the quality of seed delivered is inspection (80%).

Table 3: Measures enacted to ensure the quality of bean seeds by delivery models, % proportions.

| Measures | NGO partners (%) | Seed company (%) | Producer group (%) | NARS partners (%) | Overall (%) |
|----------------------------|------------------|------------------|--------------------|-------------------|-------------|
| Certification | 54 | 80 | 74 | 73 | 70 |
| Testing | 61 | 74 | 77 | 45 | 64 |
| Inspections | 62 | 80 | 86 | 55 | 71 |
| Training | 77 | 75 | 64 | 49 | 66 |
| Traceability | 64 | 60 | 56 | 37 | 54 |
| Feedback mechanisms | 57 | 79 | 55 | 29 | 55 |

4.0 CONCLUSIONS

The overarching goal of key stakeholders in the seed sector is to meet their needs. This is achieved through the production and market delivery of high-quality seeds. Limited supply, availability, and access to bean seeds are likely among the most constraining factors on crop productivity. Effective seed systems have the potential to increase production. Seed systems can influence food security by improving the availability, access to and use of improved seed varieties. Countries across Africa have instituted diverse seed systems for the production and market delivery of common bean seeds.

The study findings reveal that the most common production model practiced by actors is contract farming, followed closely by seed production cooperatives/groups, and seed multiplication and distribution. The most notable delivery models are direct sales, agrodealer networks and seed fairs and exchanges.

The production and delivery models encourage inclusivity and are beneficial to women and vulnerable groups. Furthermore, the models promote the availability of and access to affordable high-quality seeds for men and women at the required times and point. However, it should be noted that leadership positions across the actors are dominated by male in contrast with their female counterparts. Furthermore, the models are beneficial and not primarily empowering women and vulnerable groups. This means that, to a great extent, they do not participate in making key decisions along the chain. For instance, seed companies and agrodealer outlets employ women to work in their farms, thus benefiting through salaries. Women also provide labour and participate in various farm activities but in the end, it is their male counterparts who makes decisions on the use of income that is generated from bean farming.

The main goals of production models are ensuring high-quality seeds and increasing productivity. In contrast, the primary goals of delivery models are ensuring high-quality seeds, profitability/market expansion, increased productivity, inclusivity, and promoting rural economies. Notable programs/policies put in place by delivery models to help farmers afford seeds include flexible payment terms, bulk purchase discounts and credit schemes.

The study underscores the effectiveness of the models in the production and delivery of high-quality bean seeds through the high ratings of the models highlighted. By doing so, farmers can harness the effectiveness of the highlighted seed production and delivery models to improve productivity and influence food security.

5.0 RECOMMENDATIONS

To continue realizing the inclusivity of women and vulnerable groups, a multistakeholder approach that is geared toward women's empowerment should be considered for both production and delivery models.

Additionally, a key cross-cutting issue is the lack of women in leadership positions as actors who participate in bean production and delivery models. The authors recommend the establishment of mechanisms and strategies that will support women's involvement in leading bean seed entities.

Women should be supported to effectively participate in contract farming. It is also important to strengthen and expand the agrodealer network since they play an important role in the distribution of seeds.

REFERENCES

- Adam, R. I., Kandiwa, V., David, S., & Muindi, P. (2019). Gender-responsive approaches for enhancing the adoption of improved maize seed in Africa: a training manual for plant breeders and technicians.
- Agarwal, B. 2018. "Gender Equality, Food Security and the Sustainable Development Goals." *Current Opinion in Environmental Sustainability* 34: 26-32.
- Arouna, A., Michler, J. D., & Lokossou, J. C. (2021). Contract farming and rural transformation: Evidence from a field experiment in Benin. *Journal of development economics*, 151, 102626. <https://www.sciencedirect.com/science/article/pii/S0304387821000031>
- Bayesian Consulting Group. 2016. *Agro-dealer baseline study*, <http://www.stak.or.ke/wp-content/uploads/2017/02/Agrodealer-Baseline-Study-Final-Report.pdf>
- Bates, R. M., Bicksler, A. J., Burnette, R., Gill, T., Yoder, L. M., Ricciardi, V., & Srigiofun, Y. (2011). Strengthening informal indigenous seed systems in Southeast Asia. *ECHO Asia Impact Center*.
- Bellemare, M. F., & Bloem, J. R. (2018). Does contract farming improve welfare? A review. *World Development*, 112, 259-271. <https://doi.org/10.1016/j.worlddev.2018.08.018>
- Bellemare, M. F., & Novak, L. (2017). Contract farming and food security. *American Journal of Agricultural Economics*, 99(2), 357-378. <https://doi.org/10.1093/ajae/aaw053>
- Bellemare, M. F., Barrett, C. B., & Just, D. R. (2016). The welfare impacts of commodity price volatility: reply. *American Journal of Agricultural Economics*, 98(2), 676-678. <https://onlinelibrary.wiley.com/doi/abs/10.1093/ajae/aav070>
- Birachi, E., Sperling, L., Kadege, E., Mdachi, M., Upendo, T., & Kessy, R. F. (2020). An Analysis of the Yellow Bean Corridor: a status report of Tanzania. *CIAT: Arusha, Tanzania*.
- Bishaw, Z., Struik, P. C., & Van Gastel, A. J. G. (2012). Farmers' seed sources and seed quality: 1. Physical and physiological quality. *Journal of Crop Improvement*, 26(5), 655-692. <https://doi.org/10.1080/15427528.2012.670695>
- Bossuet, J., 2020. Making seed systems work for men and women. Available at: <https://www.cimmyt.org/news/making-seed-systems-work-for-men-and-women/>.
- Brewin, S., & Murphy, S. (2019). *The Farmer and Her Husband: Legal innovations for women in contract farming*. International Institute for Sustainable Development. <https://www.jstor.org/stable/pdf/resrep22009.pdf>
- Buruchara, R., Chirwa, R., Sperling, L., Mukankusi, C., Rubyogo, J. C., Mutonhi, R., & Abang, M. M. (2011). Development and delivery of bean varieties in Africa: the Pan-Africa Bean Research Alliance (PABRA) model. *African crop science journal*, 19(4), 227-245. <https://www.ajol.info/index.php/acsj/article/view/74168>
- Campos, H., & Ortiz, O. (2020). *The potato crop: its agricultural, nutritional and social contribution to humankind* (p. 518). Springer Nature. <https://library.oapen.org/bitstream/handle/20.500.12657/23122/1/1007034.pdf>
- Donkor, E., Dela Amegbe, E., Ratering, T., & Hejkrlik, J. (2023). The effect of producer groups on the productivity and technical efficiency of smallholder cocoa farmers in Ghana. *Plos one*, 18(12), e0294716. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0294716>
- Erenstein, O., & Kassie, G. T. (2018). Seeding eastern Africa's maize revolution in the post-structural adjustment era: a review and comparative analysis of the formal maize seed sector. *International Food and Agribusiness Management Review*, 21(1), 39-52. <https://doi.org/10.22434/IFAMR2016.0086>
- FANRPAN (Food, Agriculture and Natural Resource Policy Analysis Network). 2011. "Seeds without Borders." Volume XI: Policy Brief 1 (March)
- Farnworth, C. R., Galie, A., Gumucio, T., Jumba, H., Kramer, B., & Ragasa, C. Gender and seed entrepreneurship in aquaculture, maize, and poultry value chains in. *Frontiers in Sustainable Food Systems*, 8, 1198130. <https://www.frontiersin.org/articles/10.3389/fsufs.2024.1198130/full>
- Feed the Future Mozambique Agricultural Innovations Activity (FTF Inova) 2018. Findings from a Qualitative Study on Gender Norms in Farming, Input Use, and Distribution in Manica Province August 28, 2018
- Flores, M., & Holtland, G. (2017). *Contract farming in Ethiopia: Concept and practice*. AgriProFocus. <https://library.wur.nl/WebQuery/titel/2305458>
- Food and Agriculture Organization (FAO). 2011. The state of food and agriculture: women in agriculture, closing the gender gap for development. FAO, Rome, Italy.

- Galié, A. (2013, February). Governance of seed and food security through participatory plant breeding: Empirical evidence and gender analysis from Syria. In *Natural Resources Forum* (Vol. 37, No. 1, pp. 31-42). <https://onlinelibrary.wiley.com/doi/abs/10.1111/1477-8947.12008>
- Giel Ton, Wytse Vellema, Sam Desiere, Sophia Weituschat, Marijke D'Haese. 2018. Contract farming for improving smallholder incomes: What can we learn from effectiveness studies? *World Development*, Volume 104, Pages 46-64.
- Gray, A. W., & Boehlje, M. D. (2005). Risk sharing and transactions costs in producer-processor supply chains. *Choices*, 20(4), 281-286. <https://www.jstor.org/stable/pdf/choices.20.4.0281.pdf>
- Hanif, C., Sperling, L., 2017. Delivery of legume seed at the last mile: theory and practice. In: Sperling, L., Dey, B., Leege, D. (Eds.), *Proceedings of New Models for Legume Seed Business: Resilience, Nutrition, and Reaching Farmers at the Last Mile Workshop*. March 1-2, 2017, Washington DC,
- Hoogendoorn, J. C., Audet-Bélanger, G., Böber, C., Donnet, M. L., Lweya, K. B., Malik, R. K., & Gildemacher, P. R. (2018). Maize seed systems in different agro-ecosystems; what works and what does not work for smallholder farmers. *Food Security*, 10, 1089-1103. <https://link.springer.com/article/10.1007/s12571-018-0825-0>
- Judith Beatrice Auma Oduol, J. B. A. O., & Mithöfer, D. (2014). *Constraints to and Opportunities for Women's Participation in High Value Agricultural Commodity Value Chains in Kenya* (No. 2014/11). Maastricht School of Management. <https://econpapers.repec.org/RePEc:msm:wpaper:2014/11>
- Kandiwa, V., Adam, R. I., Lweya, K. B., Setimela, P. S., Badstue, L. B., & Muindi, P. (2018). Gender-responsive approaches for the promotion of improved maize seed in Africa.
- Kramer, B., & Galié, A. (2020). *Gender dynamics in seed systems development*. Intl Food Policy Res Inst.
- Langyintuo, A. S., Mwangi, W., Diallo, A. O., MacRobert, J., Dixon, J., & Bänziger, M. (2010). Challenges of the maize seed industry in eastern and southern Africa: A compelling case for private-public intervention to promote growth. *Food Policy*, 35(4), 323-331. <https://www.sciencedirect.com/science/article/pii/S0306919210000278>
- Larochelle, C., Katungi, E. M., & Cheng, Z. (2017). Pulse consumption and demand by different population subgroups in Uganda and Tanzania. <https://cgspace.cgiar.org/handle/10568/82822>
- Lukonge, E. J., Gibson, R. W., Laizer, L., Amour, R., & Phillips, D. P. (2015). Delivering new technologies to the Tanzanian sweetpotato crop through its informal seed system. *Agroecology and Sustainable Food Systems*, 39(8), 861-884. <https://www.tandfonline.com/doi/abs/10.1080/21683565.2015.1046537>
- Man-Kwun C. Improving opportunities for women in smallholder based supply chain: business case and practical guidance for international food companies. 2010. http://hummedia.manchester.ac.uk/institutes/gdi/research/research-programmes/businessfordevelopment/GenderValueChain_Part2_The_Guide_HR.pdf
- Marcho, C., Records, A. R., & Lapitan, N. L. (2020). Transforming crop breeding in the developing world. *CSA News*, 65(7), 31-33. <https://access.onlinelibrary.wiley.com/doi/abs/10.1002/csan.20199>
- McGuire, S., & Sperling, L. (2016). Seed systems smallholder farmers use. *Food Security*, 8, 179-195. <https://link.springer.com/article/10.1007/s12571-015-0528-8#auth-Shawn-McGuire-Aff1> men-farmers-in-uganda/.
- Mudege, N. N., & Torres, S. (2017). Gender mainstreaming in root tuber and banana crops seed systems interventions: identification of lessons learnt and gaps. *RTB Working Paper*. <https://cgspace.cgiar.org/handle/10568/89806>
- Mudege, N. N., Mwangi, R. O., Mdege, N., Chevo, T., & Abidin, P. E. (2018). Scaling up of sweetpotato vine multiplication technologies in Phalombe and Chikwawa districts in Malawi: A gender analysis. *NJAS-Wageningen Journal of Life Sciences*, 85, 1-9. <https://doi.org/10.1016/j.njas.2018.05.003>
- Mudege, N. N., T. Chevo, T. Nyekanyeka, E. Kapalasa, and P. Demo. 2016b. "Gender Norms and Access to Extension Services and Training among Potato Farmers in Dedza and Ntcheu in Malawi." *The Journal of Agricultural Education and Extension* 22 (3): 291-305.
- Mudege, N. N., E. Kapalasa, T. Chevo, T. Nyekanyeka, and P. Demo. 2015. "Gender Norms and the Marketing of Seeds and Ware Potatoes in Malawi." *Journal of Gender, Agriculture and Food Security* 1 (2): 18-41.
- Nagarajan, L., Fernando, A., Leonardo, W., Matias, A., & Goncalvez, G. (2015). Assessment on the effectiveness of technology transfers through the USAID-AIMS project in Mozambique: Agricultural Input Markets

- Strengthening (AIMS) III: June 2015. *Assessment on the effectiveness of technology transfers through the USAID-AIMS project in Mozambique: Agricultural Input Markets Strengthening (AIMS) III: June 2015*. <https://www.cabdirect.org/cabdirect/abstract/20173011813>
- Nanyonjo, G., & Nchanji, E. (2023). Seed credit model in Uganda": Participation and empowerment dynamics among smallholder women and men farmers. *Global Food Security*, 39, 100720. <https://www.sciencedirect.com/science/article/pii/S2211912423000500>
- Nchanji, E. B., & Ageyo, O. C. (2021). Do common beans (*Phaseolus vulgaris* L.) promote good health in humans? A systematic review and meta-analysis of clinical and randomized controlled trials. *Nutrients*, 13(11), 3701. <https://www.mdpi.com/2072-6643/13/11/3701>
- Nchanji, Eileen, Nanyonjo, Grace, Muggaga, Isaac, 2021. Cultural expectations in women's economic empowerment: case of women and men farmers in Uganda. <http://www.pabra-africa.org/cultural-expectations-in-womens-economic-empowerment-case-of-women-and->
- Neate, P. J., & Guéi, R. G. (2010). *Promoting the growth and development of smallholder seed enterprises for food security crops: best practices and options for decision making*. Food and Agriculture Organization of the United Nations (FAO). <https://www.cabdirect.org/cabdirect/abstract/20113153550>
- 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*. Food and Agriculture Organization of the United Nations. <https://cgspace.cgiar.org/handle/10568/98358>
- Platform, March 12.pp. 25-28.
- Puskur, R., Mudege, N. N., Njuguna-Mungai, E., Nchanji, E., Vernoooy, R., Galiè, A., & Najjar, D. (2021). Moving beyond reaching women in seed systems development. *Advancing Gender Equality through Agricultural and Environmental Research: Past, Present, and Future*, 113-145.
- Rutsaert, P., & Donovan, J. (2020). Sticking with the old seed: Input value chains and the challenges to deliver genetic gains to smallholder maize farmers. *Outlook on Agriculture*, 49(1), 39-49. <https://journals.sagepub.com/doi/abs/10.1177/0030727019900520>
- Schöley, M., & Padmanabhan, M. (2017). Formal and informal relations to rice seed systems in Kerala, India: Agrobiodiversity as a gendered social-ecological artifact. *Agriculture and Human Values*, 34(4), 969-982. <https://link.springer.com/article/10.1007/s10460-016-9759-3>
- Simmons, P., Winters, P., & Patrick, I. (2005). An analysis of contract farming in East Java, Bali, and Lombok, Indonesia. *Agricultural Economics*, 33, 513-525. <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1574-0864.2005.00096.x>
- Sisay, D. T., Verhees, F. J., & van Trijp, H. C. (2017). Seed producer cooperatives in the Ethiopian seed sector and their role in seed supply improvement: A review. *Journal of crop improvement*, 31(3), 323-355. <https://www.tandfonline.com/doi/abs/10.1080/15427528.2017.1303800>
- Suma, T. R., & Großmann, K. (2017). Exclusions in inclusive programs: State-sponsored sustainable development initiatives amongst the Kurichya in Kerala, India. *Agriculture and human values*, 34, 995-1006. <https://link.springer.com/article/10.1007/s10460-016-9758-4>
- Tallam, S. J. (2015). *The process of farmer group development and its influence on the effectiveness of collective action: the case of Bungoma County (Kenya) and Kapchorwa district (Uganda)* (Doctoral dissertation, University of Nairobi). <http://erepository.uonbi.ac.ke/handle/11295/95335>
- Vernoooy, R. (2016). A resource manual for resilient seed systems. *Indian Journal of Plant Genetic Resources*, 29(03), 442-444. <http://ispgr.in/index.php/ijpgr/article/download/146/261>
- Vice Versa. 2017. "Farmers Gain Access to and Control over Seeds." Food and Business Knowledge Platform, March 12.

LIST OF ANNEXES

Annex 1: Questionnaire

Seed Production and Market Delivery Models Questionnaire

You have been selected to participate in this study because you are a key stakeholder in servicing the needs of the seed sector. The study aims to understand key bean/soybean/cowpea seed value chain actors. The study will document the gendered seed production and delivery models used by diverse value chain actors (NGOs, seed companies, government, research organisations, and farmers). Please indicate sources of information and provide any available documentation. We are requesting a few minutes of your time to take this survey. All the collected information will be treated as confidential and only be used for study purposes and to provide evidence for change in the existing legume seed systems.

PART 1: ENUMERATOR/SURVEY INFORMATION

1. Name of supervisor: *[Provide a list of supervisors]*
2. What is the name of the enumerator/data collector? *[Provide a list of enumerators]*
3. Date of data collection: *[Auto select from tablet]*
4. Name of NARS: 1=KALRO (Kenya), 2=RAB (Rwanda), 3=ISABU (Burundi), 4=ZARI (Zambia), 5=DR&SS (Zimbabwe), 6=INERA (DRC), 7=SARI (GHANA), 8=IAR/ABU (Nigeria), 9=UAM (Nigeria), 10=IIAM (Mozambique), 11=IRAD (Cameroon), 11= EIAR (Ethiopia), 12=NARO (Uganda), 13=TARI (Tanzania), 999=If other specify [...]
5. Type of actor ___ Codes: 1=NGO, 2= Seed companies, 3=Seed Producer groups, 4=Research Organization, 99=Other, specify

PART 2: GEOGRAPHICAL INFORMATION OF THE SEED PRODUCER

1. Name of the Country: 1= Kenya, 2=Rwanda, 3= Burundi, 4= Zambia, 5=Zimbabwe, 6= DRC, 7=Nigeria, 8=Ghana, 9= Mozambique, 10=Cameroon, 11=Ethiopia, 12=Uganda, 13=Tanzania
2. Region/County/Province/State: [...]
3. District/Sub- County/Commune/Woreda/Local Government Area (LGA): [...]
4. Ward/Sector/Colline/Parish: [...]
5. Village/Community (Head Quarters for Companies): [...]

PART 3: CROP INFORMATION

Please select the CROP under study (*Select all that apply*): 1=Common Bean, 2=Soybean, 3=Cowpea
If selected 1 in Part 1 (5) = 1, Ask PART 4

PART 4: Non-government Organization

1. List the NGOs you work with on bean production: (*Provide the names of the NGOs*)
2. State whether the NGOs are national or international: 1=national, 2=International, 3 = both national and international
3. How many NGOs are men or women-led: a) Number of Women-led NGOs_____, b) Male-led_____, c). Don't know_____
4. Are these NGOs involved in seed production? _____ 1= Yes, 0=No
5. List the different seed production models used by these NGOs. (*Select all the at apply*): ___Codes: 1=Community-based seed production, 2=Participatory plant breeding, 3=Integrated seed sector development, 4=Seed multiplication and distribution, 5=Farmer field schools, 6=Contract farming (individual), 7=Seed revolving fund, 8=Seed production cooperatives/group, 9=Public-private partnerships, 99=Other, specify
6. For each of the seed production model selected, please rate how inclusive (in terms of participation and benefiting) you believe it considers women and vulnerable groups.

| Production model | The extent to which the model encourages active involvement of women and vulnerable groups. (1=Not at all participatory, 2=Slightly participatory, 3=Moderately participatory, 4=Participatory, 5=Very participatory) | The extent to which the model benefits women and vulnerable groups. (1=Not at all beneficial, 2=Slightly beneficial, 3=Moderately beneficial, 4=Beneficial, 5=Very beneficial) |
|--------------------------------------|--|---|
| Community-based seed production | | |
| Participatory plant breeding | | |
| Integrated seed sector development | | |
| Seed multiplication and distribution | | |
| Farmer field schools | | |
| Contract farming (individual) | | |
| Seed revolving fund | | |
| Seed production cooperatives/groups | | |
| Public-private partnerships | | |
| Other, specify | | |

7. For each of seed production models used by NGOs, please rate how well you believe it promotes availability and access to affordable high-quality seed for both men and women farmers. Use a scale of 1 to 5, where 1= Very poorly, 2=Poorly, 3=Moderate (neither poorly nor well), 4=Well, 5=Very well

| Production model | Seed availability to men and women when required and at the required point and time | Men and women have access to affordable quality seed. |
|--------------------------------------|--|--|
| Community-based seed production | | |
| Participatory plant breeding | | |
| Integrated seed sector development | | |
| Seed multiplication and distribution | | |
| Farmer field schools | | |
| Contract farming (individual) | | |
| Seed revolving fund | | |
| Seed production cooperatives/Groups | | |
| Public-private partnerships | | |
| Other, specify | | |

8. List the different seed delivery models by type of NGO (*Select all that apply*). _____ Codes: 1=Seed fairs and exchanges, 2=Emergency seed distribution, 3=Seed multiplication and distribution, 4=Agro-dealer development/network, 5=Seed banks, 6=Direct sales, 7=Seed credit, 8=Community-based seed marketing, 9=Public-private partnerships, 10=Mobile seed shops, 11=Digital platform, 99=Other
9. For each of the seed delivery models selected, please rate how inclusive (in terms of participation and benefiting) you believe it considers women and vulnerable groups.

| Seed delivery model | The extent to which the model encourages active involvement of women and vulnerable groups. (1=Not at all participatory, 2=Slightly participatory, 3=Moderately participatory, 4=Participatory, 5=Very participatory) | The extent to which the model benefits women and vulnerable groups. (1=Not at all beneficial, 2=Slightly beneficial, 3=Moderately beneficial, 4=Beneficial, 5=Very beneficial) |
|--------------------------------------|---|--|
| Seed fairs and exchanges | | |
| Emergency seed distribution | | |
| Seed multiplication and distribution | | |
| Agro-dealer development/network | | |
| Seed banks | | |
| Direct sales | | |
| Seed credit | | |
| Community-based seed marketing | | |
| Public-private partnerships | | |
| Mobile seed shops | | |
| Digital platform | | |
| Other, specify | | |

10. For each of seed delivery models used by NGOs, please rate how well you believe it promotes availability and access to affordable high-quality seed by both men and women farmers. Use the scale of 1 to 5, where 1= Very poorly, 2=Poorly, 3=Moderate (neither poorly nor well), 4=Well, 5=Very well

| Seed delivery model | Seed availability to men and women when required and at the required point and time | Men and women access to affordable quality seed |
|--------------------------------------|---|---|
| Seed fairs and exchanges | | |
| Emergency seed distribution | | |
| Seed multiplication and distribution | | |
| Agro-dealer development/network | | |
| Seed banks | | |
| Direct sales | | |
| Seed credit | | |
| Community-based seed marketing | | |
| Public-private partnerships | | |
| Mobile seed shops | | |
| Digital platform | | |
| Other, specify | | |

11. On a scale of 1 to 5, with 1 being very affordable and 5 being very expensive, how would you rate the affordability of the seeds provided by each of the listed seed production and delivery models used by the NGOs?

| Seed production model | Rating (1-5) | Seed delivery model | Rating (1-5) |
|--------------------------------------|--------------|--------------------------------------|--------------|
| Community-based seed production | | Seed fairs and exchanges | |
| Participatory plant breeding | | Emergency seed distribution | |
| Integrated seed sector development | | Seed multiplication and distribution | |
| Seed multiplication and distribution | | Agro-dealer development/network | |
| Farmer field schools | | Seed banks | |
| Contract farming (individual) | | Direct sales | |
| Seed revolving fund | | Seed credit | |
| Seed production cooperatives/Groups | | Community-based seed marketing | |
| Public-private partnerships | | Public-private partnerships | |
| Other, specify | | Mobile seed shops | |
| | | Digital platform | |
| | | Other, specify | |

12. What are the programs or policies in place to help farmers afford seeds supplied via each of the listed seed delivery models ___ Codes: 1=Subsidies, 2=Credit schemes, 3=Seed exchange program, 4=Voucher program, 5=Bulk purchase discounts, 6=Insurance/risk mitigation program, 7=Flexible payment terms, 8=Seed aid, 99=Other, specify

| Seed delivery model | Programs or policies in place to help farmers afford seeds supplied (Select all that apply) |
|---------------------------------|---|
| Seed Fairs and Exchanges | |
| Agro-dealer development/network | |
| Seed banks | |
| Direct Sales | |
| Franchise model | |
| Community-based seed marketing | |
| Public-private partnerships | |
| Mobile seed shop | |
| Digital platform | |
| Other | |

13. How does the cost of seed produced by each of the listed seed production models compared? ___ Codes: 1=Much cheaper, 2=Somewhat cheaper, 3>About the same cost, 4=Somewhat more expensive, 5=Much more expensive, 6=Not sure

| Seed production model | Rating of cost of production of seed |
|--------------------------------------|--------------------------------------|
| Community-based seed production | |
| Participatory plant breeding | |
| Integrated seed sector development | |
| Seed multiplication and distribution | |
| Farmer field schools | |
| Contract farming (individual) | |
| Seed revolving fund | |
| Seed production cooperatives/groups | |
| Public-private partnerships | |
| Other, specify | |

14. How does the cost of seed delivered by each of the listed delivery models compare? __ Codes: 1=*Much cheaper*, 2=*Somewhat cheaper*, 3=*About the same cost*, 4=*Somewhat more expensive*, 5=*Much more expensive*, 6=*Not sure*

| Seed delivery model | Rating of cost of seed delivery model |
|--------------------------------------|---------------------------------------|
| Seed fairs and exchanges | |
| Emergency seed distribution | |
| Seed multiplication and distribution | |
| Agro-dealer development/network | |
| Seed banks | |
| Direct sales | |
| Seed credit | |
| Community-based seed marketing | |
| Public-private partnerships | |
| Mobile seed shops | |
| Digital platform | |
| Other, specify | |

15. List the goals of the seed production and delivery models (*Select all that apply*). Codes: 1=Ensure high-quality seed, 2=Increase productivity, 3=Sustainability (reduce the environmental footprint of seed production), 4=Profitability/market expansion, 5=Diversity(e.g., preserve genetic diversity), 6=Climate change adaptability/risk management, 7=Inclusivity (e.g., quality seeds accessible and affordable to all farmers), 8=Education and training, 9=Relief, 10=Technological innovation (e.g., genetic engineering techniques), 11=Partnership and collaboration, 12=Policy influence (e.g., national health and nutrition policy (biofortification), 13=Promoting rural/local economies (e.g., employment, stimulate local business environment), 99=Other, specify

| Seed production model | Goal | Seed delivery model | Goal |
|--------------------------------------|------|--------------------------------------|------|
| Community-based seed production | | Seed fairs and exchanges | |
| Participatory plant breeding | | Emergency seed distribution | |
| Integrated seed sector development | | Seed multiplication and distribution | |
| Seed multiplication and distribution | | Agro-dealer development/network | |
| Farmer field schools | | Seed banks | |
| Contract farming (individual) | | Direct sales | |
| Seed revolving fund | | Seed credit | |
| Seed production cooperatives/Groups | | Community-based seed marketing | |
| Public-private partnerships | | Public-private partnerships | |
| Other, specify | | Mobile seed shops | |
| | | Digital platform | |
| | | Other, specify | |

16. How effective do you believe the seed production and delivery models used by the NGOs are achieving their goals? Please rate each seed production model you have listed on a scale of 1 to 5, with 1 being not ineffective at all and 5 being very effective.

| Seed production | Rating (1-5) | Seed delivery model | Rating (1-5) |
|--------------------------------------|--------------|--------------------------------------|--------------|
| Community-based seed production | | Seed fairs and exchanges | |
| Participatory plant breeding | | Emergency seed distribution | |
| Integrated seed sector development | | Seed multiplication and distribution | |
| Seed multiplication and distribution | | Agro-dealer development/network | |
| Farmer field schools | | Seed banks | |
| Contract farming (individual) | | Direct sales | |
| Seed revolving fund | | Seed credit | |
| Seed production cooperatives/groups | | Community-based seed marketing | |
| Public-private partnerships | | Public-private partnerships | |
| Other, specify | | Mobile seed shops | |
| | | Digital platform | |
| | | Other, specify | |

17. What measures are in place to ensure quality of seeds produced and delivered by NGOs? (Select all that apply to each model) __ Codes: 1=Certification, 2=Testing, 3=Inspections, 4=Training, 5=Traceability, 6=Feedback mechanisms, 98=Not sure, 99=Other, specify

| Production model | Measures | Delivery model | Measures |
|--------------------------------------|----------|---------------------------------|----------|
| Community-based seed production | | Seed Fairs and Exchanges | |
| Participatory plant breeding | | Agro-dealer development/network | |
| Integrated seed sector development | | Seed banks | |
| Seed multiplication and distribution | | Direct Sales | |
| Farmer field schools | | Franchise Model | |
| Contract farming (individual) | | Community-Based Seed Marketing | |
| Seed revolving fund | | Franchise Mode | |
| Seed production cooperatives/groups | | Public-Private Partnerships | |
| Public-private partnerships | | Mobile Seed Shop | |
| Other, specify | | Digital platform | |
| | | Other | |

If Part 1 (5) = 2 or 3, Ask PART 5

PART 5: Seed Companies/Seed Producer groups

- List the seed companies/seed producer groups that you work with on bean production. {text as a type of variable}
- Nature of company/ producer group? _____ 1=Formal, 2=Informal
- Type of company/producer group? (Select all that apply) _____ 1=Farmer based, 2=Private {Instruction: The respondent should state whether the seed company/seed producer is farmer-based or private seed company based}
- How many of these seed companies are men or women-led? Men-led_____ Women-led_____
- List the different seed production models these seed companies or farmer groups use. (Select all that apply) __ **Codes:** 1=Community-based seed production, 2=Contract farming (individual), 3=Seed production cooperatives/group, 4=Public-private partnerships, 99=Other, specify
- Composition of farmer groups? _____ 1= Mixed, 2=Male only, 3= Female only
- For each of the following seed production model selected, please rate how inclusive (in terms of participation and benefiting) you believe it considers women and vulnerable groups.

| Production model | The extent to which the model encourages active involvement of women and vulnerable groups. (1=Not at all participatory, 2=Slightly participatory, 3=Moderately participatory, 4=Participatory, 5=Very participatory) | The extent to which the model benefits women and vulnerable groups. (1=Not at all beneficial, 2=Slightly beneficial, 3=Moderately beneficial, 4=Beneficial, 5=Very beneficial) |
|-------------------------------------|---|--|
| Community-based seed production | | |
| Contract Farming (individual) | | |
| Seed production cooperatives/groups | | |
| Public-private partnerships | | |
| Other, specify | | |

8. For each of the selected seed production models, please rate how well you believe it promotes availability and access to affordable, high-quality seed for both men and women farmers. Use the scale of 1 to 5, where 1= Very poorly, 2=Poorly, 3=Moderate (neither poorly nor well), 4=Well, 5=Very well

| Production model | Seed availability to men and women when required and at the required point and time | Inclusive access to affordable quality seed |
|-------------------------------------|---|---|
| Community-based seed production | | |
| Contract Farming (individual) | | |
| Seed production cooperatives/groups | | |
| Public-private partnerships | | |
| Other, specify | | |

9. List the different seed delivery models used by seed companies/ producer groups (Select all that apply) _____ **Codes:** 1=Seed fairs and exchanges, 2=Agro-dealer development/network, 3=Seed banks, 4=Direct sales, 5=Franchise model, 6=Community-based seed marketing, 7=Public-private partnerships, 8=Mobile seed shops, 9=Digital platform, 99=Other, specify

10. For each of the selected seed delivery models, please rate how inclusive (in terms of participation and benefiting) you believe it considers women and vulnerable groups.

| Seed delivery model | The extent to which the model encourages active involvement of women and vulnerable groups. (1=Not at all participatory, 2=Slightly participatory, 3=Moderately participatory, 4=Participatory, 5=Very participatory) | The extent to which the model benefits women and vulnerable groups. (1=Not at all beneficial, 2=Slightly beneficial, 3=Moderately beneficial, 4=Beneficial, 5=Very beneficial) |
|---------------------------------|---|--|
| Seed fairs and exchanges | | |
| Agro-dealer development/network | | |
| Seed banks | | |
| Direct sales | | |
| Franchise model | | |
| Community-based seed marketing | | |
| Public-private partnerships | | |
| Mobile seed shop | | |
| Digital platform | | |
| Other | | |

11. For each of seed production and delivery models used by seed companies/producer groups, please rate how well you believe it promotes availability and access to affordable, high-quality seed to both men and women farmers. Use the scale of 1 to 5, where 1= Very poorly, 2=Poorly, 3=Moderate (neither poorly nor well), 4=Well, 5=Very well

| Seed delivery model | Seed availability to men and women when required and at the required point and time | Inclusive access to affordable quality seed |
|---------------------------------|---|---|
| Seed fairs and exchanges | | |
| Agro-dealer development/network | | |
| Seed banks | | |
| Direct sales | | |
| Franchise model | | |
| Community-based seed marketing | | |
| Public-private partnerships | | |
| Mobile seed shop | | |
| Digital platform | | |
| Other | | |

12. On a scale of 1 to 5, with 1 being very affordable and 5 being very expensive, how would you rate the affordability of the seeds provided by each of the listed seed production and delivery models used by seed companies/seed producer groups?

| Seed production model | Rating (1-5) | Seed delivery model | Rating (1-5) |
|-------------------------------------|--------------|---------------------------------|--------------|
| Community-based seed production | | Seed fairs and exchanges | |
| Contract Farming (individual) | | Agro-dealer development/network | |
| Seed production cooperatives/groups | | Seed banks | |
| Public-private partnerships | | Direct sales | |
| Other, specify | | Franchise model | |
| | | Community-based seed marketing | |
| | | Public-private partnerships | |
| | | Mobile seed shop | |
| | | Digital platform | |
| | | Other | |

13. What programs or policies are in place to help farmers afford seeds supplied via each of the listed seed delivery model (Select all that apply) ___Codes: 1=Subsidies, 2=Credit schemes, 3=Seed exchange program, 4=Voucher program, 5=Bulk purchase discounts, 6=Insurance/risk mitigation program, 7=Flexible payment terms, 8=Seed aid, 99=Other, specify

| Seed delivery models | Policy in place to ensure seed affordability |
|---------------------------------|--|
| Seed fairs and exchanges | |
| Agro-dealer development/network | |
| Seed banks | |
| Direct sales | |
| Franchise model | |
| Community-based seed marketing | |
| Public-private partnerships | |
| Mobile seed shop | |
| Digital platform | |
| Other | |

14. How does the cost of seed produced by each of the listed seed production models compare? ____ Codes: 1=*Much cheaper*, 2=*Somewhat cheaper*, 3=*About the same cost*, 4=*Somewhat more expensive*, 5=*Much more expensive*, 6=*Not sure*

| Seed production model | Rating of cost of seed production |
|-------------------------------------|-----------------------------------|
| Community-based seed production | |
| Contract Farming (individual) | |
| Seed production cooperatives/groups | |
| Public-private partnerships | |
| Other, specify | |

15. How does the cost of seed delivered by each of the listed seed market delivery models compare? ____ Codes: 1=*Much cheaper*, 2=*Somewhat cheaper*, 3=*About the same cost*, 4=*Somewhat more expensive*, 5=*Much more expensive*, 6=*Not sure*

| Seed delivery model | Rating of cost of seed delivery |
|---------------------------------|---------------------------------|
| Seed fairs and exchanges | |
| Agro-dealer development/network | |
| Seed banks | |
| Direct sales | |
| Franchise model | |
| Community-based seed marketing | |
| Public-private partnerships | |
| Mobile seed shop | |
| Digital platform | |
| Other | |

16. List the goals of the seed production and delivery models. (*Select all that apply*). Codes: 1=Ensure high quality seed, 2=Increase productivity, 3=Sustainability (reduce environmental footprint of seed production), 4=Profitability/market expansion, 5=Diversity(e.g., preserve genetic diversity), 6=Climate change adaptability/risk management, 7=Inclusivity (e.g., quality seeds accessible and affordable to all farmers), 8=Education and training, 9=Relief, 10=Technological innovation (e.g., genetic engineering techniques), 11=Partnership and collaboration, 12=Policy influence (e.g., national health and nutrition policy (biofortification), 13=Promoting rural/local economies (e.g., employment, stimulate local business environment), 99=Other, specify

| Seed production model | Goal | Seed delivery model | Goal |
|-------------------------------------|------|---------------------------------|------|
| Community-based seed production | | Seed fairs and exchanges | |
| Contract Farming (individual) | | Agro-dealer development/network | |
| Seed production cooperatives/groups | | Seed banks | |
| Public-private partnerships | | Direct sales | |
| Other, specify | | Franchise model | |
| | | Community-based seed marketing | |
| | | Public-private partnerships | |
| | | Mobile seed shop | |
| | | Digital platform | |
| | | Other | |

17. How effective do you believe the seed production models used by the seed companies/producer groups are achieving their goals? Please rate each seed production model you have listed on a scale of 1 to 5, with 1 being ineffective at all and 5 being very effective.

| Seed production model | Rating (1-5) | Seed delivery model | Rating (1-5) |
|-------------------------------------|--------------|---------------------------------|--------------|
| Community-based seed production | | Seed fairs and exchanges | |
| Contract Farming (individual) | | Agro-dealer development/network | |
| Seed production cooperatives/groups | | Seed banks | |
| Public-private partnerships | | Direct sales | |
| Other, specify | | Franchise model | |
| | | Community-based seed marketing | |
| | | Public-private partnerships | |
| | | Mobile seed shop | |
| | | Digital platform | |
| | | Other | |

18. What measures are in place to ensure the quality of seeds produced and delivered by seed companies/ farmer groups? (Select all that apply to each model) ___ Codes: 1=Certification, 2=Testing, 3=Inspections, 4=Training, 5=Traceability, 6=Feedback mechanisms, 98=Not sure, 99=Other, specify

| Seed production model | Measures | Seed delivery model | Measures |
|-------------------------------------|----------|---------------------------------|----------|
| Community-based seed production | | Seed fairs and exchanges | |
| Contract Farming (individual) | | Agro-dealer development/network | |
| Seed production cooperatives/groups | | Seed banks | |
| Public-private partnerships | | Direct sales | |
| Other, specify | | Franchise model | |
| | | Community-based seed marketing | |
| | | Public-private partnerships | |
| | | Mobile seed shop | |
| | | Digital platform | |
| | | Other | |

If Part 1 (5) = 4, Ask PART 6

PART 6: National Agricultural Research Organizations (NARS)

18. List partners you work with on bean seed production. _____ **Codes:** 1=International Agricultural Research Centers, 2=Universities and Academic Institutions, 3=Non-Governmental Organizations (NGOs), 4=Seed companies, 5=Farmers' Associations or Cooperatives, 6=Government Agencies, 7=International Donor Agencies/Foundation, 8=Private Sector Partners (e.g., financial institutions, technology companies, agribusiness firms), 9=Community-Based Organizations, 10=Individual farmers, 99=Other, specify
19. How many partners are men or women-led? Number of women-led: ___ Number of Men-led: Don't know _____
20. List the different seed production models used by these different partners (Select all that apply), **Codes:** 1=Community-based seed production, 2=Participatory plant breeding, 3=Integrated seed sector development, 4=Seed multiplication and distribution, 5=Farmer field schools, 6=Contract farming (individual), 7=Seed production cooperatives/groups, 8=Public-private partnerships, 99=Other, specify
21. For each of the selected seed production models used by partners, please rate how inclusive (in terms of participation and benefiting) you believe it considers women and vulnerable groups.

| Production | The extent to which the model encourages active involvement of women and vulnerable groups. (1=Not at all participatory, 2=Slightly participatory, 3=Moderately participatory, 4=Participatory, 5=Very participatory) | The extent to which the model benefits women and vulnerable groups. (1=Not at all beneficial, 2=Slightly beneficial, 3=Moderately beneficial, 4=Beneficial, 5=Very beneficial) |
|--------------------------------------|---|--|
| Community-based seed production | | |
| Participatory plant breeding | | |
| Integrated seed sector development | | |
| Seed multiplication and distribution | | |
| Farmer field schools | | |
| Contract farming (individual) | | |
| Seed production cooperatives/groups | | |
| Public-private partnerships | | |
| Other, specify | | |

22. For each of the selected seed production models used by partners, please rate how well you believe it promotes availability and access to affordable, high-quality seed for both men and women farmers. Use the scale of 1 to 5, where 1= Very poorly, 2=Poorly, 3=Moderate (neither poorly nor well), 4=Well, 5=Very well

| Production model | Seed availability to men and women when required and at the required point and time | Inclusive access to affordable quality seed |
|--------------------------------------|---|---|
| Community-based seed production | | |
| Participatory plant breeding | | |
| Integrated seed sector development | | |
| Seed multiplication and distribution | | |
| Farmer field schools | | |
| Contract farming (individual) | | |
| Seed production cooperatives/groups | | |
| Public-private partnerships | | |
| Other, specify | | |

23. List the different seed delivery models used by partners (Select all that apply) _____ **Codes:** 1=Seed Fairs and Exchanges, 2=Emergency seed distribution, 3=Agro-dealer development/network, 5=Seed banks, 6=Direct sales, 7=Seed credit, 8=Franchise model, 9=Community-based seed marketing, 10=Public-private partnerships, 11=Mobile seed shops, 12=Digital platform, 99=Other

24. For each of the following seed delivery models, please rate how inclusive (in terms of participation and benefiting) you believe it considers women and vulnerable groups.

| Seed delivery model | The extent to which the model encourages active involvement of women and vulnerable groups. (1=Not at all participatory, 2=Slightly participatory, 3=Moderately participatory, 4=Participatory, 5=Very participatory) | The extent to which the model benefits women and vulnerable groups. (1=Not at all beneficial, 2=Slightly beneficial, 3=Moderately beneficial, 4=Beneficial, 5=Very beneficial) |
|---------------------------------|--|---|
| Seed fairs and exchanges | | |
| Emergency seed distribution | | |
| Agro-dealer development/network | | |
| Seed banks | | |
| Direct sales | | |
| Seed credit | | |
| Franchise model | | |
| Community-based seed marketing | | |
| Public-private partnerships | | |
| Mobile seed shops | | |
| Digital platform | | |
| Other | | |

25. For each of the selected seed delivery models, please rate how well you believe it promotes availability and access to affordable, high-quality seed for both men and women farmers. Use the scale of 1 to 5, where 1=Very poorly, 2=Poorly, 3=Moderate (neither poorly nor well), 4=Well, 5=Very well

| Seed delivery model | Seed availability to men and women when required and at the required point and time | Inclusive access to affordable quality seed |
|---------------------------------|--|--|
| Seed fairs and exchanges | | |
| Emergency seed distribution | | |
| Agro-dealer development/network | | |
| Seed banks | | |
| Direct sales | | |
| Seed credit | | |
| Franchise model | | |
| Community-based seed marketing | | |
| Public-private partnerships | | |
| Mobile seed shops | | |
| Digital platform | | |
| Other | | |

26. On a scale of 1 to 5, with 1 being very affordable and 5 being very expensive, how would you rate the affordability of the seeds provided by each of the listed seed production and delivery models used by partners?

| Seed production model | Rating (1-5) | Seed delivery model | Rating (1-5) |
|--------------------------------------|--------------|---------------------------------|--------------|
| Community-based seed production | | Seed fairs and exchanges | |
| Participatory plant breeding | | Emergency seed distribution | |
| Integrated seed sector development | | Agro-dealer development/network | |
| Seed multiplication and distribution | | Seed banks | |
| Farmer field schools | | Direct sales | |
| Contract farming (individual) | | Seed credit | |
| Seed production cooperatives/groups | | Franchise model | |
| Public-private partnerships | | Community-based seed marketing | |
| Other, specify | | Public-private partnerships | |
| | | Mobile seed shops | |
| | | Digital platform | |
| | | Other | |

27. On a scale of 1 to 5, with 1 being very affordable and 5 being very expensive, how would you rate the affordability of the seeds provided by each of the listed seed delivery model used by partners?

| Seed production model | Rating (1-5) | Seed delivery model | Rating (1-5) |
|--------------------------------------|--------------|---------------------------------|--------------|
| Community-based seed production | | Seed fairs and exchanges | |
| Participatory plant breeding | | Emergency seed distribution | |
| Integrated seed sector development | | Agro-dealer development/network | |
| Seed multiplication and distribution | | Seed banks | |
| Farmer field schools | | Direct sales | |
| Contract farming (individual) | | Seed credit | |
| Seed production cooperatives/groups | | Franchise model | |
| Public-private partnerships | | Community-based seed marketing | |
| Other, specify | | Public-private partnerships | |
| | | Mobile seed shops | |
| | | Digital platform | |
| | | Other | |

28. What programs or policies in place to help farmers afford seeds supplied via each of the listed seed delivery models used by partners (Select all that apply) ___Codes: 1=Subsidies, 2=Credit schemes, 3=Seed exchange program, 4=Voucher program, 5=Bulk purchase discounts, 6=Insurance/risk mitigation program, 7=Flexible payment terms, 8=Seed aid, 99=Other, specify

| Seed delivery model | Programs/policies in place to help farmers afford seeds supplied |
|---------------------------------|--|
| Seed fairs and exchanges | |
| Emergency seed distribution | |
| Agro-dealer development/network | |
| Seed banks | |
| Direct sales | |
| Seed credit | |
| Franchise model | |
| Community-based seed marketing | |
| Public-private partnerships | |
| Mobile seed shops | |
| Digital platform | |
| Other | |

29. How does the cost of seed produced by each of the listed seed production models used by partners compare? ___ 1=*Much cheaper*, 2=*Somewhat cheaper*, 3=*About the same cost*, 4=*Somewhat more expensive*, 5=*Much more expensive*, 6=*Not sure*

| Seed delivery model | Rating of cost of seed production model |
|--------------------------------------|---|
| Community-based seed production | |
| Participatory plant breeding | |
| Integrated seed sector development | |
| Seed multiplication and distribution | |
| Farmer field schools | |
| Contract farming (individual) | |
| Seed production cooperatives/group | |
| Public-private partnerships | |
| Other, specify | |

30. How does the cost of seed delivered by each of the listed delivery models used by partners compare? ___ 1=*Much cheaper*, 2=*Somewhat cheaper*, 3=*About the same cost*, 4=*Somewhat more expensive*, 5=*Much more expensive*, 6=*Not sure*

| Seed delivery model | Rating of cost of seed delivery model |
|---------------------------------|---------------------------------------|
| Seed fairs and exchanges | |
| Emergency seed distribution | |
| Agro-dealer development/network | |
| Seed banks | |
| Direct sales | |
| Seed credit | |
| Franchise model | |
| Community-based seed marketing | |
| Public-private partnerships | |
| Mobile seed shops | |
| Digital platform | |
| Other | |

31. List the goals of the seed production and delivery models. (*Select all that apply*). Codes:

1=Ensure high quality seed, 2=Increase productivity, 3=Sustainability (reduce environmental footprint of seed production), 4=Profitability/market expansion, 5=Diversity(e.g., preserve genetic diversity), 6=Climate change adaptability/risk management, 7=Inclusivity (e.g., quality seeds accessible and affordable to all farmers), 8=Education and training, 9=Relief, 10=Technological innovation (e.g., genetic engineering techniques), 11=Partnership and collaboration, 12=Policy influence (e.g., national health and nutrition policy (biofortification), 13=Promoting rural/local economies (e.g., employment, stimulate local business environment), 99=Other, specify

| Seed production model | Goal | Seed delivery model | Goal |
|--------------------------------------|------|---------------------------------|------|
| Community-based seed production | | Seed fairs and exchanges | |
| Participatory plant breeding | | Emergency seed distribution | |
| Integrated seed sector development | | Agro-dealer development/network | |
| Seed multiplication and distribution | | Seed banks | |
| Farmer field schools | | Direct sales | |
| Contract farming (individual) | | Seed credit | |
| Seed production cooperatives/group | | Franchise model | |
| Public-private partnerships | | Community-based seed marketing | |
| Other, specify | | Public-private partnerships | |
| | | Mobile seed shops | |
| | | Digital platform | |
| | | Other | |

32. How effective do you believe the seed production models used by partners are in achieving their goals?

Please rate each seed production model you have listed on a scale of 1 to 5, with 1 being ineffective at all and 5 being very effective.

| Seed production model | Rating (1-5) | Seed delivery model | Rating (1-5) |
|--------------------------------------|--------------|---------------------------------|--------------|
| Community-based seed production | | Seed fairs and exchanges | |
| Participatory plant breeding | | Emergency seed distribution | |
| Integrated seed sector development | | Agro-dealer development/network | |
| Seed multiplication and distribution | | Seed banks | |
| Farmer field schools | | Direct sales | |
| Contract farming (individual) | | Seed credit | |
| Seed production cooperatives/group | | Franchise model | |
| Public-private partnerships | | Community-based seed marketing | |
| Other, specify | | Public-private partnerships | |
| | | Mobile seed shops | |
| | | Digital platform | |
| | | Other | |

33. What measures are in place to ensure the quality of seeds produced and delivered by partners? Please select all that apply to each model___ Codes: 1=*Certification*, 2=*Testing*, 3=*Inspections*, 4=*Training*, 5=*Traceability*, 6=*Feedback mechanisms*, 98=*Not sure*, 99=*Other, specify*

| Seed production model | Measures | Seed delivery model | Measures |
|--------------------------------------|-----------------|---------------------------------|-----------------|
| Community-based seed production | | Seed fairs and exchanges | |
| Participatory plant breeding | | Emergency seed distribution | |
| Integrated seed sector development | | Agro-dealer development/network | |
| Seed multiplication and distribution | | Seed banks | |
| Farmer field schools | | Direct sales | |
| Contract farming (individual) | | Seed credit | |
| Seed production cooperatives/group | | Franchise model | |
| Public-private partnerships | | Community-based seed marketing | |
| Other, specify | | Public-private partnerships | |
| | | Mobile seed shops | |
| | | Digital platform | |
| | | Other | |

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