

Telephone farmers and an emerging ecosystem are unlocking the hidden middle of agricultural value chains in Kenya through innovation

Meine Pieter van Dijk, Gigi Limpens, Julius Gatune Kariuki and Diederik de Boer

Maastricht School of Management, Maastricht, The Netherlands

Abstract

Purpose – This article explores the potential of an emerging group of farmers in Kenya, namely the growing segment of urban-based medium-size farmers, often called “telephone farmers”. To what extent do they benefit from an emerging ecosystem to support them in operating their farms, and what does that mean for the Hidden middle of agricultural value chains, the actors between the farmers and consumers? Unlocking the potential production of telephone farmers will require more services from collectors, traders, transport firms, the storage facilities, wholesalers and processing units and retailers. Ultimately, optimized telephone farm production benefits the business of Hidden middle value chain actors, increases incomes and jobs and improves food security.

Design/methodology/approach – Based on a survey and in-depth interviews a profile of the telephone farmers is given and their role as innovators is analyzed. The Latia Resource Centre (LRC) provides assistance to medium-size farmers, like the telephone farmers, helping them to prepare business plans and use modern technology and contributing to an emerging ecosystem providing support to all farmers.

Findings – The article analyzes the medium-size telephone farmers. It documents the contributions of this new agricultural actor to developing value chains and a dynamic ecosystem. The paper profiles the telephone farmers first and then identifies what they need and the support they receive. The emerging innovative ecosystem impacts agricultural productivity and production and hence the development of value chains. Small farmers gain access to opportunities offered by telephone farmers, working for them as outgrower or farm worker.

Research limitations/implications – The authors used a small sample of 51 farmers and covered only a two-year period.

Social implications – Small farmers are being helped through the emerging eco-system and farm labor acquire skills, which they can also use on another or their own farm.

Originality/value – Based on the analysis an even more effective ecosystem is suggested and policy recommendations are formulated before the conclusion is drawn that these medium-size farmers contribute to innovation diffusion, inclusive value chain development and food security and are becoming part of this expanding, innovative ecosystem. Following the debate on food security the results suggest to pay more attention to the development of telephone farmers given their role in developing agricultural value chains and innovative ecosystems.

Keywords Telephone farmers, Ecosystem, Hidden middle, Innovation, Value chains, Kenya

Paper type Research paper



Introduction

Africa's development would be served by a vibrant medium-size farmers sector. These farmers can contribute most to food security, exports, employment and the development of smaller farmers as suppliers to modern agricultural value chains. We interviewed 51 medium-size farm owners and managers in Kenya, to find out how to unlock their agricultural productivity using an emerging ecosystem of agriculture-related services suppliers, catalyzers for agricultural innovation.

While the Green revolution in Asia was largely driven by increasing the productivity of small-scale farming, in Latin America success has largely been driven by large-scale farming. Attempts to replicate these experiences in Africa have been unsuccessful so far. As Mellor (2014) points out: an Africa green revolution has not happened despite many initiatives because Africa's agro-ecology, institutions and infrastructure were quite different. He also mentions the heterogeneous nature of African agriculture, which means a much broader set of crops have to be targeted. The greater diversity of agriculture calls for a larger and more diverse institutional structure. Also, the research systems, the education systems to spread innovation and the rural financial systems are generally inferior to those of Asia at the beginning of the green revolution. Furthermore, rural infrastructure is less developed than in most Asian countries, including the irrigation infrastructure. Efforts to develop large-scale farming, through foreign direct investment in Africa also did not have much success due to governance issues and fear for land grabbing (Van Dijk, 2016). However, AGRA (2019) argues that we are "on the edge of a breakthrough for agriculture in Africa". They point to the importance of the hidden middle, "the role played by small and medium enterprises (SMEs) in driving this transformation". We will use this concept and study to what extent an emerging eco (or agricultural support) system and telephone farmers play the role of developing agricultural value chains in Kenya.

Who are the medium-size farmers and how can telephone farmers boost their operation? Medium-size farms have been the bedrock of an agricultural driven economic progress in Europe. Due to a much stronger support or ecosystems and better educated and resourced farmers, European farms have supported a strong agro-processing sector. In Africa the key role such a medium-size sector can play is bridging the gap between large-scale farms that have the capacity to export and adapt frontier technologies, and resource poor smallholder farmers, who can benefit from the diffusion of modern technologies and agriculture-related services and processing activities. Medium-size farms have the resources to interact with both large- and small-scale agriculture and thus the potential to speed up diffusion of knowhow and technology. This sector has largely been hidden in Africa, not benefitting from policies or development projects (Veldhuizen *et al.*, 2020). This is changing, as urban middle class started to buy agricultural land and started investing in agriculture, but they need an infrastructure of support services and the availability of good farm managers. A significant number of Kenyans has done so, using parcels of land in the medium-scale farming range (5 to 100 hectares; Jayne *et al.*, 2016). Within the category of medium-size farmers we focused on this segment of urban-based, part-time telephone farmers, who give instructions via their mobile telephones (Mworia, 2016). However, they have not been very successful in Kenya in the past (Leenstra, 2014). Making this emerging class of farmers more successful can help agricultural development, but requires good farm managers and a strong farm support function by a telephone farmer focused eco-system.

To support farmers in their growth new models for agricultural development have been proposed, for example in the Comprehensive Africa Agriculture Development Program (CAADP). This program prescribes how to achieve a rapid 6% agricultural growth rate, with a minimum of 10% of government expenditure used for agriculture. Using the CAADP as the key input, country development strategies have put agriculture at the center as can be seen in many vision documents of African countries (AU, 2014). One unchanging feature

of the efforts to achieve agriculture-driven transformation of Africa is focusing on smallholder farmers. This is understandable given about 80% of the farmers are smallholder farmers (FAO, 2012). However, the smallholder farming model is becoming unsustainable as parcels become smaller and are being farmed more intensively and in a less sustainable way (Heady and Jayne, 2014). Meanwhile rising incomes and urbanization are driving diet shifts, resulting in an increase in the demand for processed foods and with that modernized value chains. Tschirley *et al.* (2015) found that processed food now holds a 39% share of all food expenditure. These trends are putting pressure on smallholder farming. The demand for processed foods requires a strong agro-processing value chain, which in turn calls for a farm system that can guarantee continuous supply and consistent quality at low prices, which is difficult for many smallholders. Participating in supermarket value chains is a challenge for smallholder farmers and can only be achieved through aggregation. Supermarket orders are huge (as they want to reduce transaction costs) and quality requirements (both health and visual) are also very high. Many smallholders find it difficult to meet these requirements (Reardon and Timmer, 2006). As a result, much of the demand is being met by imports, which are huge and rising fast, but go against the idea of assuring national food security.

Problem statement

This article explores the potential that an emerging group of farmers, namely the growing segment of urban-based medium-size farmers, often called “telephone farmers”, can bring to further modernize value chains and supportive ecosystems that benefit both medium- and small-scale producers. It is based on a project implemented in Kenya that sought to explore whether an intervention through incubation could make medium-size farming more sustainable. These farmers have the potential to be a bridge between smallholder farmers and large landowners. The telephone farmers’ segment, however, has so far struggled to fulfill this potential. This article investigates if telephone farmers can help to develop the medium-size farming sector faster, by becoming part of an emerging ecosystem that also serves their specific needs, their needs and becoming part of it.

The article makes an empirical contribution to the academic debate on agriculture and economic development in Africa. It analyzes the phenomenon of the telephone farmer. It reflects on the position in and contributions of this agricultural actor to existing value chains. To fulfill their potential and become sustainable economically, ecologically and socially, this paper profiles the telephone farmers first and then identifies the support they receive and what they need.

Based on our research we develop a tailored incubation model and outline the potential of this model in terms of improving agricultural education and vocational training to also support the medium-size farmers. The proposed model works toward a comprehensive ecosystem approach that aims to do justice not only to the technological demands of medium-size farmers but also addresses their needs for creative and dynamic managerial approaches and new institutional facilitations.

The article proceeds as follows. The next section summarizes the literature and we describe the rise of urban farmers. Subsequently the methodology of the study is explained. We present the empirical data by providing a profile of the telephone farmers, by analyzing their role in innovation and the development of an ecosystem. Then we identify the needs for support by middle-size farmers to play a role in the development of value chains and the ecosystem, while catalyzing innovation. Reflecting on the results, an even better ecosystem service model for medium-size farmers is suggested. Some policy recommendations are drawn and conclusions formulated.

Literature review on the role of medium-size farmers

There is a large untapped potential for more agro-processing in Africa that could contribute to food security as well as fighting unemployment and poverty (Diao *et al.*, 2014). To boost the agricultural transformation needed, Africa has to upgrade its agricultural value chains. The efforts made focused mainly on improving smallholder farming, through improving access to seeds, high-quality inputs and finance and also by developing new markets. This approach, however, has been contested by some who feel that the smallholder focus needs re-thinking. In Kenya, Jayne *et al.* (2016) find that the number of farms under 5 hectares has risen from 2.22 to 2.97 million between 1994 and 2006 while the number of farms over 5 hectares has declined. Land is becoming an increasingly constraining factor of production for a sizeable and growing proportion of Kenya's rural population leading to intensification and less sustainable and rewarding agriculture. This may impede the smallholder's ability to invest in inputs, leading to soil mining and subsequent soil degradation. About two-thirds of the arable land is now degraded across Africa (Heady and Jayne, 2014).

At the same time, about 65% of the world's uncultivated arable land is in Africa. The opportunity to farm that land may not be easily accessible to smallholder farmers because investments are needed to make it available. For that reason, some authors consider a shift toward more resourced and larger commercial farmers could be the way to drive Africa's agricultural transformation. Collier and Dercon (2014) make the case for large-scale farming arguing that they are key to feeding the growing urban population as they produce surplus (a large majority of smallholder farmers do not produce a net-surplus and are net-buyers of food). Also commercial farming can create rural employment for many subsistence farmers in rural areas especially the net food buyers. Finally, they can adopt and adapt new technologies to local conditions and thus boost yields. Collier and Dercon (2014) argue that larger commercial farms are likely to be close to the frontiers of technology, finance and logistics. Further innovations of recent decades have made the rapid adaptation of technology, access to finance and high-speed logistics more important, and in the process commercial agriculture has obtained a substantial advantage over the smallholder mode of production.

The global food crises of 2008 gave a huge impetus to large-scale commercial farming as countries worried about future food security. Investors saw opportunities for commercial farming utilizing much unused land in Africa and elsewhere. However, this trend suffered a serious blow as it came to be seen as a new scramble for Africa and was quickly given the label of "land grab" (Deininger *et al.*, 2011). This shift toward large-scale farming has been slowed down as Civil Society has been very effective in painting this as a move to dispossess people of their land.

However, framing the farmer system debate as small farmers vs large-scale farming systems misses the larger picture of building a more productive farming ecosystem that includes all types of farmers working in symbiotic relationship. Collier and Dercon (2014) allude to this through saying that large-scale commercial farmers are providing rural employment to subsistence farmers thus boosting their incomes. The extra income can be invested to increase the productivity of these subsistence farmers. However, the gap between large-scale and smallholder farmers is too large to create much synergy, which is potentially available when there is a mix of smallholders, medium-scale farmers and large-scale farmers.

The potential of a medium-scale farming sector to contribute to the emergence of a more vibrant agricultural production system stems from various considerations. First, although it is often assumed that technological innovation is limited to large farms, research shows that medium-size farms also have the resources and inclination to invest in and disseminate new technologies. Second, following a similar logic, medium-scale farms might effectuate a much-needed "trickle down" of mechanization. Mechanization levels are comparatively low in African agriculture. Yet because hired labor is one of the most significant expenses of farmers, demand for labor-saving technology is rising (Diao *et al.*, 2014). Building on research

in Ghana, [Chapoto et al. \(2014\)](#) suggest that medium-scale farmers play a brokering role in the agricultural mechanization services. They have the resources to invest in mechanization, but, given their scale, may not always utilize the full capacity of the machines, which leaves them with excess capacity that can be leased out to smallholders.

Thirdly, medium-scale farmers might contract smallholder farmers in their engagement with the emerging markets that they typically target, e.g. the emerging supermarket value chains through contract farming ([Adabe et al., 2019](#)). Fourthly, they may be better positioned than large-scale farmers to engage with smallholders due to closer proximity both geographically and organizationally. Fifth, medium-scale farmers can be key in establishing what has been called “cottage industries,” which might kick-start the emergence of strong rural-based agro-processing value chains. Sixth, the presence of medium-size farmers has the potential to stimulate the entry of large-scale traders that can upgrade relevant value chains (through upgrading logistics and storage systems). [Sitko et al. \(2018\)](#) find that Kenyan regions with a large share of cultivated land by medium-scale farms have seen the entry of large-scale traders. Seven, it promotes specialization.

[Reardon \(2015\)](#) defines the “hidden middle” as the middle part of an agri-food value chain. It concerns the transport, storage, processing and retail activities. They are called hidden, because policies tend to concentrate on producers’ or consumers’ interests and neglect the in-betweens. The hidden middle requires inputs from commercial agriculture ([Bolarinwa et al., 2020](#)), but the SMEs (that is what they usually are) are an integral and crucial part of the value chain, which is reflected in an analysis of power in the chain and the distribution of the margins between different actors (cases in [Van Dijk and Trienekens, 2012](#)). The telephone farmers are at the beginning of this chain, but some also act as operators in the chain, by buying, transporting or even processing agricultural produce from neighboring farms. They have become part of the ecosystem and introduce innovations, which have lasting effects on the small farmers. Examples will be given in the empirical part of this article, concerning the distribution of improved seeds and complementary inputs, promotion of commercial animal husbandry and producing quality fruits and vegetables for telephone farmers.

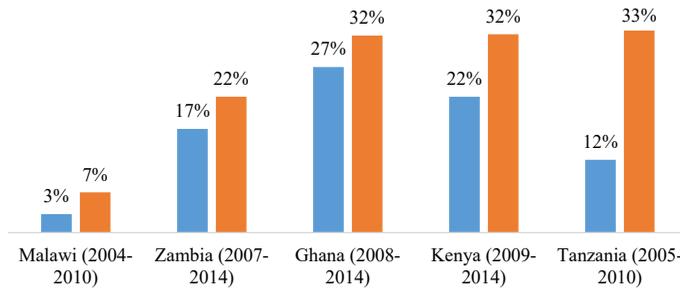
Urban-based farming is a rapidly growing sector as urban-based households increasingly acquire agricultural land. [Jayne et al. \(2016\)](#) find that acquisition of land by the urban-based middle class has accelerated in Africa. In some countries the urban-based middle class already controls a significant amount of farmland with almost a quarter of farmland owned by urban households in Kenya, Zambia, Ghana and Tanzania. This fairly recent development is depicted in [Figure 1](#).

In Kenya small-scale production represents roughly 75% of the total agricultural output and 70% of the marketed agricultural produce. The large-scale farming subsector accounts for 30% of marketed agricultural produce, if no distinction is made for medium-scale farmers. Smallholders account for over 70% of maize, 65% of coffee, 50% of tea, 70% of beef and 80% of milk production ([GoK, 2013](#)).

Medium-size farms contributed very little until recently. To address this the government has proposed to tax idle land [1]. This may lead to greater fragmentation as people sell landholdings they cannot farm profitably to pay the tax. In terms of land distribution, 66% of land is owned by smallholders, 19% by medium-size farmers and 15% by large-scale farmers.

The role of a sustainable and innovative ecosystem

Efforts aimed at achieving the Green Revolution in Africa recognize the need for innovation. Innovation emerges when individuals and organizations “with diverse – often conflicting – stakes in the management of scarce resources or the governance of productive processes”



Source(s): Jayne *et al.* (2016)

Figure 1. Trends in share of land owned by urban-based households

interact (Kilelu *et al.*, 2013). It is a collective, collaborative and co-evolutionary process. Operating at the intersections of rural and urban markets and occupying mediating positions in relevant value chains, medium-size farmers might be relevant as “innovation brokers” (Devaux *et al.*, 2018). This potential lies in their ability to change processes rather than in supplying new technologies. The ecosystems they operate in can play an important role in this process.

As Kilelu *et al.* (2013) have shown, sustainable innovation depends on multi-stakeholder platforms, networks and interfaces. Medium-scale farmer such as telephone farmers can be hubs in such processes and help broker the skills and modalities for “plant breeding, farm management, agronomy, feed industries, veterinary services, farm inputs supply and servicing, marketing, storage, supply chain management, food processing, packaging and distribution” that are needed for the innovation that allows for sustainable production (Kaneene *et al.*, 2015, p. 95).

Innovation is hard to “produce” in a direct sense, as it is highly serendipitous and depends on interaction and practice (Nagarajan *et al.*, 2019, p. 4). However, policies can stimulate innovation, for instance, by supporting telephone farmers and the ecosystems they operate in. In terms of innovation strategies, telephone farmers tend to adopt an imitative or traditional approach, responding to changes in demand (Gomes *et al.*, 2019, p. 538). Institutional development might allow them to develop potentially more beneficial offensive or opportunistic strategies that create new markets (Gomes *et al.*, 2019). Ultimately, supporting these ecosystems to the extent that telephone farmers shift toward more assertive innovation strategies can help them to become even more sustainable and even more value-adding in their respective value chains.

Methodological approach

The study uses a mix of qualitative and quantitative methods to determine the impact of the Agricultural Incubation Project in Kenya. The project was sponsored by the Netherlands government and implemented by a consortium [2]. The objective was to support urban or “telephone farmers” and explore the impact of their activities on agricultural productivity and sustainability. The project’s theory of change is that telephone farmers having access to advisory services will enhance their skills and have better access to finance. This would lead to developing their farm and improve their productivity. The project provides advisory services to enhance the technical, social and business skills of selected telephone farmers to ensure that they and their employees are capable of efficiently operating the farm. The following services were provided: developing and implementing business plans; training for

farmworkers; recruiting and training and coaching of farm managers; developing market linkages; access to finance; and providing full farm management services. This support should contribute to value chain upgrading directly and indirectly, through the spillover to other stakeholders, for example through employment, subcontracting and access to infrastructure, services, material, and knowledge by the project beneficiaries. The issue of spill-over effects to other full-time medium-size farmers is important.

The project had three main categories of beneficiaries: The initial “telephone farmers,” who were provided a package of support for free. Secondly, the “pipeline farmers,” who joined the program as fee paying clients and thirdly a group of small-scale farmers also known as the “Hortimpact” farmers, who served to find out whether the innovations could also be transferred to smaller farmers, in particular the use of greenhouses. This group also received services from LRC, but were funded under a different development program.

Table 1 gives some key indicators for the three groups, showing land size, revenues, input cost and employment vary a lot. The telephone farmers have more land at the average, a higher turnover, they invested more, employ more workers and have a better control of water, an important input for farmers in Kenya. We interviewed all telephone farmers receiving assistance from the LRC for free. A sample of the more than 100 farmers wanting to receive assistance and willing to pay (pipeline farmers) was interviewed and a sample of 11 Hortimpact farmers was interviewed (from the 152 who received specific training from LRC).

Sometimes farm owners and sometimes farm managers were interviewed as not always both were present during our visit to the farms [3]. The questionnaire used for face-to-face interviews collected demographic data, data on the size of the land and its use, on inputs and production, the type of problems telephone farmers face and the solutions they seek [4]. Data were collected at two moments of time. The first measurement was in early 2017, the second at the end of 2018. We also looked which services were and which ones should be provided in the ecosystem.

The study also looked at the economic, social and ecological sustainability of the farm operations and measured the productivity of the farmers involved and their contribution to food security. It did so to explore the efficiency and effectiveness of services offered by the developing ecosystem.

Interviews were conducted by the researchers using a questionnaire with open and closed questions. The 2017 survey was adjusted for the 2018 measurement, focusing more on the relationship between the farm owner and manager, an issue which surfaced as a crucial determinant of farm productivity during the first measurement round (Limpens *et al.*, 2019). The sample is small since the number of assisted telephone farmers is limited and they are located in different parts of the country, which required long trips to see their farms and interview them.

To gain better insight in their motivation and aspirations, to understand the place of small, medium and large farmers in the farm ecosystem and to further contextualize the findings of the survey, a round of more in-depth key informant interviews was conducted with a selected

Table 1.
Key indicators for the three groups of medium-size farmers interviewed

Variable	Telephone farmers	Pipeline farmers	Hortimpact farmers
Number interviewed	20	20	11
Total land in acres	228	114	7.8
Revenue million KSh	8.3	2.8	1.2
Investments in KSh	18,366,666	6,695,153	3,635,600
Permanent workers	12.8	3.4	1.6
Enough water? Yes	91%	75%	17%

group of farmers, project partners and other stakeholders at the end of 2018 and the beginning of 2019.

Unlocking the potential of telephone farmers requires a better understanding, trying to answer the question to what extent these telephone farmers invigorate the hidden middle of value chains? Kenya is interesting for this study because it has a dynamic agricultural sector, an emerging eco system for farmers and a good digital infrastructure. The study is also justified because of the lack of attention given to the medium-scale farmers in Kenya, while we will show their importance.

The role of telephone farmers

Telephone farmers' characteristics

Many telephone farmers living in urban areas are current or former government employees. Most of these urban-based emerging farmers financed their land acquisitions from nonfarm income (Jayne *et al.*, 2016). They are essentially investor farmers. Many investor farmers operate their farms remotely, which proved to be difficult and many have recorded disastrous results (Leenstra, 2014). Indeed, many have abandoned farming altogether and some of the land is left idle.

Based on the survey we will provide the characteristics of telephone farmers and answer the question whether they are more innovative through an emerging ecosystem contributing to agricultural innovation, rural employment and income generation and function as the engine for value chain development. Burgeoning cheese production in Kenya is an example. It is the result of an attempt to service emerging urban high-end markets as well as fast-food restaurants. It is driven by medium-scale farmers (Gatune, 2018).

Besides the information in Table 1 we collected data on farmers' characteristics such as technology used, sub-contracting relations and their problems. Previous research emphasized the absence of the telephone farmer on the farm as a distinctive characteristic (Leenstra, 2014). However, the current study does not support this. Telephone farmers spend on average more than one-third of their time on the farm. The study also found that the more successful an investor becomes, the more time the farm owner spends on his or her farm. If the farm is improving, we see farm owners moving to their farms. However, if an experiment is not working out well, the investor minimizes his/her attendance on the farm.

The farmers interviewed are furthermore characterized by a high educational level compared to the Kenyan average, with half of them having at least a Master degree. Around half of the farmers were also younger than 50 years. The older telephone farmers tend to be more experienced, engaged longer in farming (for an average of 10 years) and they are capable to make the changes to their farm in the agreed business plan, developed with the LRC. Younger telephone farmers tend to be either a start-up farmer or have less than five years of experience. Both recognize the need to seek help in the form of professional service providers. Yet, they are not equally capable of paying for these services. The telephone farmer can be said to have an entrepreneurial attitude. They show willingness to use advanced technology and are clearly market-oriented trying for example to get a contract with a supermarket, an exporting or a processing firm.

The farmers interviewed operate in the range from five to 100 hectares. The majority of the telephone farmers interviewed do not own more than 30 hectares. Between the first and the second round of interviews the total of land owned by the farmers studied increased. Only a few of the telephone farmers leased land, but some have been able to buy or lease additional land. Telephone farmers largely engage in horticulture (80%), with fruit and dairy as other popular farming activities. It was noticed that telephone farmers were often active in specialized or niche markets, which requires high initial investments but offer the option of value addition or contract farming, for products such as beans, potatoes, herbs, fruits, flowers

and fish (Mwambi *et al.*, 2016). One farmer has a contract with the Ministry of Education to supply schools, others worked for seed distribution companies.

To assure that the farm operations run efficiently and effectively in their absence, farm owners hire farm managers. On average, 75% of the farms employed a farm manager. These farm managers are often younger than the farm owners, with the average age being around 35 years. They are also less educated, with the majority having secondary and vocational education levels. However, the more professionalized telephone farmers showed an increasing interest in higher-educated and experienced farm managers. They put a premium on the knowledge and skills of their farm managers as they are directly responsible for the success of the farm and the supervision of other staff. The average interviewed farmer had six men and one woman permanently working on their farms. Besides, many farmers also employ seasonal workers, so-called casuals, who on average work on the farm for seventeen weeks per year. The number of temporary workers averaged six men and 17 women per farm per year.

A better understanding of the relation between the farm owner and the farm manager is essential to assess the challenges and opportunities that telephone farmers face as agro-entrepreneurs. Having trust in each other and a real functioning relationship between the farm owner and manager were identified as factors contributing to the success of the farm. If not appropriately managed, or an inadequate relationship between the owner and manager, given the distance between the farm and the city where telephone farmers tend to live, there is a substantial risks that farming is affected negatively. Consistent and frequent communication and the right balance of expectations and responsibilities will guarantee that farm owners and managers can improve their relationship in line with the organizational goals, which are formulated in the business plan that the LRC prepared.

Most telephone farmers interviewed do not live continuously on the farm and that may be a reason why they were more inclined to use a business plan. This shows the increased professionalization and generally leads to an improved relation between farm owners and managers. Having a business plan allowed for the development of a shared vision among farm owners and managers and enabled farm managers to be more effective in recruiting staff and upgrading skills of existing workers.

Innovation through the ecosystem for medium-size farmers

The availability of specialized services, which can provide managerial, technical and financial advice to medium-size farmers, rather than farmers relying on neighbors and relatives, is very important. The LRC contributed to the development of an ecosystem that supports medium-size farmers and gives them access to capacity development, innovations, training and development and establishes linkages with lending institutions and contracting parties. The LRC functioned in fact as a one-stop shop.

The project started with a group of 17 telephone farmers, who were advised for free, but later attracted paying customers. This is an indication of medium-size farmers' interest in support services. Interviews indicated that many farmers were willing to pay for the support, because they were attracted through referrals from satisfied farmers involved in the initial project. The second group of pipeline farmers were younger but had equal education levels.

Technological innovations in agriculture for these farmers means developing better varieties of seed and improving the availability of these seeds and the complementary inputs. Wainaina *et al.* (2018) show that in Kenya the largest gains occur when improved seeds are adopted together with organic manure and zero tillage, pointing at important synergies between plant breeding technologies and natural resource management practices. That is what we also found: farmers, buying manure and reducing or not ploughing, to preserve the quality of the soil, were doing well.

Other examples of innovations are the greenhouses introduced by the LRC, ranging from a very simple ones to an imported technologically advanced greenhouse with complete climate control. The good thing is that the LRC demonstrates their use in the Center and trains the farmers to use these greenhouses in an optimal way. Usually tomatoes or other vegetables are produced and we interviewed some successful farmers using limited amounts of land, but putting greenhouses on it. Farmers also look for contract partners and contact other organizations in the ecosystem to identify plant diseases they suffer from.

Medium-size farmers buy their seeds and complementary inputs, use manure, organize the water supply and link up with value chains. The use of modern technology is becoming more and more common and even small Japanese tractors were demonstrated (organized by the LRC) and bought by some of the medium-size farmers. These farmers say they benefit from the emerging ecosystem. Two farmers interviewed had asked independent firms to do a soil study and several farmers contracted companies to help them to find water. Several farmers used a company to drill a bore hole for their farms and some used a consultant to find out that the soil needs fertilizer, but also additional gypsum to produce more. This kind of technical advice can help to put a brake on soil depletion and these services are available in the private sector in Kenya.

Equally important are innovations in business models, social innovation and policy innovations to make agricultural value chains more responsive. Innovation is essential if Africa's agribusiness is to live up to the expectations that it will feed and employ its population. Traditionally innovation is seen as the result of research. More holistic and less top-down notions of innovation consider research and practice as mutually reinforcing (Melkas and Harmaakorpi, 2012). These perspectives on innovative agriculture would benefit from studying and linking up with the experimental modalities of agribusiness. This is especially relevant when it comes to small and medium-scale farmers and how they can be integrated into innovation processes in value chains. Our findings align with an emerging insight in scholarly debates on innovation in agriculture, which states that innovation is as much practice-based as it is research-driven (Melkas and Harmaakorpi, 2012). It is the farm managers using a planting plan and the trained worker knowing how to prune the trees that make the difference.

We found a number of examples of relations of telephone farmers employing, or working with smaller farms and developing activities for the communities living next to them. For example one farm provides drinking water and water for animals for cattle raising farmers. One farmer has a staff member who goes to the villages to train pig farmers and he buys their pigs for a telephone farmer who has a slaughterhouse. Three telephone farmers buy agricultural products from small farmers, if their contract requires bigger quantities than they can deliver themselves. It is noted that the smaller farmers learn from these more modern farmers. This evidence supports the claim that the project succeeded in creating a more dynamic and business-oriented farming sector, where investments and innovations are made for direct returns.

Medium-size farmers and available services for farmers

Farmers in developing countries often lack an enabling environment to integrate and upgrade their position in the value chain (Pingali, 2012). They are systematically pushed back by challenges such as lack of support and negligence from institutions, multinationals and even regulations. The further development of the ecosystem proposed below can help to remedy these shortcomings.

Telephone farmers understand that it is possible to make money with agriculture if you use modern technologies, if you choose for more commercial crops and production for the market. They understand that a farmer does not need to have all the knowledge and

equipment him or herself. We asked what the assisted telephone farmers do for small farmers and communities living next to them. Several telephone farmers buy products from small farmers, if they need bigger quantities than they can produce themselves. Often drinking water is made available for animals of cattle raising farmers and sometimes the inhabitants of the village can use water from the borehole. We also came across a Whatsapp group for small farmers, working with a bigger farmer, to share information on dates of sowing and harvesting, the use of fertilizers and pesticides and the prices of their final products. [Karing'u et al. \(2021\)](#) show that the cost of information collection was an important variable that impedes smallholder farmers' participation in export marketing.

One telephone farmer hires additional tractors when needed, but his tractors can also be rented by small farmers, if he does not use them. They can also buy other agro-services, learn from more advanced farmers, or link up with them. One of the problems the medium-scale farmers are facing is that many of their trained workers start their own business, or earn more on another farm. For the farmer concerned this is a loss, but from a national point of view this is how innovation diffusion takes place.

The importance of a supportive ecosystem aligns with the debate in the literature on the potential contribution of medium-size farmers. For example, a more interdependent systems is developing for some dairy farming areas in the hinterland of Nairobi. Some of the bigger dairy farmers focus on breeding high-quality cows and supply their technology (these new breeds) to medium-size farmers who are focused on raising the high-quality cows and selling them to smallholders farmers who are focused on milk production.

Key services that need to be offered to telephone farmers

Interviews with telephone farmers established their needs for more skills and different services. Four elements of an effective support system for telephone farmers were mentioned most often. First, farm advisory services and support, specifically the development of business, cropping and animal husbandry plans. Farmers demand consistent communication with and a strong on-farm advisory presence of LRC.

Secondly, they mention the development of and matching to competent farm managers (the headhunting function of the LRC). Mediation services, to avoid or solve frictions between farm owners and managers, is at the heart of the current support system. Key to the farmers' success is an understanding and alignment of organizational goals, strategic plans, responsibilities and incentives between them.

Third, apart from training farm owners and managers, telephone farmers needed training for their workers. They also expressed the need for highly specialized skills, for instance, soil testing, water management, irrigation and agronomic skills. Telephone farmers would like to be advised on how to find relevant service providers in these areas. Finally, telephone farmers expressed a strong desire to be linked to markets to be able to make better-informed investment decisions and to have access to credit services.

Building support for sustainable and innovative medium-size farmers

Based on the insights gained from the project, we propose a model to support medium-size farmers in a sustainable way. The model suggests an incubation stage for farmers focusing on the development of business plans, access to finance, setting up accounting systems, crop or dairy planning, assistance with procurement, standardization and certification, human resource management, training and networking, and governance and succession issues.

This phase is then followed by the second phase of acceleration and roll-out to come to scale, in which more customized services can be provided to focus on expanding the operations. This implies shifting attention from the farm owners to the farm managers. After

incubation and acceleration, the third phase of the suggested model for supporting sustainable remote farming entails moving toward a full ecosystems approach. Rather than providing the required services directly with support from the government and donors, interventions should start to promote private sector providers of advice and technical support (veterinary services, soil and water quality research and other agro-services). Gradually a full ecosystem of service providers for medium- and small-size farmers is built. Farmers can satisfy their needs and will contact relevant service providers and innovation brokers and formalize the contact between farmers and providers.

The development of such a system to broker, deliver and evaluate both in-house services and services that are delivered through service providers can also include an agri-business e-platform. This virtual platform connects farmers, experts and service providers. It points to how the service to medium-size farmers can be expanded by linking medium-size farmers to various service suppliers and also to an accredited Training and Farm Services provider (TFS) to develop staff and services needed in various location, eventually through a franchise model that converts some of the successful medium-size farmers to mini-TFS providers (the franchise is given by the accredited TFS). They can train farm managers and workers and also provide Farm Advisory (FA) services and hence become part of the ecosystem.

Other key elements of this ecosystem include linkages with development partners through a Research and Development unit to design and implement projects to support medium-size farmers, the establishment of an agricultural revolving fund to help them to gain access to credit and a system to link them to markets. All these elements are connected through an Internet platform allowing farmers to access skills and services seamlessly.

Policy recommendations

This article has documented the development of supported telephone farming in Kenya. It argued in favor of supporting medium- and small-scale farmers and their linkages as part of a broader support to developing a full-fledged agricultural ecosystem. In line with the rationale for focusing on supporting medium-scale farming outlined, policies that aim to support telephone farmers and other medium-scale farmers operating on a medium-size level should do so with the overarching aim to enable symbiotic and synergistic farming ecosystems, serving all sizes of farmers. The aim should be to link up to smallholder farmers and contribute to value chain development.

The pertinence of telephone farming has repercussions for agricultural education as well. [Haggblade *et al.* \(2015, p. 182\)](#) mention that agribusiness experts agree “that agricultural training needs to be more practical and more focused on business management skills.” This underscores the importance of investing not merely in on-farm training, but also the managerial and entrepreneurial aspects of agribusiness.

Another potential support pathway that can have a profound positive impact on the development of a vibrant medium-scale farming and the related ecosystem is the development of special markets for medium-size farmers (and particularly those who are contracting smallholder farmers). Finally, the Kenyan government can channel support such as subsidized fertilizers and farmers’ extension services through medium-size farmers who are contracting smallholder farmers, for example extension officers on government payroll can be seconded to these farms to support the medium-size farmers and also contracted small farmers. Subsidizing the development of skills and the development of a farm service sector will be important.

Three policy options can be considered “low-hanging fruits.” First, investments in farm management skills are essential to develop a strong telephone farmer-driven medium-scale farming sector. The government can provide trainers to institutions training farm managers and offer support in paying fees for trainees. Second, the manifold activities described above

as part of a medium- and small-scale farmers ecosystem will need more access to finance. Since banks have traditionally been wary of lending to agriculture, and since the specificities of remote farming will require special funds, the government can consider the establishment of a fund specifically for medium- and small-scale farmers. Ghana, for example, has set-up a specialized fund from taxes on food imports to encourage the growth of a medium-scale farming and agro-processing sector. Third, the government can subsidize the development of a vibrant farm service sector that would not only support the medium-size farmers to become training and incubation centers, but can also be a job creation opportunity for many youths who cannot compete to acquire land but can be trained and equipped to become farm services providers and farm managers.

Conclusions

The article outlined the need to invest in medium-scale farming in a sustainable way and demonstrated that telephone farmers have the potential to play a significant role in the ecosystem. Medium-scale farmers with the enthusiasm and means have potential to: adopt and adapt new technologies and diffuse them to smallholders, to develop new markets, to invest in capital-intensive services and to develop agricultural value chains. The medium-scale farmer can play an essential role in developing the agricultural sector in Kenya by developing agricultural value chains and linking with other producers in the chain and becoming eventually part of the ecosystem.

The telephone farmers, the pipeline and Hortimpact farmers interviewed can be considered as three steps toward a dynamic medium-size farming sector, where small-, medium- and large-scale farming are connected and supported by the ecosystem. They also have the potential to support this thriving ecosystem, providing agricultural services and modern technology, training their workers and helping them to benefit from contracts in value chains and subcontracting certain activities to smaller farmers.

Key success factors for a good-running telephone farm are a good relationship between the farm owner and manager, which can be improved through capacity development, well-developed business plans and a shared vision. The entrepreneurial take that telephone farmers tend to have on running their farms and the spread of innovations this entails responds to many of the challenges that Africa's agriculture faces, including value chain inclusiveness and upgrading. Our research proved the dynamics of medium-size farmers and the importance of the emerging ecosystem for agricultural development. In analyzing what it takes to help farmers grow and prosper, the article has outlined a range of services and made the case that intentions to improve the relationship between farm owners and managers are key to the success of telephone farmers. This specifically regards building trust between the telephone farmers and the farm managers through joint business plan development and implementation; development of a strong pool of farm managers through training and development, development of farm services and the development of systems to link medium- and small-scale farmers to skills, services, markets and credits.

Latia provides specific services to medium-size farmers and has contributed to a specific ecosystem for them to grow their business. The analysis showed that medium-size farmers are relevant to help to invigorate the "hidden middle" in Africa's agricultural value chains and enhancing food security. They drive innovation across value chains. Building an ecosystem that provides skilled people and also services to medium-size farmers is key. Information and communication technology platforms can be leveraged to connect medium-size farmers to the services they need (Casaburi *et al.*, 2014). Policy support will be key in unlocking their productivity, providing the services that medium-size farmers can use. Policies to support the emergence of a strong and symbiotic ecosystem of smallholders, medium-size and large-scale farmers is key to a dynamic agricultural sector and attaining food security.

Notes

1. <https://www.businessdailyafrica.com/economy/Tax-on-idle-land-to-be-introduced/3946234-4391358-yqvtfmz/index.html>
2. The consortium consisted of the Maastricht School of Management (MSM) and Aeres in the Netherlands; the Resource Center (LRC), later complemented by Latia Agribusiness Solutions (LAS) that operates as LRC's commercial arm, and Strathmore Business School (SBS) in Kenya; and the Netherlands African Business Council (NABC).
3. The fact that for nine farms we were able to separately interview managers and owners allowed us to internally triangulate the interview data and study the relation between the farm owners and farm managers.
4. The farm managers often did not have the full picture of the financial situation of the farm. Hence we had to leave out some of these questionnaires in the quantitative analysis.

References

- Adabe, K.E., Abbey, A.G., Egyir, I.S., Kuwornu, J.K.M. and Anim-Somuah, H. (2019), "Impact of contract farming on product quality upgrading: the case of rice in Togo", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 9 No. 4, pp. 314-332.
- AGRA (2019), *Africa Agriculture Status Report: The Hidden Middle: A Quiet Revolution in the Private Sector Driving Agricultural Transformation (Issue 7)*, Alliance for Green Revolution in Africa, Nairobi.
- AU (African Union) (2014), *The Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods*, African Union Commission, Addis Ababa.
- Bolarinwa, O.D., Oehmke, J.F. and Moss, C.B. (2020), "Agricultural commercialization and food security: an ex-ante approach", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 11 No. 5, pp. 472-489, doi: [10.1108/JADEE-01-2020-0014](https://doi.org/10.1108/JADEE-01-2020-0014).
- Casaburi, L., Kremer, M., Mullainathan, S. and Ramrattan, R. (2014), *Harnessing ICT to Increase Agricultural Production: Evidence from Kenya*, Harvard University, Boston.
- Chapoto, A., Houssou, N., Mabiso, A. and Cossar, F. (2014), *Medium and Large-Scale Farmers and Agricultural Mechanization in Ghana: Survey Results*, International Food Policy Research Institute (IFPRI), Washington.
- Collier, P. and Dercon, S. (2014), "African agriculture in 50 Years: smallholders in a rapidly changing world?", *World Development*, Vol. 63, pp. 92-101.
- Deininger, K., Byerlee, D., Lindsay, J., Norton, A., Selod, H. and Stickler, M. (2011), *Rising Global Interest in Farmland: Can it Yield Sustainable and Equitable Benefits?*, World Bank, Washington.
- Devaux, A., Torero, M., Donovan, J. and Horton, D. (2018), "Agricultural innovation and inclusive value chain development: a review", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 8 No. 1, pp. 99-123.
- Diao, X., Cossar, F., Houssou, N. and Kolavalli, S. (2014), "Mechanization in Ghana: emerging demand, and the search for alternative supply models", *Food Policy*, Vol. 48, pp. 168-181.
- FAO (2012), *Smallholders and Family Farmers*, Food and Agriculture Organization (FAO), Rome, available at: http://www.fao.org/fileadmin/templates/nr/sustainability_pathways/docs/Factsheet_SMALLHOLDERS.pdf.
- Gatune, J. (2018), *Upgrading Africa's Agricultural Value Chains-Catalyzing Business Model Innovations*, Latin America Report, Vol. 34.
- GoK (2013), *Agricultural Sector Overview*, Government of Kenya, Nairobi.

- Gomes, M.S., Ferreira Lopes Santos, D. and Fernando Cruz Basso, L. (2019), "Innovation strategies in the Brazilian sugar-energy industry", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 9 No. 5, pp. 536-551.
- Haggblade, S., Chapoto, A., Drame-Yayé, A., Hendriks, S.L., Kabwe, S., Minde, I., Mugisha, J. and Terblanche, S. (2015), "Motivating and preparing African youth for successful careers in agribusiness. Insights from agricultural role models", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 5 No. 2, pp. 170-189.
- Heady, D. and Jayne, T.S. (2014), "Adaptation to land constraints – is Africa different?", *Food Policy*, Vol. 48, pp. 18-33.
- Jayne, T.S., Chamberlin, J., Traub, L., Sitko, N., Muyanga, M., Yeboah, F. K., Anseeuw, W., Antony Chapoto, A., Wineman, A., Nkonde, C. and Kachuleh, R. (2016), "Africa's changing farm size distribution patterns: the rise of medium-scale farms", *Agricultural Economics*, Vol. 47, pp. 197-214.
- Kaneene, J.B., Haggblade, S. and Tschirley, D.L. (2015), "Sub-Saharan Africa's agri-food system in transition", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 5 No. 2, pp. 94-101.
- Karing'u, K.N., Isaboke, H.N. and Ndirangu, S.N. (2021), "Transaction costs and participation in avocado export marketing in Murang'a County, Kenya", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 11 No. 3, pp. 221-240, doi: [10.1108/JADEE-12-2019-0206](https://doi.org/10.1108/JADEE-12-2019-0206).
- Kilelu, C., Klerkx, L. and Leeuwis, C. (2013), "Unraveling the role of innovation platforms in supporting co-evolution of innovation: contributions and tensions in a smallholder dairy development programme", *Agricultural Systems*, Vol. 118, pp. 65-77.
- Leenstra, M. (2014), "From suitcase farmers to telephone farmers", in Foeken, D. (Ed.), *Agriculture and Diversified Livelihoods Among Urban Professionals*, Brill, Leiden, pp. 217-231, doi: [10.1163/9789004282698_011](https://doi.org/10.1163/9789004282698_011).
- Limpens, G., van Dijk, M.P. and de Boer, D. (2019), *Telephone Farming - A New Approach for Agricultural Development, a Project with the Latia Resource Centre*, MSM, Kenya, Maastricht, Working Paper No. 2019/03, available at: www.msm.nl/IManager/MediaLink/935/104441/21059/0/.
- Melkas, H. and Harmaakorpi, V. (Eds) (2012), "Practice-based innovation: insights", *Applications and Policy Implications*, Springer, Berlin.
- Mellor, J.W. (2014), "High rural population density Africa – what are the growth requirements and who participates?", *Food Policy*, Vol. 48, pp. 66-75.
- Mutua Mworira, W. (2016), "Mobile technology innovation ecosystem in Kenya", in Adesida, O., Karuri-Sebina, G. and Resende-Santos, J. (Eds), *Innovation Africa*, Emerald Group Publishing, Bingley, pp. 167-206, doi: [10.1108/978-1-78560-311-220151004](https://doi.org/10.1108/978-1-78560-311-220151004).
- Mwambi, M.M., Oduol, J., Mshenga, P. and Saidi, M. (2016), "Does contract farming increase smallholder income? The case of avocado farmers in Kenya", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 6 No. 1, pp. 2-20.
- Nagarajan, L., Naseem, A. and Pray, C. (2019), "Contribution of policy change on maize varietal development and yields in Kenya", *Journal of Agribusiness in Developing and Emerging Economies*, Vol. 9 No. 1, pp. 4-21.
- Pingali, P.L. (2012), "Green revolution: impacts, limits, and the path ahead", *Proceedings of the National Academy of Sciences*, Vol. 109 No. 31, pp. 12302-12308.
- Reardon, T. and Timmer, C.P. (2006), "Transformation of markets for agricultural output in developing countries since 1950: how has thinking changed?", in Evenson, R. and Pingali, P. (Eds), *Handbook of Agricultural Economics*, Elsevier, Amsterdam, Vol. 3.
- Reardon, T. (2015), "The hidden middle: the quiet revolution in the midstream of agrifood value chains in developing countries", *Oxford Review of Economic Policy*, Vol. 31 No. 1, pp. 45-63, doi: [10.1093/oxrep/grv011](https://doi.org/10.1093/oxrep/grv011).

-
- Sitko, N., Burke, J.W.J. and Jayne, T.S. (2018), "The quiet rise of large-scale trading firms in East and Southern Africa", *The Journal of Development Studies*, Vol. 54 No. 5, pp. 895-914.
- Tschirley, D., Reardon, T., Dolislager, M. and Snyder, J. (2015), "The rise of a middle class in East and Southern Africa: implications for food system transformation", *Journal of International Development*, Vol. 27, pp. 628-646.
- Van Dijk, M.P. and Trienekens, J. (2012) (Eds), *Global Value Chains, Linking Local Producers from Developing Countries to International Markets*, University Press, Amsterdam.
- Van Dijk, M.P. (2016), "Is China grabbing land in Africa? A literature overview study", *Utrecht University:Conference: Landac Conference*.
- Veldhuizen, L.J.L., Giller, K.E., Oosterveer, P., Brouwer, I.D., Janssen, S., van Zanten, H.E. and Slingerland, M.A. (2020), "The Missing Middle: connected action on agriculture and nutrition across global, national and local levels to achieve Sustainable Development Goal 2", *Global Food Security*, Vol. 24, doi: [10.1016/j.gfs.2019.100336](https://doi.org/10.1016/j.gfs.2019.100336).
- Wainaina, P., Tongruksawatane, S. and Qaim, M. (2018), "Technologies in the Kenyan small farm sector", *The Journal of Development Studies*, Vol. 54 No. 11, pp. 1974-1990.

Corresponding author

Meine Pieter van Dijk can be contacted at: dijkm@msm.nl