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Investment Guide for Community-Based Seed Entrepreneurs in Soybean Production

Esther Tolorunju, Feyisayo Ayeni, Ronke Adeniyi, Prakash K. Silwal, Olukayode Faleti, Bassey Archibong, Quadri Shakiru, Munir Ahmad, and Sini Luwa

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and Sini Luwa

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Foreword and Acknowledgements

This handbook is intended to guide seed farmers, entrepreneurs, agrodealers, extension workers, students of agriculture, and researchers on costs and returns analysis of soybean seed production in Northeast Nigeria.

The guide draws its lessons from the work and experience of IITA and partners in research for the development of seed systems in Nigeria. This publication is a production of the Feed the Future Nigeria Integrated Agriculture Activity implemented in targeted locations of Adamawa, Borno, Gombe, and Yobe states, Nigeria between July 2019 and December 2024, and was made possible through funding support from the United States Agency for International Development (USAID).

As part of its contribution to the economic recovery process in the northeast part of Nigeria, which the insurgent activities of armed groups have ravaged, USAID awarded to the International Institute of Tropical Agriculture (IITA) and its Partners (International Crops Research Institute for the Semi-Arid Tropics and Catholic Relief Services) the five-and-a-half-year "Feed the Future Nigeria Integrated Agriculture Activity" which aims to advance the objectives of inclusive and sustainable agriculture-led economic growth; strengthened resilience among people and systems; and a well-nourished population, especially among women and children in targeted locations of Adamawa, Borno, Gombe and Yobe states, northeast Nigeria. The Activity seeks to support vulnerable populations to engage in basic farming activities that will improve food security, increase agricultural incomes, and improve resilience among smallholder farmers and their families. It works with a coalition of partners to facilitate improved agro-inputs and extension advisory services to serve vulnerable populations; strengthens the institutions that form the market system and the networks that serve smallholder

farmers who have been disenfranchised by conflict; and facilitates the engagement of youth and women in economic and entrepreneurial activities.

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Kenton Dashiell
Deputy Director General/Partnerships for Delivery/General Directorate
International Institute of Tropical Agriculture (iita.org) Headquarters & West Africa Hub. PMB 5320, Oyo Road, Ibadan 200001, Oyo State, Nigeria

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Acronyms

AC:	Administrative Cost
CBSEs:	Community-Based Seed Entrepreneurs
GP:	Gross Profit
IITA:	International Institute of Tropical Agriculture
IAR:	Institute for Agricultural Research
MoU:	Memorandum of Understanding
NASC:	Nigeria Agricultural Seed Council
NP:	Net Profit
NIAA:	Nigeria Integrated Agriculture Activity
OC:	Operating Cost
PBD:	Profit before Depreciation
PBT:	Profit before Tax
TC:	Total Cost
TFC:	Total Fixed Cost
TR:	Total Revenue
TVC:	Total Variable Cost
USAID:	United States Agency for International Development

1 Introduction

Access to improved and quality seed plays a vital role in addressing low agricultural productivity, food insecurity, malnutrition, hunger, and poverty, especially within the context of smallholder farming systems in Nigeria. To achieve this objective, the International Institute for Tropical Agriculture (IITA), through funding support from the United States Agency for International Development (USAID) under the Feed the Future Initiative of the United States Government, implements the Nigeria Integrated Agriculture Activity (NIAA). NIAA is a 5-year Activity that focuses on improving access to quality and improved seeds in the maize value chain. The Activity facilitates access to quality and improved maize seeds through engagement with Community-Based Seed Entrepreneurs (CBSEs). The intervention has led to the establishment of over 2,250 CBSEs with high possibilities of emerging ones, leading to competitiveness in the seed markets.

This handbook is designed to offer some guidance on sound economic decisions to existing and upcoming CBSEs to enable them to compete favorably with other seed producers operating within the maize value chains in Northeast Nigeria. The handbook focuses primarily on economic activities in seed production, processing, packaging, and sales. The objective is to present a clear understanding of the cost structure, risks, opportunities, and management decisions that could enhance increased productivity and income for CBSEs in the maize value chain. The overall goal is to stimulate investment in maize

seed production by presenting information on investment cost implications, operating costs, return on investment, and the expected level of income per production.

The handbook presents detailed cost and returns analysis and brief information on the approach used to arrive at the estimation of the investment model, its usage, and application, as well as its limitations, particularly due to changes in market prices at the time of its development. However, a soft copy of the investment model used for the handbook can be accessed online. The soft copy is designed to be updated to ensure its relevance irrespective of time and changes in market prices. The handbook is divided into sections to present clear information and a specific guide on each of the financial models. Details on how the electronic version was used to develop the handbook are presented under the model description.

It is important to note that this handbook is developed in relation to an earlier publication by IITA titled *Guide to Maize Production In Northern Nigeria*. It is highly recommended that users should first study the handbook to help them understand some of the basic assumptions made on the agronomic practices in this handbook.

Soybean Production

Soybean [*Glycine max* (L). Merr.] plays a vital role in addressing food security and poverty in sub-Saharan Africa (SSA). It is a multipurpose leguminous food and industrial crop that thrives in tropical, subtropical, and temperate climates (Oyenpemi et al., 2023; Adebayo et al., 2018). Soybean supplies the highest percentage of protein compared to other sources of protein. It has an average protein content of 40% while beans and peas

contain only about 20%.It is also grown for its oil content, which is a major source of cholesterol-free vegetable oil. It accounts for 339 metric tons (t) out of the total world oilseed production of 578.7 t, making up approximately 59% of the global oilseed production. (Oyenpemi et al., 2023; Omoigui et al., 2022)

Importance of Soybean

Soybean makes up 70% of protein meal and 28% of vegetable oil consumption, second only to oil palm. It serves as a medicinal food, reducing bad cholesterol and triglycerides linked to heart disease. It also aids in the regulation of blood glucose, weight loss, and combatting malnutrition due to its high protein, fiber, and low cholesterol content. Industrially, it can be used to produce biofuel. According to Adebayo et al. (2018), an acre of soybeans could yield 66 gallons of biodiesel. In Nigeria, soybean has become a significant alternative to animal protein whose consumption is declining due to its exorbitant price. It is also promoted among smallholder farmers for improving soil fertility in cereal-dominated cropping systems through biological nitrogen fixation. (Kamara et al., 2022). The crop can be successfully cultivated in many states in Nigeria using little agricultural inputs. It represents a source of income for many households, especially in northeast Nigeria.

Soybean Yield

The average yield per hectare of soybean in Nigeria remains below one ton, which is below the potential yield of over 3 tons per hectare despite Nigeria being the second largest producer of soybean in Africa after South Africa (Kamara et al., 2022). The low output of soybeans in Nigeria can be attributed to cultivating low-yielding varieties, using fertilizers sparingly, pests and diseases, drought, poor soil fertility, high pod shattering,

poor agronomic practices, and market-related constraints (Khojely et al., 2018; Kamara et al., 2022). The crop's potential, which is rich in both oil and protein, has not been fully maximized in Nigeria to produce various forms of food products (Khojely et al., 2018)

In response to these obstacles, the International Institute of Tropical Agriculture (IITA) has, for many years, fostered close collaboration with national partners to develop improved soybean varieties (ISVs) along with complementary agronomic practices and several interventions have been implemented to disseminate the ISVs and associated management practices among smallholder farmers in Nigeria. (Kamara et al., 2022). Despite these interventions, access to improved and quality seeds remains a major challenge.

One of the feasible and sustainable ways to address the gap is to promote the adoption of the Community-Based Seed Entrepreneurs (CBSEs) model in the Nigerian seed sector. The CBSE model allows local farmers to act as seed producers thereby making improved and quality seeds available to smallholder farmers within their local communities and at affordable prices. IITA, through funding support from USAID, signed a memorandum of understanding (MoU) with the Nigeria Agricultural Seed Council (NASC) to promote the CBSE approach by ensuring validation and certification of the CBSE activities in northeast Nigeria. The approach is growing in northeast Nigeria with the involvement of over 2,250 CBSEs.

However, considering the rate of engagement of youth in the seed business alongside the rapid change in weather and economic situations in the country, there is a need to ensure that seed entrepreneurs are properly guided to engage in the business effectively and successfully. In addition, while

a series of information has been published on agronomic practices on improved seed, there is no or limited information on economic guidance to enable existing or new CBSEs to make sound economic decisions to ensure the success of their operations. To this end, this handbook intends to offer guidance to community-based seed entrepreneurs (CBSEs) on sound economic and management decisions necessary to ensure sustainable investment in soybean seed production.

Basic agronomic information

Different soybean varieties come with varying agronomic requirements. According to Omoigui et *a*l., (2022), the following varieties can be grown in the Guinea savanna ecological zones in Nigeria.

i) TGX 1448-2E
ii) TGX 1951-3F
iii) TGX 1904-6F
iv) TGX 1987-62F
v) TGX 1987-10F
vi) TGX 1835-10E

However, for this handbook, attention will be centered on the agronomic properties of the commonly cultivated varieties in Northeast Nigeria, which is TGX 1951-3F.

This variety is characterized by early maturity, high yield, a low shattering of the pod, high oil content, excellent grain color, and tolerance to rust and poor soil. No wonder it is unanimously adopted among the CBSEs. Therefore, all the agronomic properties adopted for this handbook are based on the TGX 1951-3F.

The variety has a production cycle of four (4) months from planting period to harvesting as seeds. Planting soybean in the same field that just grew soybeans is not recommended. Soybean yield will suffer even before factoring in environmental conditions, weather, pest, and disease pressures. According to Mallarino et al. (2021), second-year soybean crops in Minnesota and Wisconsin demonstrated a yield decline of at least 5% and, in certain instances, as much as 9% when compared to their first-year counterparts. Soybeans are commonly cultivated in crop rotations alongside cotton, maize, and sorghum. The spacing between rows typically ranges from 0.4 to 0.6 meters, with 30 to 40 seeds sown per meter of row.

This crop can thrive in a variety of soil types, except extremely sandy soils. The ideal soil pH for soybean falls within the range of 6 to 6.5. Its fertilizer requirement is between 15 and 30 kg/ha of phosphorus (P) and 25 to 60 kg/ha of potassium (K). Soybeans can fix atmospheric nitrogen to fulfill their nutrient needs for achieving high yields. Nevertheless, an initial application of 10 to 20 kg/ha of nitrogen (N) can be advantageous for promoting strong early growth (FAO, 2023).

Yields in soybean cultivation vary widely based on water availability, fertilization, and row spacing. Under rainfed conditions, good yields range from 1,500 to 2,500 kg/ha of seed, while improved varieties can yield 2,500 to 3,500 kg/ha of seed with irrigation. The effect of irrigation on the oil and protein content of the grain is rather insignificant. However, under adequate irrigation, there is a tendency toward a slight increase in protein content and a slight decrease in oil content.

2

Methodological approach

The handbook was developed based on consultations with CBSEs in maize production. A series of meetings were held with a total of 140 representatives of the existing seed producers of different production capacities to gain an understanding of their business operations, including the investment and operating costs. The sample size was estimated using a minimum sample size calculator covering about 90% of the population proportion of 2,250 CBSEs at a 95% confidence interval. The aim is to help arrive at a valid cost−benefit analysis to guide new or existing CBSEs. It was observed that the majority of the existing CBSEs operate as a group and share the cost of the fixed assets used for their production, such as tractors, planters, water sources, etc., especially the newly established ones, while a few CBSEs operate individually. As a result, the cost of production varies significantly due to the share of fixed asset costs. However, to ensure that a valid business model was developed irrespective of the mode of operation, a stakeholders' validation meeting was organized to review the business activity and validate each of the cost elements based on existing business operations and market prices.

Considering the variations that exist across CBSE business operations, including the scale of operations and management costs, a generic investment model was developed to accommodate this concern. As a result, the electronic version of the model is designed to be updated to suit the individual CBSE business scales, operations, and management structure.

To arrive at a standard investment guide, an average CBSE business structure and current market prices were used in designing the model. Thus, the estimation presented in this handbook represents standard CBSE business operations and the existing market prices at the time of production, precisely October 2023. It is important, however, to note that the model can be adjusted to either lower or higher CBSE business operations alongside the market prices. The rationale is to enable any of the existing or upcoming CBSEs to utilize the model irrespective of their scale of operations, locations, and market prices. Thus, the handbook presents brief information on the electronic version of the model that was used to guide CBSEs on how to adjust or update the handbook to meet their respective business operations. This, therefore, implies that figures used for estimation could be regarded as assumptions as the values may change due to several factors, including variation in capital assets, management structure, labor costs, market prices, frequency of sales, utility costs, etc. The discussion presented in the model is based on the final estimation as contained in each of the tables.

The Model Description

The model is designed primarily with Microsoft Excel to facilitate ease of estimation and updating of the model. The Excel has a total of four worksheets, including the index, assumption sheet, cost projection, and summary page. Each of the worksheets is named after a specific financial estimation. Of all the worksheets, only the assumption sheet is designed to be edited or updated to accommodate the variations that may exist across different CBSE business operations. All of the sheets are linked such that any adjustment made through the assumption sheet will reflect on the entire model. The assumption sheet has three main forms of cells, each having a different color code, as indicated below.

Table 1. Legend

Name	Color code	Explanations
Calculations		DO NOT CHANGE
Hardcoded assumptions		Can change
To be revalidated		Can change

The table provides a guide to how the electronic version could be updated. The **orange cells** indicate cells in the Excel that should not be touched to avoid disruption in the model. To prevent the possibility of having such disruptions, the real cells are, however, locked. The **blue cells** contain figures based on the average business operation and actual market prices as elicited directly from the CBSEs. The cells, however, can be revised based on individual business status. Also, the **yellow cells** represent figures that are assumed based on the current happenings. This is also subject to change based on individual business operations. It should be noted, however, that the figures used in this handbook are a true reflection of the current 2,250 CBSEs in northeast Nigeria as of October 2023. To adjust the handbook to reflect the current business reality at any point in time, only the blue and the yellow cells should be adjusted.

3

Soybean production cost requirements

To standardize the cost and business operation reported in this handbook, each cost is estimated on a per-hectare basis. This is to allow for ease of extrapolations and scaling. Hence, the model/handbook presents a summary of the cost implications per hectare per production cycle reported by seed entrepreneurs in northeast Nigeria. The actual yield per hectare is 2,500 kg/ha. This shows that there has been a huge increase of about 1,500 kg/ha in the yield of the CBSEs following the intervention of Feed the Future Nigeria Integrated Farm Activity. This implies that an intending CBSE needs to work towards attaining the actual yield per hectare reported by the existing CBSEs to maximize income from their production activities to enable them to compete favorably.

Observations from the interaction held with farmers revealed that different capital items are owned by different CBSEs. The variation is influenced by several factors, including capital, production capacity, management practices, and so on. From the analysis, basic capital assets are required to operate a community-based production, and these include land, a storage house, a water source, a planter, a harvester, and basic farm implements such as hoe, head axe, cutlass, etc.

According to the investment model, establishing a typical community-based soybean seed business will necessitate an average capital of ₦710,730. The breakdown of the average

cost is provided in Table 2, where the largest portion of the capital, at 57.90%, is allocated to operating expenses. Fixed assets account for 23.21%, and administrative costs make up a modest 15.84% of the total capital requirement.

The operative costs include the costs of labor (land clearing, weeding, spraying, harvesting, packaging, etc.), herbicides, packaging bags, and so on. On the other hand, the administrative costs include the cost of NASC inspection and certification, extension services, insurance, fuel costs, repairs, and phone calls. Again, these may vary depending on the aforementioned factors that influence the cost of investment/ production.

Table 2. Basic capital and production cost for CBS business

N	List of Items	Cost	% Share
1	Land (rent)	20,000	2.67
2	Building/storehouse (rent)	70,000	9.33
3	Tractor (hire)	20,000	2.67
4	Vehicle (hire)	25,000	3.33
5	Two knapsack sprayers purchased)	30,000	4.22
6	***Total fixed cost***	*165,000*	*23.21*
7	**Total variable cost (Appendix 1)**	411,500	57.90
8	Procurement of foundation seeds	50,000	7.04
9	Average administrative expenses (Appendix 1)	84,230	15.84
10	***Total operating cost (App. 1)***	*495,730*	69.74
11	Total cost (line 6 + 8 + 10)	*710,730*	*100*

The figures are average market values in northeast Nigeria as of October 2023. Note: To arrive at an actual cost project per specific business operation, it is advisable to make use of the e-version of the financial model. Refer to Appendix 1 for the Economics of production.

4

Costs and returns analysis

Table 3 presents the summary of the costs and returns analysis for the production cycle per hectare. From the proposed actual yield of 2,500 kg/ha reported, a CBSE is liable to generate a gross profit of ₦838,500 per hectare when TDX1951-3F is cultivated. The expected net profit is ₦584,270. The net profit indicates the amount of money a CBSE can re-invest into the business.

The analysis suggests the existing and upcoming CBSE must attain the recommended yield of 2,500 kg/ha to operate favorably in the seed business. However, new farmers that are new to the business should strive to not go below a minimum yield of 2,000 kg/ha so as to at least break even. The yield agrees with the average yield reported in soybean production in the northeast.

Table 3. Costs and Returns Analysis

Financial summary	**Production Performance Scenario**
Description	
Bags sold per hectare(100-kg bags)	*25*
Sales of certified seeds ***(revenue)***	***1,250,000***
Total variable costs (App. 1)	*411,500*
Cost of foundation seeds	*50,000*
Gross profit	***838,500***
Admin expenses	*84,230*
Profit before depreciation	***754,270***
Shared cost of fixed asset (refer to Table 3)	*165,000*
Profit before tax	***589,270***
Tax (zero for start-up businesses)	*5000*
Net profit from production	***584,270***

Decision-making in seed production

Considering that the minimum soybean yield in northeast Nigeria stands at 2,000 kg/ha per hectare, it is highly recommended that a new CBSE start the operation with just one hectare and later scale up the production after attaining a reasonable level of yield. This will help to reduce risk in investment while lowering the cost of capital requirement to kick-start the business.

Also, starting a business with basic capital assets is highly recommended, especially when operating a one-hectare farm. This is to avoid an increase in depreciation costs, which consequently reduces the net profit. In addition, increasing capital assets will lead to an increase in maintenance costs, and thus increase the overall administrative costs.

Considering that a community-based seed business can be established with an average of N710,730, it is recommended that an intending CBSE engages in little or no loan services with a repayment period of at least two years with a maximum interest rate of 10 percent, especially for starters. Under such conditions, it is recommended that the intending CBSE strive to attain a yield of at least 2,000 kg/ha by adopting the use of improved varieties. This will enable an intending CBSE to attain a reasonable income level after the first year of production. With the increase in the number of new CBSEs, the existing and upcoming seed entrepreneurs should adopt strategic community engagement with farmers to boost demand and sales.

6

Market demand analysis

Soybean production and importation are on the upswing in Nigeria; this is fueled by the country's increasing demand for this versatile legume, which is used for both dietary and livestock feed purposes. Nigerian farmers are increasingly inclined to boost their soybean yield aided by collaborative efforts with organizations like the International Institute for Tropical Agriculture (IITA) and other international research institutions. (Nigeria Export Promotion Council [NEPC], 2020).

Currently, there is an increasing demand for soybean seeds due to increased awareness of the importance of improved and quality seeds among the farming communities. Seed producers face significant challenges in meeting the high demand for seeds in northeast Nigeria. Frequently, the available seed supply is exhausted before the planting seasons, precisely around June each year. This justifies the need for increased involvement of community-based seed entrepreneurs. Much effort should be made to increase soybean yields and there should be an increasing crop output to meet the growing needs of local feed millers and poultry farmers. As seed entrepreneurs, there is a need to acquire more land to be able to grow enough seeds to meet the demand to operate effectively in northeast Nigeria.

The area under cultivation in northeast Nigeria is about 243,000 hectares of arable land, and the active population of farmers in northeastern Nigeria is estimated to be between 3

and 5 million people (FAO, 2019). There are only 2,250 seed entrepreneurs who produce seeds that will be cultivated by these farmers. And not all 2,250 farmers are into soybean seed production. Consumption of soybean is also at an all-time high; there is a big market for the sale of soybean grain and fodder in Nigeria.

Marketing channels

In northeast Nigeria, several marketing channels have been identified for the sales of seeds by CBSEs. and these include seed companies, agrodealers, direct engagement with farmers, open markets, and input fairs. Of all the available market channels, the strategic community approach—which implies engagement directly with farmers through extension agents—has proven to be the most effective market channel. Under this approach, CBSEs engage the services of extension workers to interact and sensitize the farmers on the quality of seeds, prices, location, etc., thus facilitating access to improved and quality seeds to smallholder farmers within their immediate communities.

The other component of the strategic community approach is through the engagement of marketing agents. For effective demand, a CBSE is required to have marketing agents who can engage with farmers at all levels, including mosques, churches, and the community level, to sensitize farmers and stimulate demand. This approach has been extremely effective in increasing demand for notable agrodealers and CBSEs in northeast Nigeria.

Factors influencing seed marketing

The seed market is influenced by several factors, including planting, prices, and increased awareness of improved and quality seeds among smallholder farmers. While these factors are highly important in driving demand, logistics remains a critical factor in ensuring that smallholders have access to seeds.

CBSEs are not only required to engage with buyers but must also adopt effective market logistics to be able to meet the demand of farmers. Sometimes, seed buyers come from afar, and reaching such may be a major challenge. One of the proven logistic arrangements in responding to such needs is to work closely with farmers to arrange for a representative who can travel the distance to bring seeds to other farmers in the community. This approach is recommended when demand from such communities is relatively low to warrant establishing sales outlets in such communities.

9

Opportunities in the soybean market

The soybean market in Nigeria is experiencing rapid growth, offering significant potential to enhance the income of farmers. Presently, several companies, including SALMA Oil Mills in Kano, Grand Cereals in Jos, ECWA Feeds in Jos, KARMA FOOD Ltd in Gwagwalada, AFCOT Oil Seed

Processors in Ngurore, Adamawa State, and P.S. Mandrides in Kano, are actively involved in soybean processing. Moreover, the International Institute of Tropical Agriculture and other research institutes have collaboratively developed advanced technologies aimed at improving soybean production practices in Nigeria. (NEPC, 2020).

The growing demand for soybean from different industrial uses within the country is also creating opportunities for soybean farmers to increase their production and income. Leading infant food manufacturers in the country use soybean because of its high nutritional value, and it is also processed into flour and the oil is used for local paints, cosmetics, and soap-making industries. The oil can also be processed into margarine and vegan cheese.

The direct human consumption of soybean in Nigeria, especially among rural low-income groups that cannot afford animal protein sources such as meat, fish, and eggs, cannot be overestimated. Soybeans are now widely consumed and are readily used in the production of soymilk, soy cake,

soy yogurt, and the fortification of local carbohydrate-based Nigerian staple food. Dawadawa, a local food seasoning, is also produced from soybeans. Soybeans are also sprouted for use as a salad ingredient or as a vegetable and may be roasted as snacks. Young soybeans, known as edamame, are commonly steamed or boiled and eaten directly from the pod.

10

Risk and risk management in soybean business

In the soybean business, as with any agribusiness, there are inherent risks that potential investors should be aware of. These risks can impact the success and profitability of soybean farming and trade. Understanding and effectively managing these risks are essential to attain maximum profit at the minimum cost possible.

Soybean crops are vulnerable to a range of pests and diseases. If not managed effectively, pest and disease outbreaks can result in substantial crop losses. Implementing timely and appropriate pest control strategies and utilizing disease-resistant soybean varieties are essential for risk mitigation.

Soybean prices are subject to fluctuations due to various factors. These may include variations in weather conditions, changes in supply and demand, and even speculative market behavior. These fluctuations contribute about 76.7% to the loss in revenue (Mojeed and Udegbunam, 2021), while climate variation alone contributes about a 43.3% loss in yield. (Abdulrazaq and Ohunene, 2022).

Also, managing the soybean supply chain presents its own set of challenges. Issues related to transportation, storage, and logistics can lead to postharvest losses of about 58.6% of total yield (Abdulrazaq and Ohunene, 2022), impacting both farmers and businesses. Addressing these supply chain risks is vital for ensuring the quality and availability of soybean in the market. Seed farmers should ensure they meet the breakeven point in

their production regardless of the risks encountered by not going below 2,000 kg/ha yields.

Potential investors can adopt various risk management strategies to navigate these risks and create a sustainable and successful soybean business by conducting a thorough market analysis to understand demand trends, consumer preferences, and competitive dynamics. An in-depth understanding of the market can guide investors in making well-informed decisions.

Incorporating modern farming techniques and technology, such as precision agriculture and weather forecasting, can help predict and manage climate-related risks more effectively. Also, implementing robust pest and disease control measures, including crop rotation, integrated pest management, and disease-resistant soybean varieties, can reduce the threat of pest and disease outbreaks.

To resolve the issue of supply chain management, investing in appropriate storage facilities and transportation infrastructure is essential to minimize postharvest losses. Ensuring that soybeans reach the market in optimal condition is crucial for profitability.

Above all, exploring partnerships with government agencies and nongovernmental organizations involved in agriculture and rural development, like IITA, FAO, USAID etc., can provide valuable support and resources for risk management and sustainable growth.

Summary

The community-based seed business is a profitable venture if all the recommended agronomic and economic principles are obeyed. Irrespective of the variety used, existing or

prospective CBSE must target to attain the recommended yield of 2,500 kg/ha and not go below a yield of 2,000 kg/ha. Begin business operation on one hectare with basic capital assets to minimize risk and reduce the cost of investment. Scale up after at least the first successful production cycle. Above all, efforts must be put in place to ensure the producer−customer relationship to facilitate demand for sales.

References

Adebayo, C.O., Coker, A.A., & Tsavhemba, S. (2018). Adoption of improved soybean production technologies in Benue State, Nigeria. *Nigeria Agricultural Journal, 49*, 65-70.

Abdulrazaq A.S. and Ohunene, K. (2022). Analyses of Risk Coping Strategies among Small Scale Soybean Farmers in Kaduna State, Nigeria. *African Scholar Publication.*

Food and Agriculture Organization of the United Nations. (2023). SoybeanCrop information.FAO. https://www.fao.org/land- water/databases-and-software/crop- information/soybean/en/#:~:text=Under%20rainfed%20condi tions%2C%20good%20soybean,ton%2Fha%20seed%20und er%20irrigation. Accessed (September 28, 2023)

FAO. (2019). Northeast Nigeria Rapid Gender Analysis in Livestock, Fisheries and Apiculture of Affected Population in Borno, Adamawa and Yobe states ReliefWeb.https://digitalarchive.worldfishcenter.org/handle/20.

Kamara, A. Y., Oyinbo, O., Manda, J., Kamsang, L. S., & Kamai, N. (2022). Adoption of Improved Soybean and Gender Differential Productivity and Revenue Impacts: Evidence from Nigeria. *Food and Energy Security, 11*, e385. https://doi.org/10.1002/fes3.385

Khojely D.M., Ibrahim S.E., Sapey E., Han T. (2018) History, Current Status, and Prospects of Soybean Production and Research insub-Saharan Africa. *Crop Journal 6*(3):226–235.

Mojeed, A. and Udegbunam, O. (2021). How Prices of Rice, other Cereals in Nigeria doubled in one year. www.premiumtimesng.com

Nigeria Export Promotion Council. (2020). Product Profile: Soybeans Group 2 Review. Retrieved from https://nepc.gov.ng/cms/wp-content/uploads/2020/10/Product-Profile-soyabeans-Group- 2-Review-4-22-SEpt.pdf

OmoiguiL. O., Kamara A.Y., Kamai N., Dugje I.Y., Ekeleme F., Kumar P.L., et *a*l. Guide to Soybean Production in Northern Nigeria. Revised Ed. Ibadan, Nigeria: International Institute of Tropical Agriculture; 2020. p. 1

Oyenpemi, L., Solaja, S., Fadeyi, B., Awe, T., Ayojimi, W., Etta-Oyong, S., Okonta, O. & Oriade, O. (2023). Economic performance of Smallholder Soybean Production in Kwara State, Nigeria. Open Agriculture, 8(1), 20220100.https://doi.org/10.1515/opag-2022-0100

Appendix-i

Table 4. Economics of Production

Labor cost	Unit cost (N)	Qty (ha/ L/k g)	FQ	Total cost
Land clearing	20,000	1	1	20,000
Land preparation	20,000	1	1	20,000
Planting	25,000	1	1	25,000
Weeding	40,000	1	2	80,000
Spraying (if different from weeding)	30,000	1	1	30,000
Harvesting/loading/packaging	45,000	1	1	45,000
Threshing	10,000	1	1	10,000
Drivers	10,000	1	1	10,000
Pre-emergence herbicides	2,500	4	1	14,000
Post-emergence herbicides	4,500	2	1	9,000
SSP fertilizer	22,000	4	1	88,000
Seed preparation/ sorters	1,000	25	1	25,000
Fungicide	7,000	1	1	7,000
Liquid fertilizer	8,000	2	1	16,000
Branded packaged bags (100 kg)	500	25	1	12,500
Total variable cost				**411,500**
Administrative costs	**Unit Cost**	**Qty**	**FQ**	**TC**
Documentation and advisory services	3000	1	1	3,000
NASC inspection and certification	30,000	1	2	30,000
Service providers (F/Mapping)	5,000	1	1	5,000
Extension services	10,000	1	1	10,000
Fueling/transportation	15,000	1	1	15,000
Insurance (2% of variable cost)	7,830	1	1	8,230
Water (for spraying of chemicals)	200	20	3	12,000
Phone calls	1,000	1	1	1000
Total administrative expenses				**84,230**
Total operating cost				**495,730**

Appendix - II

Explanation of the Cost and Returns Analysis Method

This section explains the cost analysis, i.e., the values of the input used in production, and the returns analysis, i.e., the yields realized in production per hectare. How they are estimated is shown in the table in Appendix II.

1. The total fixed cost (TFC) is the total cost of all physical assets like buildings, land, tractor, rent, etc. Sum up all your fixed assets to get the TFC.
2. The total variable cost (TVC): These are expenses incurred on variable inputs like labor cost, seed procurement, cost of fertilizer, seed preparation, and other operating costs. Sum all these costs to get your TVC.
3. Administrative cost (AC): These are costs incurred by the farmer to support the functioning of his farm that are not directly related to the production of soybeans. It is also known as utility cost. Add all utility costs, like the cost of maintenance or repair of the tractor, water supply, payment of security personnel, telephone communication, etc., together to get (AC).
4. Total cost (TC): this is the actual cost that must be incurred to produce your soybean yield. This can be calculated by adding Total fixed cost (TFC), Total variable cost (TVC), and Administrative cost (AC)
5. Operating cost (OC): All expenses the farmer incurs in his day- to-day farm operations during the production cycle are operating costs. Add TVC as explained in (2) and AC as explained in (3) to get OC.

6. Total revenue (TR): This is the total money the farmer generates from the sales of his soybeans. Multiply the price of 1 kg of soybean with the total yield realized on the farm (e.g., 4,500 kg/ha) to get the TR.

7. Gross profit (GP): This is the profit the farmer realizes after deducting all operating costs from his total revenue, i.e., TR−OC.

8. Profit before depreciation (PBD): This is the farmer's profit before deducting depreciation of assets, i.e., Gross profit – Administrative cost.

9. Profit before tax (PBT): This is the farmer's profit before deducting tax, i.e., Profit before depreciation – Total fixed cost.

10. Net profit (NP): This is the real or actual profit the farmer earned after deducting all operating, interest, and tax expenses during that particular production cycle, i.e., Profit before tax – Tax.

Appendix III

Table 5 – Cost and Returns Analysis Method

N	Production Cost	Formula
	Total fixed cost (TFC)	Add the cost of all fixed assets Together, e.g., Land +Tractor cost.
2	Total variable cost (TVC)	Add all the labor costs and other operating costs together.
3	Administrative cost (AC)	Sum up all costs of utilities, e.g., maintenance cost.
4	Total cost (TC)	TFC + TVC + AC
5	Operating cost (OC)	TVC + AC
6	Total revenue (TR)	Unit price of 1 kg of soybean × Total yield (750 × 2,500 kg)
7	Gross profit (GP)	TR − OC
8	Profit before depreciation (PBD)	GP − AC
9	Profit before tax (PBT)	PBD − TFC
10	Net profit (NP)	PBT − Tax

Appendix IV

Table 6. Farm Production Record Guide

1. Machinery and Equipment Record

	Date	Types of Operation	Machinery or Equip-ment Used	Total Area Covered	Cost of Services
1.	25/06/2023	Planting	Tractor	1 hectare	#40,000
2.	20/09/2023	Harvesting	Harvester	1 hectare	#20,000

2. Labor Record

Date	No. of hired labor	No. of family labor	Total No. of labor used	Wage rate	Total cost of hired labor
25/06/2023	3	1	4	#5000 / person	#20,000
28/06/2023	O	2	2	#5000/ person	#10,000
					#30,000

3. Labor Record

S/N	Date	Quan-tity sold	Price per Unit	Total Sales (Quan-tity sold × Price per unit)	Quantity given out as a gift
1.	20/09/2023	10 kg	#750	#7,500	1 kg
2.	21/09/2023	30 kg		#22,500	0

Title:	**Investment Guide For Community-Based Seed Producers**
Filename:	**Soybean Production**
Date created:	**27/10/2023**

Legend

Name	Colour code	Explanations
Calculations		DO NOT CHANGE
Hardcoded assumptions		Can change
To be revalidated		Can change

Sheet	Explanation
Index	*Table of contents and legend*
Assumptions	*Key input assumptions*
Cost projections	*Details of costs elements*
Financial Summary	*Summary of key financial items*

Key	
Estimated Areas (No need to touch)	
Input Areas (Areas to update)	
Estimated cells (no need to touch)	

	Basic Information	**Response**
A)	Crop Name	Soybean
	Production Cycle (Months)	4
	Number of Cycle in a Year	1
	Number of Varieties Grown	1
	Names of the Commonly Grown Variety	TDX 1951-3F
	Differences in Varietal Yield (Yes/No)	Yes
	Name of the Variety Used for the Investment Model	TDX 1951-3F

	GENERAL ASSUMPTIONS	Values
B)	**Plot Information**	
	Land Length (meter)	*100*
	Land Breath (meter)	*100*
	Inter-row Spacing (meter)	*0.75*
	Intra-row Spacing (meter)	*0.1*
	Number of Stands Per Hole	*3*
	Average Weight Per Bag	*100*
	Bags of Soybean Seed Per (Kg/Ha)	*25*
	Land Area (meter square)	*10,000*
	Required Planting Space (Area Per Stand)	*0.08*
	Average Seed Hole Per Land Aread	*133,333*
	Average Number of Soybeans Stands Per Land Area	*400,000.00*

C)	FIXED ASSET (Shared Cost)	Unit Cost	Quantity	Total Cost
	Land (The land was rented on a yearly basis)	20,000	1	20,000
	Tractor (rented per year)	20,000	1	20,000
	Building/Store House (Rent)	70,000	1	70,000
	Vehicle (Hire during Harvesting)	25,000	1	25,000
	Motorised Sprayer	0	0	-
	Knapsack Sprayer (Purchased)	15,000	2	30,000
	Total	150,000		***165,000***

D)	Labour Cost Per Production Per Hecatare Per Cycle	Unit Cost	Quantity	Frequency	Total Cost
	Land Clearing	20,000	1	1	20000
	Land Preparation (Tilling/Ploughing, Harrowing, etc. Raining season)	20,000	1	1	20000
	Planting	25,000	1	1	25,000
	Weeding	40,000	1	2	80,000
	Spraying (if different from weeding)	30,000	1	1	30,000
	Harvesting / Loading/ Packaging	45,000	1	1	45,000
	Threshing	10,000	1	1	10,000
	Drivers (Included in harvesting and loading cost)	10,000	1	1	10,000
	Total				**240,000**

E)	**Procurement of Foundation seeds**	1,000	50	1	50,000

F)	Other Operating Costs	Unit Cost	Quantity	Frequency	Total Cost
	Pre-emergence Herbicide	3,500	4	1	14,000
	Post-emergence Herbicide	4,500	2	1	9,000
	SSP Fertilizer	22,000	4	1	88,000
	Seed Preparation / Sorters #1000/bag	1,000	25	1	25,000
	Fungicide	7,000	1	1	7,000
	Liquid Fertilizer	8,000	2	1	16,000
	Branded Packaged Bags (100kg only)	500	25	1	12,500
	Total				**171,500**

G)	Utilities (Per Hectare Per Cycle)	Unit Cost	Quantity	Frequency	Total Cost
	Documentation and Advisory services	3000	1	1	3000
	NASC Inspection and Certification	30,000	1	1	30000
	Service providers (F/Mapping)	5,000	1	1	5000
	Extension Services	10,000	1	1	10000
	Fueling / Transportation	15,000	1	1	15000
	Insurance (2% of Variable Cost)	8,230	1	1	8230
	Water Supply (For spraying of chemicals)	200	20	3	12000
	Phone Calls	1,000	1	1	1000
	Total				**84,230**

			Expected Yield
H)	**Market Information (average price/bag = N50,000)**	**Unit Price/ bag**	**TDX 1951-3F**
	Price of Certified Seeds (100 kg bag) only	50,000	25
	Price of Certified Seeds (1 kg bag) = **N**1000		
	Total Sales		1,250,000
I)	**Tax Information #200/ bag**	200	5000

Cost Project	Per Production Cycle
Fixed Costs	
Land (The land was rented on a yearly basis)	20,000
Tractor (rented per year)	20,000
Building/Store House (Rent)	70,000
Vehicle (Hire during Harvesting)	25,000
Knapsack Sprayer (Purchased)	30,000
Total	**165,000**
Variable Cost	
Labour Cost Per Production Per Hecatare Per Cycle	240,000
Other Operating Costs	171,500
Total Variable Cost	**411,500**
Procurement of Foundation seeds	**50,000**
Administrative Costs	
Utilities (Per Hectare Per Cycle)	**84,230**
Total Operating Cost	**495,730**
Total Cost	**710,730**

FINANACIAL SUMMARY	Production Performance
Description	TDX 1951-3F
Average Yield Per Hectare(100Kg bags)	25
Operating Costs	411,500
Total Revenue	1,250,000
Procurement of Foundation Seeds	50,000
Gross profit	838,500
Admin Expenses	84,230
Profit Before Depreciation	754,270
Shared Cost of Fixed Asset	165,000
Profit Before Tax	589,270
Tax (zero for start up businesses)	5,000
Net Profit from Production	584,270

Who we are

IITA is the lead research partner facilitating agricultural solutions for hunger and poverty in the tropics. It is a member of the CGIAR Consortium, a global research partnership that unites organizations engaged in research for sustainable development for a food-secure future.