



BUILDING A SUSTAINABLE & INCLUSIVE
HORTICULTURE SECTOR

B2B DIGITAL PLATFORM

FOR STRENGTHENING THE
NIGERIAN HORTICULTURAL
SECTOR.

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Photo credit: Richard Satii

LIST OF ACRONYMS

ABCs	Agribusiness Clusters
AMIS	Agricultural Market Information System
AMITSA	Agricultural Input Market Information and Transparency System
B2B	Business – To – Business
BCs	Business Champions
EWS	East West Seed
GPS	Global Positioning System
ICT	Information Communication Technology
IFDC	International Fertilizer Development Center
LL	Lima Links
MIS	Market Information System
MSMEs	Micro and Medium Scale Enterprises
NLT	Nokia Life Tool
POS	Point of Sales
RATIN	The Regional Agricultural Trade Intelligence Network
SMS	Short Message Service
SoHo	Small Office/Home Office
SQL	Structured Query Language
UMP	Unified Market Platform.
ZNFU	The Zambia National Farmers Union Market Information System

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INTRODUCTION



Photo Credit: Berekiah Tarfa

PROBLEM STATEMENT AND BACKGROUND

The HortiNigeria program aims to facilitate the development of a sustainable and inclusive horticulture sector in Nigeria, contributing to food and nutrition security. The intervention locations of the program are in Kaduna and Kano states in the North, and in Ogun and Oyo states in the South. HortiNigeria has four project components including: (1) Increasing productivity and income of smallholder vegetable farmers in Kaduna and Kano states; (2) Piloting production system innovation and regional diversification with entrepreneurial farmers in Ogun and Oyo states; (3) Component 3: Increasing access to finance for micro, small, and medium enterprises (MSMEs), and; (4) Enhancing sector coordination and business-to-business (B2B) linkages.

Within the component 4, the B2B activity aims to promote trade and other economic interactions within value chain systems of the horticulture sector in Nigeria: strengthen B2B linkages and partnerships among smallholder farmers, aggregators, off-takers, large processors, large buyers, as well as input and technology providers. Since the start of the project, the B2B team has identified 134 B2B opportunities and brokered 74 B2B linkages/partnerships (December 2023). In addition, B2B team monitors the needs of the targeted B2B value chain actors the project.

The inefficiencies of agricultural markets as a result of the lack of market information pose significant challenges for smallholder producers to participate in them effectively. This is the case for the Nigerian markets of perishable goods, such as Horticulture and vegetable products, which are failing to provide the conditions required for economic efficiency. Several studies discuss the importance of business information platforms in the Nigerian contexts whose aim is to address -among others- information asymmetries across market actors[1]. Several platform initiatives already exist in practice in which market information is exchanged via specially designed Apps, websites and WhatsApp groups. However, stakeholders operating in the Nigerian Horticulture sector find that these initiatives are only at the beginning of their development and often not tailored to the horticulture context in Nigeria.

Objective and Target Audience

This knowledge product aims to take stock of the key insights of the HortiNigeria program and propose terms for the design of a B2B digital platform for the Nigerian Horticultural sector. The underlying idea is to demonstrate the potential opportunity for private sector actors, practitioners (including state governments and other public bodies) for collective action, including resource pooling.

In particular, this document aims to provide guidance to stakeholders involved in different capacities in the horticulture sector of Nigeria; producers, aggregators, traders as well as state government policy makers by: (1) highlighting critical issues surrounding the sector, in particular for what concerns market information asymmetries; (2) discussing critical business and market information needs for enabling the B2B linkages and partnerships, and; (3) proposing key features of a functional B2B platform in the context of the Nigerian Horticultural sector.

The key results highlighted in this report come from a desk study and a series of interviews performed between January and March 2023 with Agri Business Cluster (ABC) coaches in the North and entrepreneurial farmers in the South, also referred to as business champions (BCs).[1]

This report is structured in the following way. First it highlights the specific challenges connected with business and market information needs in Nigeria. It highlights key results from a desk study and primary data. The second chapter reviews existing platforms currently operating in several African countries outlining their key functionalities. Ultimately this knowledge product offers practical considerations of setting up such B2B platform in the context of the Nigerian Horticultural sector.

[1] Olukunle (2013); Olomu (2020)

[1] The interview reports are available upon request.

THE ISSUE OF MARKET INFORMATION IN NIGERIA

The issue of limited access to market information is flagged in literature. These platforms, often referred to as Market Information System or Service (MIS) or Agricultural Market Information Systems (AMIS). These are described as a set of integrated and coordinated processes and tools to collect and deliver agricultural market information and services to farmers, traders, food processors, government functionaries and others that may benefit from current market data[1]. Market information can play an extremely important role in promoting agricultural development, especially among small-scale producers. Sound market information can help to enhance transparency, competitiveness and the more equitable sharing of benefits among key players in the marketing system. An effective AMIS can increase competitiveness, reduce information asymmetries and improve market efficiency. Business and market information platforms thus intend to correct market and information asymmetries, strengthen bargaining power to farmers, create a transparent open trading environment, business linkages and foster an efficient market systems. The rationale is to provide access to more transparent price information mechanisms, accurate, (near) real-time information on prices to help them make optimal marketing decision. In addition to price information, Pingali[2] observe emerging trading platforms to address the issue of farmers which often cannot find traders, and traders often cannot find farmers with the right good of the right quality and quantity. In this sense, these platform promote vertical coordination, modes of exchange in which producers and buyers bypass existing marketing channels to assure the supply of quality agricultural goods, in demanded quality at a stipulated time[3].

Lastly, marketing information is often integrated with other mobile agriculture information tools and carry additional information, including agricultural extension advice, weather forecasts and prices for agriculture related inputs, such as seeds, fertilizer or pesticides.

Several studies discuss the importance of business information platforms in the Nigerian contexts. Studies of Olukunle and Olomu[1] argue the inefficiencies of agricultural markets as a result of the lack of market information pose significant challenges for the smallholder producers to participate in them effectively. This is the case for the Nigerian markets of perishable goods, such as Horticulture and vegetable products, which are failing to provide the conditions required for economic efficiency. Neza[2] address the market failures in the Nigerian horticultural sector manifesting in the form of challenges including a misalignment in the supply of and demand for the horticultural goods produced by smallholder farmers, and smallholder farmers are often at a price disadvantage when it comes to knowledge of prices of their commodities. Many farmers in Nigeria are unable to find buyers willing to purchase their outputs at profitable prices. Smallholders with limited marketable surplus may not sell directly in the markets owing to geographical constraints, distance to market and poor connectivity. In such situations, they sell their produce to traders at the farm gate although the price realized at the farm level is the lowest competitive price. Meanwhile, buyers and traders have demand for agricultural goods but face high costs in finding farmers who can consistently supply goods with certified quality.



[1] Sopov, (2018)

[2] Pingali et al., (2019)

[3] Pingali et al.,(2019); Buvik & John, (2000)

[1] Olukunle (2013); Olomu (2020)

[2] Neza et al. (2022)

NEEDS FROM THE NIGERIAN HORTICULTURE SECTOR: RESULTS FROM THE INTERVIEW WITH ABC COACHES

Referring to the studies of Olukunle, Olomu and Neza[1] the B2B team conducted the interviews with the ABC coaches in the North (Kaduna & Kano) and entrepreneurial farmers in the South (Oyo & Ogun) with the aim to identify the specific business and market information needs for enabling the B2B linkages and partnerships activity in the HortiNigeria project.

Needs in Kano and Kaduna (North)

In Kano and Kaduna, the HortiNigeria coaches set up agribusiness clusters (ABCs), which is a local network centered on one (or more) formal or informal group(s) of smallholder farmers producing the same agricultural commodity, which is then connected to other nearby interrelated stakeholders, such as agro-input retailers, local branches of financial institutions, local aggregators and traders, transporters, and extension officers. The ABC helps to increase the productivity of a variety of vegetables (via seeds of different seed companies including EWS)[1] in an environmentally sustainable way and raise the incomes for smallholder vegetable farmers.

At the start of the project, ABC coaches organized groups of farmers, marketers, offtakers, transporters with a view to establish a functional cluster. Several farmers formalized the ABCs into cooperative societies. The underlying idea is that ABCs supply in bulk (easier and cheaper to engage a transporter), which strengthens their negotiate position with offtakers. Also allows them have market information to decide where and who they trade with depending on the negotiations.

Regarding the need for business and marketing information, the interviews revealed that production planning is a point of attention. In the rain-fed cultivation in Kano and Kaduna, the harvest season of tomatoes for instance is within a short time span late July to September; while during the dry season harvests starts from November to March. All products are supplied at the market at the same time, resulting in market gluts and low prices especially from January to March. The higher production volumes and higher quality, as a result of the new/hybrid varieties, cannot be sold at local markets.

In other words, market offtakers tend to outsmart farmers not to offer premium prices for vegetables from quality seeds. However, the same actors tend to grade such vegetables and target premium customers/markets for higher profits. The coach flagged the lack of information about production planning of others and the unawareness of farmers of what other farmers are producing and when.

The large production volume in the North does not necessarily have to be a problem, as there is market demand both in some locations within the North and particularly in the South (Lagos, Benin, Port Harcourt), in particular for new variety tomatoes. ABC coaches mentioned in the interviews that finding each other, trust and coordination between the producers and the market actors is problematic. There are fixed marketing channels, but developing new channels and network would benefit a lot from B2B platform. The use of technology for the B2B platform will offer a wider spectrum of choice for market linkages. Marketing information such as producers and contact details (of ABC, offtakers and marketers), types of produce available, required demand volumes, timing for such market demands and price would enable the ABC to seize more market opportunities in the South.

Regarding the practical transport challenges, ABC coaches reported that the costs of transportation are high and difficult to arrange especially now with the removal of fuel subsidies, multiple taxations as vegetable products are been transported along the highways and the redesign of the naira; which affects availability of liquid cash to farmers within rural locations that needs physical cash for trading. There are few cooling system in trucks and availability of cold chains to support the timely transportation of these vegetables from the farm gate to markets. There are a lot of post-harvest losses. In order to coordinate bulk transport better, farmers need to find each other, team up and engage trusted transporter. In addition, information about ways to transport better to keep quality. The introduced plastic crates (replacing raffia baskets) reduced the spoilage. This is offered by another service provider; the National Plastic crates association) as a hiring business.

[1] Olukunle (2013); Olomu (2020)

[2] Neza et al. (2022)

[1] EKN encourages HortiNigeria to open up market opportunities open for all partners.

In summary, the needs of ABCs for a B2B platform could be summarized as follows:

- 1 Production planning information to avoid market gluts and low prices.**
- 2 Information about supply and demand outside the local market context.**
- 3 Information about other farmers to coordinate transport to distant markets.**
- 4 Contact with transport equipment to reduce damaged produce.**
- 5 Contact with potential market offtakers of the different vegetables and markets**

Needs in Oyo and Ogun (South)

In Oyo and Ogun, the HortiNigeria program aims to increase overall production volumes and incomes of farmers by piloting innovative production systems on horticulture. HortiNigeria focuses on the so-called business champions (BCs) who are entrepreneurial and innovative farmers. The B2B interviews revealed that BCs often have enjoyed higher education. They see good opportunities in horticulture farming and consider it as a business. BCs are innovative and develop new technological initiatives (including greenhouses cultivation systems and irrigation) aiming for high-quality premium products. Key difference of the South and the North in Nigeria, is the difference in ecology and weather patterns which is a factor in the choice of innovation for the production of vegetables. It is more of a rainforest vegetation with significant rainfall in the south as compared to a Savannah in the North with average rainfall pattern. Most BCs are engaged in multiple value chain activities including regular production of vegetables, aggregation, marketing and selling on behalf of other farmers. BCs work closely with existing networks of smaller and more traditional farmers. Many of BCs have experience in logistics and own trucks to transport the produce to offtakers and markets. BCs are also engaged in input supply and training for the smaller farmers and develop innovative production techniques for them.

Regarding B2B interactions, most BCs have established marketing linkages both at informal open markets and to formal buyers (supermarkets, restaurants, hotels). Some BCs have set up web shops and sell online. Quality of vegetables produced are of high quality because of the profile of their customers.

Although 'informal' often understood as something undesirable, BCs (South) supply to different open markets locally and in Lagos. The advantage of the informal B2B linkages at the many open markets in large cities in the South is the possibility to sell large quantities fast and because of the limited availability of the vegetables due to high demand. It is an informal arrangement and personal contacts with the middlemen at the market are key. BCs have established a network of agents, sales representatives, middlemen at open markets. The informal dynamics provides also stability and predictability in a way because of the steady contacts with agents and direct payments. However, it is a challenge to keep overview and know the demand and day prices at the many markets at various locations in the cities. The BC expressed during the interviews that up-to-date and accurate marketing information about prices and demand at the different locations would help them in their marketing efforts and taking prompt business decisions.

The formal B2B partnerships in the South mostly concern sales to supermarkets, restaurants and hotels involving written contracts and MoUs with the specifications of the type of vegetables and quality. The sales volumes of high-quality produce are typically small or average quantities and prices are relatively constant, while the payment can take long (up to one month). BCs are looking for more opportunities to conclude formal stable contracts. They expressed interest in information and B2B support to identify, contact and discuss with supermarkets, restaurant and hotels.

Similar to the North, BCs reported that the horticulture production is not well coordinated in the South. There is no central information available what is being produced and when. Often many farmers are producing the same vegetable at the same time.

[1] Olukunle (2013); Olomu (2020)

[2] Neza et al. (2022)

[1] EKN encourages HortiNigeria to open up market opportunities open for all partners.

During harvest times, there is abundance and gluts in the market and prices are crashing (“Producers rush blindly into the market, based on hearsay assumptions. Producers are too much guessing what the market wants”). One option is to go for the off-season production, possible because of the irrigation systems that many BCs have. If there is more information what others are producing and what the markets want, then production become less a ‘gamble’. The need for individuals who coordinate the production and offtake efficiently also create job opportunities for the youths if innovative ways using smart phones can be created as a form of B2B efforts to search for premium markets.

Another challenge expressed by the BCs during the B2B interviews is the provision of inputs. Several advanced inputs needed by BCs are not available in Nigeria because of strict government regulations owing to the importation of soluble and certain classes of fertilizers. Instead, input suppliers are trying to push farmers to buy low-quality input. Input suppliers do not have good knowledge what they sell. There are no labels on the input and sometimes it concerns fake or adulterated products. There is a need to have reliable information about input; where input can be obtained, the prices, quality and availability. Also the possibility to explore the use of Cabi app (an app with origin from Dutch that has regulatory oversight of inputs especially pesticides that can provide oversight function to government authorities on inputs traded across 33 countries).

Many BCs are also developing innovative production techniques and systems. They are looking for ways and channels to marketing these technologies and systems. BCs are after producing high-quality produce for the high-end market. This could include organic production as well as production for the export market. This requires standards and certification. BCs expressed the need for a central source of information about standards and certifications. More specifically, details about the standards and certifications, how to meet and obtain them.



[1] Olukunle (2013); Olomu (2020)

[2] Neza et al. (2022)

[1] EKN encourages HortiNigeria to open up market opportunities open for all partners.

ANALYSIS OF EXISTING B2B PLATFORMS

B2B Platforms in Africa

The evolution of digital B2B platforms has transformed the way businesses operate. Digital platforms have become popular and common in Business-to-Business (B2B) markets in western economies. The existing current digital B2B platforms connect potential buyers and sellers, allows them to negotiate, and facilitates the final transactions[1]. The African market offers enormous opportunities for business digitization and a shift from the traditional business that has a physical store or stores where customers browse and make purchases in person. Despite an increase in the number of start-ups taking advantage of the digital space to launch new businesses, Adeola[2] argue that the African market is still underserved. The importance of digital tools and platforms is improving service delivery and positioning service offerings beyond geographical limitations. By identifying the value of digital tools and platforms, the digitalizing businesses in Africa should not merely follow global trends but understand the unique needs of the African market, correctly identify the target audience, and adopt optimal technology to deliver the service.

Nowadays many types B2B platforms operating in the African agriculture landscape exist, some of which are specifically designed for AIMS and others which serve as general purpose platforms[3]. This chapter reviews existing horticulture B2B platforms in Africa addressing demand and supply, input provision and transport to name but a few. Among the many initiatives, we focus on twelve platforms for their distinctive features and functionalities (Annex 1: Comparison table of services offered by existing B2B platforms).

Examples Platforms

Agricultural Input Market Information and Transparency System (AMITSA)

AMITSA is a multi-country, web- and mobile-based market information system on agro-inputs for eastern and southern Africa. For instance, the AMITSA network, which focuses on providing agriculture input market information, utilizes a software platform named mFarms by Image-AD (distinct from Kenya's MFarm). This platform is employed for price collection, dissemination, and profile management for agro-dealers throughout the region. Specifically, AMITSA utilizes the Market Information Platform for Agrodealers (MIPAD) module within mFarms.

Some AMIS are the result of intricate integrations of diverse systems. Apart from relying on the mFarms platform, AMITSA utilizes the KENTICO content management system to oversee its website, incorporating information from mFarms, publications, catalogues, directories, news, events, blogs, and other sources. Additionally, AMITSA employs Microsoft Reporting Services to manage agro-input statistics on the same website and leverages Facebook and Twitter as supplementary channels to engage its audience.

AMITSA provides data on farm inputs such as fertilizer, pesticides, and seeds specifically for the Eastern and Southern Africa region, rather than focusing solely on agricultural products or livestock. The price data are sourced directly from a network of voluntary private agro-dealers, complemented by information from public and private sources accessible at no cost.

More information:
<https://ifdc.org/2011/07/29/farmers-can-now-access-info-on-web-cell-phones/>



Infotrade

Infotrade is a platform built to integrate collection, analysis and dissemination of agricultural and other market information in Uganda. Infotrade Uganda is under provide comprehensive and disaggregated information for proper agricultural risk management in areas of commodity prices and trade of FIT Uganda LTD that was registered in July 2008

More information:
<https://app.infotradeconnect.com/>



Lima Links (LL)

Lima Links is a Zambian Social Enterprise which connect farmers to the wider agricultural market place via technology platforms. Lima Links focus is on building ICT tools to drive agri-business growth through an Agriculture Platform provides farmers with access to live market prices, a range of agricultural products, suppliers and retail prices, and connects farmers to buyers.

More information: <http://www.limalinkszambia.com/>



Photo Credit: Lima Links

[1] Shree et al., (2021)
[2] Adeola et al., (2022)
[3] USAID, (2013)



Esoko is a market information and exchange platform that allows users to distribute or collect market information over their mobile phones. With up-to-date market information, businesses and individuals can access prices, browse offers to buy or sell, or advertise their own products and services. Once subscribed to the service, Esoko regularly sends text alerts to farmers containing the prices of the specified crops in the designated markets, typically on a monthly basis.

More information: <https://esoko.com/>

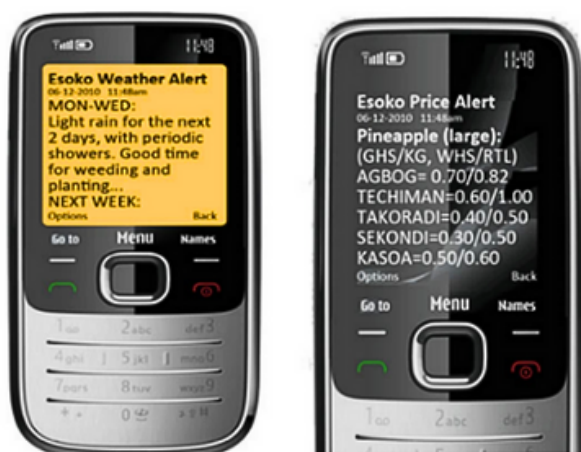


Figure 1: Esoko Price alert.



MFarm Ltd is a software solution and agribusiness company. They collect and share information pertaining to the retail price of agricultural products, farm inputs and connecting farmers to potential buyers.

More information: <https://www.wired.co.uk/article/mfarm>



Nokia Life Tools, is an SMS based, subscription information service designed to collect and disseminate accurate and regular information on weather, prices and availability of seeds, fertilisers, pesticides, and prevailing market prices for the produce are sent to the farmer.

More information: <https://www.tekedia.com/nokia-unveils-nokia-life-tools-in-nigeria/>



The Regional Agricultural Trade Intelligence Network (RATIN)

The Regional Agricultural Trade Intelligence Network (RATIN) is a Market Information System which provides grain market intelligence to both public and private stakeholders for informed policy and trade decision making.

More information: <https://eagc.org/ratin/>



The Zambia National Farmers Union Market Information System

The Zambia National Farmers Union Market Information System, or 'ZNFU 4455', was designed of a market information system that would enable their smallholder membership to find the actual prices available in the market. The ZNFU model, operated by a farmer cooperative encompassing both small and large-scale farmers, companies, and agribusinesses, effectively subsidizes smallholders. Affiliated with international agricultural associations, ZNFU has the potential to aggregate demand across the region.

More information: <https://www.jstor.org/stable/23048600>



Photo Credit: ZNFUMIS



Twiga Foods

Twiga Foods is a business-to-business marketplace platform that sources produce directly from farmers and delivers it to urban retailers. Twiga operates primarily as a digital food distribution and logistics platform, creating shared value for local businesses and smallholder farmers. Functioning as a B2B business, Twiga generates commission fees on trade volumes from the businesses it collaborates with. Twiga operates primarily as a digital food distribution and logistics platform, creating shared value for local businesses and smallholder farmers. Functioning as a B2B business, Twiga generates commission fees on trade volumes from the businesses it collaborates with.

The platform provides trade support by M-Farm Twiga Foods in Kenya[1] and Agro-Hub in Cameroon[2]. Twiga Foods facilitates the process through their Twiga Agent App, a mobile Android application by which Twiga to simplify the process of supplying produce to market, be it fresh fruits and vegetables or fast moving consumer goods such as flour.

More information: <https://twiga.com/newsroom>

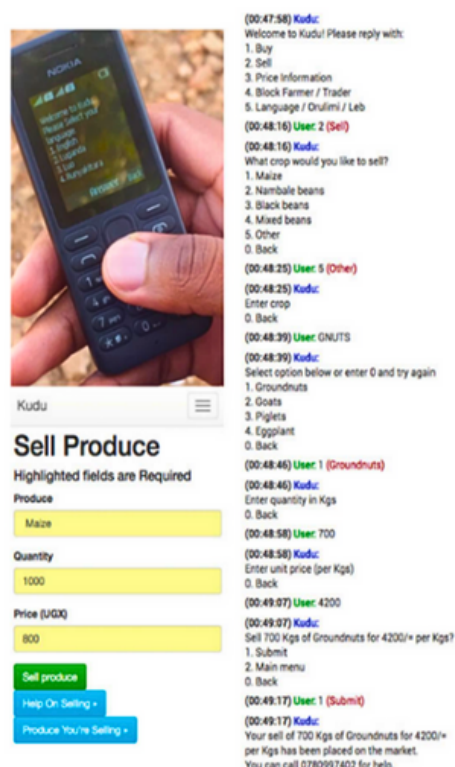
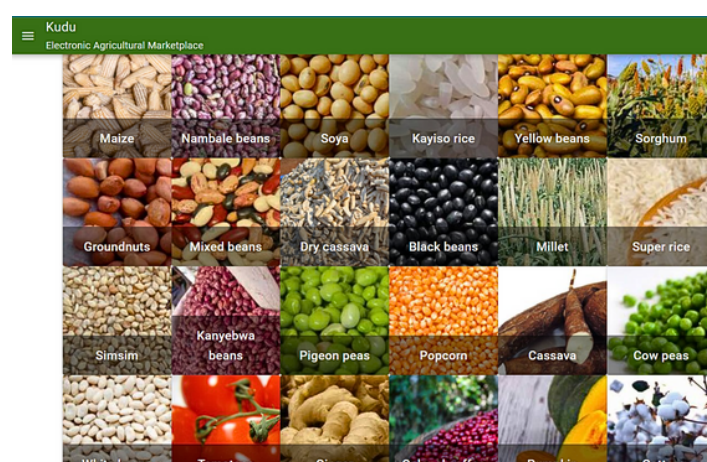


Figure 2: Twiga bidding system.

Kudu

Kudu is an electronic market platform for agricultural trade in Uganda. In this model, the farmers place their requests to either buy or sell goods in a centralized national database; then, the app processes to identify profitable traders, and the two sides are informed about it. Rather than allowing the buyers and sellers to browse through a list of potential trading partners, Kudu's matching algorithm connects bids based on maximizing the gains from trade that the platform can offer. More information: <https://kudu.ug/>



Tulaa

Tulaa, Esoko's new mobile commerce business, enables farmers to access inputs, finance, information and markets in a virtual marketplace. Incubated inside of Esoko and launched in Ghana in 2016, the solution uses mobile technology and mobile money to enable farmers to save and borrow to purchase inputs, receive tailored agronomic advice, and market their crops at harvest time. Tulaa's business model incorporates three revenue streams: a margin on inputs sold, a margin on credit (including a ~2.5% monthly interest rate), and a margin on off-take transactions (the sale of produce). Tulaa relies on grant funding. In 2022, Tulaa secured approximately \$900,000 in equity, \$600,000 in debt, and around \$750,000 in grant funding.

More information: <https://digestafrica.com/companies/tulaa>

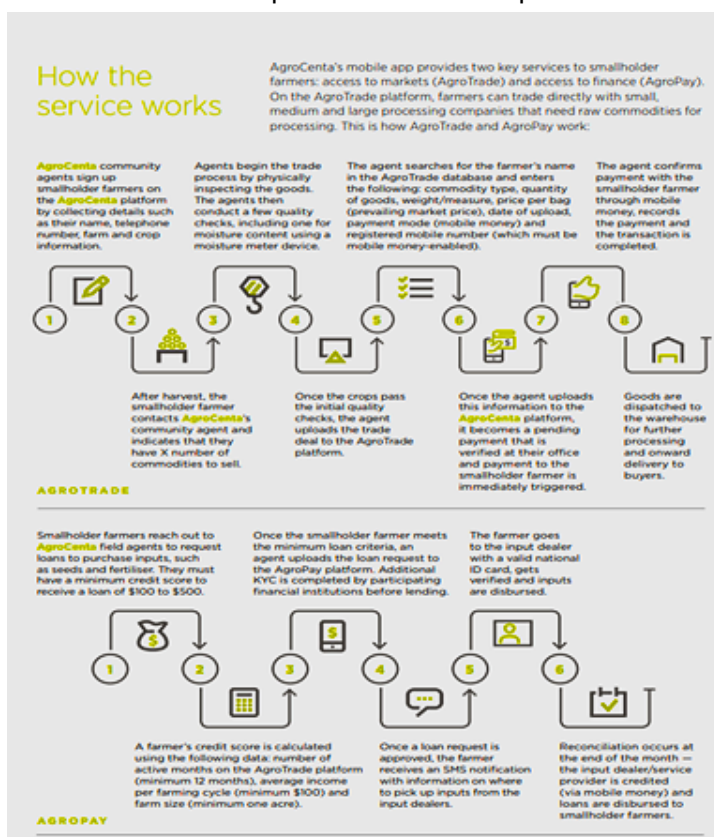


AgroCenta is a technology-driven agricultural platform provider in Ghana. Founded in 2016, AgroCenta operates two integrated digital platforms in Ghana, CropChain and LendIt, to help address challenges related to smallholder farmers' access to markets and financial services. These challenges, notably poor infrastructure and logistics and insufficient access to information on fair market prices, prevent many smallholder farmers in Ghana from accessing large, urban markets where they could obtain better prices for their crops

As part of this strengthened partnership, Vodafone Ghana collaborates with the AgroCenta team to onboard farmers onto its Small Office / Home Office (SoHo) packages.

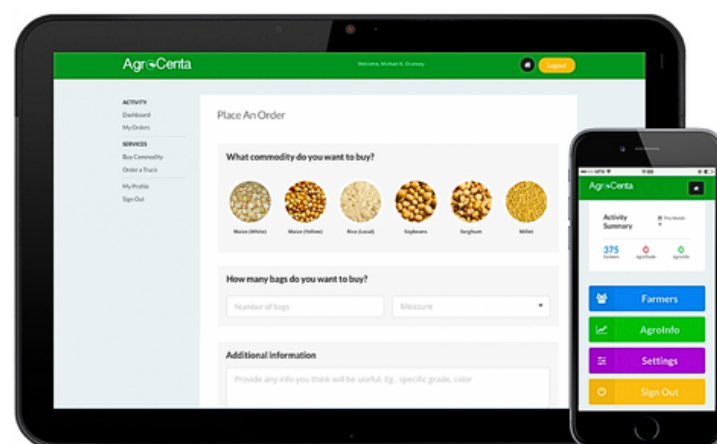
In return, Vodafone Ghana compensates AgroCenta with monthly commissions based on farmers' utilization of the SoHo services. Furthermore, Vodafone Ghana extends comprehensive support and training to farmers, enhancing the overall sustainability and effectiveness of AgroCenta's operations.

More information: <https://agrocenta.com/>



The AgroCenta solution being put to use in Ghana.

Source: <https://lhoft.com/financial-inclusion/fintech-for-all-agrocenta-founder-on-market-access-for-independent-farmers-in-ghana/>



The AgroCenta software.

AgroCenta has innovatively addressed the challenge of costs of messaging by establishing a mobile money API integration partnership with MTN and Vodafone through its AgroPay platform. This strategic move enables AgroCenta to directly and seamlessly pay smallholder farmers via mobile money. Both mobile operators, MTN and Vodafone, are actively involved in supporting AgroCenta farmers by providing financial literacy training on the ground. Expanding its collaboration with Vodafone Ghana, AgroCenta facilitates smallholder farmers on its platform to access free voice calls between farmers, along with discounted mobile devices and bundles.

B2B PLATFORM DESIGN TO IMPROVE THE NIGERIAN HORTICULTURE SECTOR

The B2B interviews insights presented in chapter 2 suggest various types of information that should be included in the design of a B2B information platform in the context of HortiNigeria project for the market offtake of vegetable products. The insights show that a broad group of HortiNigeria actors along the horticulture supply chain could be included as target groups and largely benefit from such intervention, such as farmers, traders and processors, input suppliers, other service providers such as banks, microfinance organizations, technology developers and warehousing companies. In addition, a B2B platform could be useful for researchers and government departments supporting evidence-informed policy making.

The ABC coaches, BCs and other HortiNigeria project stakeholders agree that a plan systematically structuring a tailored design for a B2B platform, responding to the producers' needs, would be an important way to facilitate and booker B2B linkages and partnerships.

Currently HortiNigeria program promotes sharing of weekly price information known as Hortiprice Index. Regular price updates of the horticulture produce at open markets at different locations are posted on the HortiNigeria Facebook page (further discussed in section 3.1). While the initiative is well appreciated by stakeholders, it is worth to investigate other features that could support actors operating in the Nigerian horticultural landscape.

In this chapter, we propose functionalities as well as practical considerations of such platform, enabling the further expansion of the B2B linkages and partnerships within the horticulture value chains in Nigeria

Scope of Functionalities Production Forecast

An important function of a horticulture B2B platform could be the provision of production forecast information for different types of produce in certain areas. This includes crop types, area planted, stocks, yield levels and crop calendars.



HortiPrice Index

Collecting production data at a larger scale is not new. National bureaus of agricultural statistics collect data on farm production for instance. The inter-agency platform called 'Agricultural Market Information System (AMIS)' assesses global food supplies (focusing on wheat, maize, rice and soybeans) and provides a platform to coordinate policy action in times of market uncertainty.

The idea of providing production forecast on horticulture B2B platform is that farmers could avoid the situation of large volumes of produce sold at the same time, implying market gluts and low prices. The platform could provide data about who is producing what (crops) in a certain geographical areas, and the anticipated harvest times.

Data sources for this function vary, including farmers uploading their production data, or filling out planting calendar. Drone technology can survey fields and estimate production yields. The sales of seeds could be used as an indicators (data obtained from agrodealers.).

Prices

Providing price information about prices on B2B Platform will reduce information asymmetries. Farmers' uncertainty about market prices is usually high. Traders and buyers may take advantage of farmers' ignorance of the market price and extract profit from them by offering very low prices for their products. The availability of price information will strengthen the bargaining power of farmers, as confirmed by Courtois & Subervie [1]. Today, access to up-to-date information on market prices and quality requirements remains a key issue for smallholder farmers' access to high income markets[2]. Market price could be communicated via alerts through mobile phones, via Facebook pages. Farmers could for instance subscribe for such service by receiving prices for the certain crops that matter to them.

Various types of price data may be distinguished for a B2B platform relevant for the Nigerian context including: farm-gate prices; aggregation prices at the local sites where the horticulture produce from different farmers and small-scale traders are accumulated; wholesale prices (traders or market agents) use. Retail prices at open markets where horticulture produce is sold mainly to consumers. Retail prices are only useful to farmers when they can access retail markets to make direct sales to consumers. (Currently, HortiNigeria program promotes sharing of weekly price information known as Hortiprice Index. These are share on may social media handles and some significant responses and interactions are currently been monitored)

Collecting farm-gate prices will be expensive and impractical. Aggregation prices also may involve considerable collection costs. Offtakers and marketers could be involved who provide the information in return for a little fee. The wholesalers prices are often easiest to collect data at these markets. Open market prices data could be collected by involving market surveyors visiting local, regional, and national markets. It is generally insufficient to supply farmers with market information alone.

Farmers may require assistance in interpreting the meaning of prices for their own situations. Farmers require assistance with interpreting this information and provides training for extension workers to supply such advice. The areas identified for support include helping farmers to understand why prices change, such as by developing an understanding of supply and demand[1].

The formal B2B partnerships in the South for the market offtake of vegetable products mostly concern sales to supermarkets, restaurants and hotels involving written contracts and MoUs. The sales volumes of high-quality produce are typically small and prices are relatively constant, while the payment can take long (up to one month). BCs are looking for more opportunities to conclude formal stable contracts. They expressed interest in information and B2B support to identify, contact and discuss with supermarkets, restaurant and hotels.

Supplier Finding Buyers (Demand) and Vice Versa

The function of suppliers finding buyers and vice versa is suggested for the platform. At the supplying side, farmers and cooperatives can present themselves, and post details about the production and harvest details, as well as an prices. Via the B2B platform, smallholder farmers can meet each other and team up to supply horticulture produce in bulk. Connecting suppliers directly with buyers helps farmers access broader markets, reducing dependency on middlemen.

At the buying side, marketers of open markets as well as supermarkets (restaurants, hotels) and processing companies can post their demand opportunities. The sales volumes of high-quality produce are typically small and prices are relatively constant. They can indicate the present or future demand in terms of types of products, volumes, delivery details and quality standard or certification requirements.

A B2B platform could thus enable horticulture producers are looking for more niche market. Via the B2B platform, they can identify, contact, discuss, and negotiate with supermarkets, restaurant and hotels etc. The contact details can be disclosed. Suppliers and buyers can contact each other via a chat function or exchange e-mail of phone, to follow up and discuss possible business linkage or partnership.

[1] Courtois & Subervie (2015).

[2] Arinloye et al., (2016)

[3]FAO, (2017)

Closing a Deal (Virtual Market Place)

Actual match-making could be a function in the B2B platform. A virtual market where supplying farmers and buyers can trade their agricultural goods. A bidding system should be employed by the platform, which contains the produce the buyer wants, or the supplier offers. This bid includes a price range, required volume, quality requirements and the delivery date. This bid is then made visible to both buyers and suppliers. The bidding information and process could open to anyone who has the app downloaded. If a supplier feels he or she meets the criteria of the bid then they submit an application containing their supply proposal. If their bid is accepted and they win the supplier proceeds to supply.

The potential buyers have to specify the desired price and quantity in their bids including timing of the supplies, but can also refine trade options, detailed of how it is pre-processed, packaged and transported. The platform enables users to engage in trade nationwide, with the algorithm factoring in travel costs when proposing matches. An additional advantage is that suppliers and buyers can also do their own trend analysis to see the trends in terms of product, quality demands and pricing to better adjust what they source and in the case of farmers, what they plant and the timing of the season/festive periods. Take that into consideration in the production planning,

The platform could also centrally facilitate agricultural trade. Supplying farmers to submit requests for buying or selling goods through a centralized national database. Such application would employ a sophisticated algorithm to identify profitable traders, ensuring efficient matches between buyers and sellers.

Input

The platform could act as an information source to provide advice about types, availability and prices of high-quality input (seed, pesticides, fertilizers). The price data are sourced directly from agro-dealers, complemented by information from public agencies involved in input sales and distribution. The efficiency, transparency, and responsiveness of the input chain could be improved for farmers.

To deliver this service, platform is utilized to collect and disseminate price information via mobile phones and websites in the countries it serves, contributing to a more informed and dynamic agro-input supply chain.

Transporters

Information for producers about transporters (and the routes they travel from North to South) and other logistics service providers (plastic crates). Other systems provide additional information. Infotrade, provides fuel prices to help users estimate transportation costs. Location information on storage facilities across the region it covers. Other platforms provide prices related to transport, and inform farmers about transport availability in specific locations by date. Using website menus, the user can view an East Africa map with points representing locations of the facilities.

Information about warehouses including the location, availability of capacity, quality and grades.

Financial Services Provision

Few platforms integrated financial services as part of their offering, including services such as mobile banking or microfinance, to provide farmers with access to financial resources. Receiving mobile money, build their credit score and access financial services (like crop insurance) through AgroPay.

Others

Other B2B platform functions could be considered, not directly contributing to establishing B2B linkages and brokering B2B partnerships. The functions could include:

- (1) Weather such as current and forecast, temperature, rainfall, wind strength, humidity precipitation monitoring, and extreme weather;
- (2) Horticulture production news relating to plant health information, pest alerts amongst others for example *Tuta absoluta*;
- (3) Horticulture trading macro-trends regarding quantities and volumes traded at selected markets, and across borders;
- (4) Financial information regarding foreign exchange, tariffs and insurance in the horticulture sector.
- (5) Regulations about taxes, standards and export requirements;
- (6) B2B platform could provide links to web shops of entrepreneurial farmers and online services.

PRACTICAL CONSIDERATIONS

Business Model

A B2B platform for the market offtake of vegetable products should be market-driven, accurate, timely and reactive, and cost-effective. Ensuring financial sustainability is a major aspect of designing and developing a B2B platform. While in theory an B2B platform in the African context should be capable of generating profit over time, or at least recover investment and operational costs, in practice many of the platforms remained financially dependent on donor or other external funding. Developing and implementing a solid business model remains a challenge for the existing platforms.

Recognizing the difficulty of B2B platforms being entirely self-funding, Kizito[1] considers that the sustainability of the platforms depends on: (1) how it generates funding internally (e.g. through user fees); (2) how it mobilizes support from users, especially farmers, traders and policymakers, and thus exerts “political” pressure on governments to provide financial support; and (3) how it controls costs (i.e. managing the organization such that the costs of information collection and diffusion are minimized).

The underlying business model facilitates the planning and implementation of the B2B platform, and will ensure the viability. The following questions are critical and should be address for a B2B platform that works for the Nigerian horticultural sector.

What types of information will be included? 2. Who are the users (customers) of the platform? 3. What digital marketing channels and technology will be used? 4. How will data be collected for the B2B platform and what other resources are needed (wat are the costs)? 5. How will HortiNigeria launch/market a pilot of the B2B platform? 6. What income streams will the generate? 7. What activities are needed to maintain the B2B platform and what are the costs? 8. What business services and partners are needed?

Initial capital is required to establish the platform including software development, licenses and server subscriptions. The subsequent fixed costs include gathering and analyzing data and maintenance and management of the platform. The variable costs of serving each new user are low, which makes it crucial to attract a sufficient number of paying customers to break even. This break-even point must be calculated, recognizing that achieving scale takes time

All the existing B2B platforms systems examined in chapter 2 are actively exploring avenues to augment their income. Two-thirds of these systems (excluding Lima Links, LMIS, and AMITSA) are striving to boost operating income by implementing user fees. Additionally, some systems permit advertising on their platforms as an additional revenue stream. While individual smallholder farmers may face challenges in paying for platform services, farmer associations can potentially overcome this hurdle by aggregating demand for platform data and introducing operational efficiencies.

Key Costs

One of the primary operational expenses for these systems involves the cost of sending text messages to users' mobile phones. Many systems strive to mitigate these costs by negotiating preferential rates with mobile network operators and then transferring the remaining fee to the user. However, this approach often results in the exclusion of the most economically challenged small producers, who may be unable or unwilling to cover the fee.

Platform Design and Language

Various systems employ free and open-source software, while others develop their own systems or procure third-party platforms. Regarding mobile platform, smaller farmers usually do not have smartphone. They have earlier generation mobile phones that are only able to communicate SMS text messages.

Data Collection and Validation

The value of a B2B platform depends, to a great extent, on the overall quality (timeliness, accuracy, reliability and relevance) of the data collected. Therefore, in implementing a system for collecting information of horticulture produce in Nigeria, it is necessary to develop procedures to ensure that the collected data is reliable and accurate. This can be extremely challenging, due to the specific nature of market prices for horticulture produce, as prices in a given market may vary among vendors and are also likely to depend on the quality and variety of the product. Quality is particularly difficult for a price collector to evaluate. Furthermore, for some horticulture products, especially the most perishable ones, prices may vary significantly during the day.



When designing and implementing a system for market price data collection, it is crucial to first consider the methodology to be applied. The principal steps are the following:

- Specification of commodities for which data is to be collected. This is vital to ensure uniformity of data collection in different markets and thus the comparability of the data collected across times and locations.
- Specification, for the selected horticulture products, of information on the required variety, quality and packaging. This is an important topic, since data collectors must follow specific standards when they perform their activities.
- Choice of the proper sampling design and number of observations.
- Timing of data collection. Depending on the features of the markets monitored and on the perishability of the selected commodities, it is necessary to decide how often and when to collect price information. It is likely that information on grain markets will have to be collected less frequently than that on perishables as, for storable products, prices fluctuate less rapidly.

Data collection using paper-based methods are not always efficient and prone to error during data transfer. Smartphones, tablets and similar tools are much better suited to collect information, just as they can be used for information dissemination. A B2B platform could best involve smartphones as a means of gathering and collecting information.

Once the data has been collected from the market, a mechanism must be in place for it to be rapidly transmitted. This can be done directly (e.g. from one original source, such as a commodity exchange or a trader) or it will have to be checked and further processed. Data that is disseminated to end users as quickly as possible can also be used for the preparation of monthly, quarterly or annual reports that present time series and also provide analysis.

All the evaluated systems strive to maintain user relevance through frequent updates of price data. Timely updates of additional production- or sales-related information are also prioritized, sourced from market-based enumerators. In the systems under scrutiny, data collection primarily involves enumerators who observe prices in public marketplaces and transmit the information via mobile phones. While most enumerators are external entities, Infotrade engages market workers as enumerators, and Esoko involves traders or wholesalers in certain countries.

The process of enumeration is a costly aspect of AMIS, demanding substantial human resources, which contributes to increased expenses and necessitates robust management. Some systems have informally expressed concerns that remunerated enumerators might submit fabricated market price information without physically visiting the markets to observe prices. To counter this risk, systems like Esoko have incorporated GPS stamps into mobile phone-based price reporting tools, ensuring that enumerators must be physically present at the specified market to report prices.

Innovatively, Lima Links and MFarm have deviated from traditional enumeration practices by extracting price data directly from transactions handled within their systems, eliminating reliance on third-party observers. Lima Links, for instance, sidesteps the challenges and costs associated with enumeration by developing a point of sale (POS) system tailored for agriculture. This POS system is distributed to small-scale traders in Zambia, serving as a valuable tool for trade facilitation and transaction record-keeping. Prices recorded during each transaction are subsequently disseminated to other stakeholders. Lima Links' price data is thus rooted in actual transactions, devoid of distortions or reporting delays.

Regarding data validation, every platform under examination incorporates data validation mechanisms. The initial validation step involves scrutiny by the enumerator's supervisor, followed by comprehensive checks during the data analysis phase. Raw data sourced from the field undergo meticulous review by analysts at the system headquarters, utilizing statistical software to pinpoint errors or anomalies. This stage also encompasses additional checks to validate data values.

Certain systems employ pre-programmed macros and other code, minimizing the need for extensive analysis and allowing staff to allocate their time to other responsibilities. As a concluding verification step, users are encouraged to report any data that appears inaccurate. While farmers and retailers may receive the mean product price for a specific time period, government and university users prefer to receive prices in both formatted and 'raw' forms, facilitating further analyses.

Typically, the data is stored on a server at the host agency in formats such as SQL, MySQL, Java, or Access/Filemaker Pro. Alternatively, in the case of more recent systems, data is stored in the cloud, enabling convenient access for analysis purposes. Data security should be observed at all times.



CONCLUDING REMARKS

Box 1: Impact of B2B Platforms for Smallholder Farmers

- *Esoko price alerts had a positive effect on yam prices received by farmers. The initial results show they received 8.73 Ghana cedis (GHC) more per 100 tubers of yam relative to those farmers who had received no Esoko price alerts[1].*
- *Ghanaian farmers were paid approximately 10% more for maize and groundnuts when they had access to the market information system[2].*
- *The introduction of information and communication technologies (ICT) reduced price dispersion, as agents were able to bargain for better price[3].*
- *Market information systems allow farmers to decrease their post-harvest losses. The introduction of phones in fisheries in Kerala reduced waste by 4.8% [4].*
- *For Indian farmers in Maharashtra state, the price improvement generated through the price alerts led them to better agricultural practices and post-harvest handling [5]*
- *A survey of M-Farm users confirmed that receiving price information can help them plan for production; however, the survey also revealed that there was a limited impact on expanding market linkages. This was driven by the fact that M-Farm could only provide single bilateral contracts between a farmer and a buyer, rather than establishing a full network that allowed for multiple connections*

This 'knowledge product' document, developed by the B2B team of the HortiNigeria program, suggests terms of reference for a B2B platform working for the Nigerian horticultural sector. The terms could support follow-up projects within or beyond the HortiNigeria project[1]. In particular, the presented needs of horticulture producers, the review of the existing similar platforms, the proposed functionalities and practical considerations will be essential elements in the development and implementation process of the platform.

The envisaged target groups (users) of the B2B platform include smallholder farmers, aggregators, offtakers, marketers, input providers, transporters, and overtime end consumers etc. Actors in horticultural value that pursue their economic interests by establishing B2B linkages and partnerships. In addition, potential uses of the platform could also be broader such as government, sector associations, donors and universities that are interested to track agricultural prices and spot demand or supply trends so they can react to with trade policies and programs or prevent food security problems amongst others[2].

For actual development and implementation of the B2B platform, several additional insights will be relevant with regard to the pricing functionality, as presented in Box 1.

The studies show that price alerts had not only a positive effect prices received by farmers. The price alerts allowed farmers to reduce postharvest losses, improve agricultural practices and plan better for production. However, the study of Baumüller revealed that there was a limited impact on expanding market linkages.

The design and effectiveness of the B2B linkages functionality, therefore, should be a point of attention in the design.

Box 2 provides several insights on reaching smallholder farmers. Special attention is needed to include smallholder farmers

[1] The actual B2B platform development and launch is not within the mandate (and budget) of the B2B team.
[2] USAID, (2013); Neza et al., (2022).

[1] Hildebrandt et al. (2020)
[2] Courtois & Subervie, 2015
[3] Zant, (2019); Jensen, (2007); Aker, (2008)
[4] Jensen, (2007)
[5] Fafchamps & Minten (2012)

Box 2: Impact of B2B Platforms for Smallholder Farmers

- *Access to better price information does not necessarily benefit farmers in their negotiations with middlemen because they don't have access to alternative markets. While such interventions reduce information asymmetries between traders and farmers, if the market agents do not have outside options for their sales, information will do little to improve their marketing outcomes [1].*
- *A so-called Unified Market Platform (UMP) on market prices generated a greater benefit for farmers with high-quality produce, increasing, on average, the prices of maize, groundnuts, and paddy by 5.1%, 3.6%, and 3.5%, respectively. The provision of price information alone might not be enough to facilitate trade among small farmers [2].*
- *Providing price information of a certain crop, farmers are incentivized to produce more of a particular crop when they receive price information on that crop. Farmers have reported growing a new crop or more of an existing crop when this happens. In addition, price alerts also caused fewer farmers to sell in the local markets and induced them to sell at the farm gate [3].*
- *Some price discovery mechanisms might target large traders who are able to sell in large volumes. Thus, only a few small farmers can access these market options[4].*

In conclusion, the B2B team, hopes that this 'knowledge product' document marks the start of the development of a B2B platform in the framework of the HortiNigeria program but which is relevant and applicable for the horticultural sector of Nigeria as a whole. The team acknowledges that the document is not yet complete and needs further refinement with a view of developing a concrete implementation proposal.

- [1] Mitra et al., (2018).
- [2] Levi et al., (2020).
- [3] Hildebrandt et al., (2020).
- [4] Baulch et al.,(2024).

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ANNEX 1: COMPARISON TABLE OF SERVICES OFFERED BY EXISTING B2B PLATFORMS

Platform												
Functions	AMITSA	Esoko	IMIS	Lima Links	M-Farm	NLT	RATIN	ZNFU	Kudu	Tulaa	AgroCenta	Twiga Food
Send Prices (Produce)												
Producer/Trader Matches												
Producer/Input Supply Matches												
Input Prices												
Agronomic Advice												
Weather Data												
Communication Across User												
Producer/Financial Inst. Support												



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