

# ICT and Food Security in Africa



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By

Adebusuyi Isaac Adeniran  
and Djane Kabran Aristide

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To Almighty God



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## PREFACE

This book explores the relevance of information and communication technology (ICT) in the drive towards the attainment of food security in Africa. Despite having well over 90% of its rural communities sufficiently covered by various Global System of Mobile Communication (GSM) service providers, a significant proportion of rural dwellers in Africa, for instance women farmers, have not been making appropriate use of related facilities in the process of food production, transportation, and distribution. The significance of ICTs (such as mobile telephony) in enhancement of communication and rebalancing of information between rural food producing areas and urban food consuming areas is analysed in the book. A comparative methodology, which combines focus group discussion (FGD), in-depth interviews (IDI), key informant interviews (KII) and observation, was employed in sourcing useful information from selected locations of the study. The book succinctly espouses the specific contributions of ICTs (especially mobile telephony) to the improvement of processes of food production and distribution from rural areas (regions of high production and low production) to urban centres in parts of Africa. Inherent situational dynamics in each of the research locations were routinely identified and juxtaposed across time and space.

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## CHAPTER ONE

### INTRODUCTION: INNOVATING AFRICAN AGRICULTURE

The need to innovate agricultural practice in a modernising Africa is becoming more daunting than ever, particularly in light of the continent's constantly expanding population—the growth rate for most countries has remained as high as 5%, for example, in the case of the Republic of Niger. To transform food value in Africa so that food security is enabled across the length and breadth of the continent, it has been observed that Information and Communication Technology (ICT) will have to play a pivotal role. A state of food crisis has remained a reality on the African continent because the processes of food production, distribution, and consumption have been predicated upon rudimentary procedures. Despite having well over 90% of their rural communities sufficiently covered by various Global System of Mobile Communication (GSM) service providers, a significant proportion of rural dwellers in Africa, such as in Côte d'Ivoire, Burkina Faso, Ethiopia, Ghana, Kenya, Nigeria, Rwanda, and Uganda, have not been making appropriate use of related facilities in the processes of food production, transportation, and distribution. This misnomer has been significantly associated with rural women farmers. With all the opportunities that ICTs (such as the mobile telephone network) offer to the attainment of sustainable agricultural practice globally, the need to enhance communication processes and rebalance imperative information between rural food production areas and urban food consumption areas in Africa has been a Herculean endeavour, and in most cases, seemingly unrealisable. Expectedly, the drive towards food security has remained unduly clogged.

In order to facilitate food sufficiency in present-day Africa, it is necessary to explore and utilise all benefits derivable from various ICT applications, especially at the level of policy planning. Being reputed to be the continent with the highest “demographic divide” globally as reflective of its increasing number of youthful populations, Africa needs to leverage this status by digitalising its agricultural value chain. In this regard,

relevant sensitisation programmes that focus on unravelling the significance of ICT platforms, such as mobile phones, in the processes of food production and distribution have to be prioritised. Although the current volume of agricultural products that are traded via mobile appliances has improved in a few African countries (for example, in Malawi and South Africa), there is still the need for improvement if food security for the entire continent is to be approached realistically. The centrality and usefulness of mobile phones (and other ICT mechanisms) in the processes of food production and distribution should be presented to all participants (that is, food producers, middlemen and women, transporters, wholesalers, retailers, and even final consumers) through sensitisation and training programmes by both mobile operators and governments at various levels. Specific interventions would have to be facilitated for agricultural stakeholders who are currently discouraged from using ICT applications in their daily routines. For instance, in the case of poor women farmers in most rural communities in sub-Saharan Africa, the problem of illiteracy has to be addressed through functional adult literacy programmes. A fitting reference here is rural Korhogo in Côte d'Ivoire where the farmers (male and female) do not own any kind of mobile phones despite the availability of mobile networks within their villages. Of course, government and various mobile communication service providers could offer to empower such people to own mobile phones through various subsidy and promotional programmes, respectively.

To explore other possibilities offered by the ICT platform beside routine “call-making,” adequate sensitisation programmes from various mobile operators are desirable for all participants in the web of the food chain (that is, food producers, middlemen and -women, transporters, wholesalers, retailers, and even final consumers). Governments (at all levels) and various ICT service providers in Africa should be prepared to execute functional policies that would serve as a bulwark of impetus for those who are involved in the web of food production and distribution on the continent (that is, food producers, middlemen and -women, transporters, wholesalers, retailers, and even final consumers).

### **The problem of food security in an expanding African society**

Food security is defined as an individual's ability to access a nutritious and reliably calorific food intake. It is, in fact, described at a macro-level as the balance between food production and demand for food by a population. In practice and, significantly, in the majority of African countries, most of the

foods that are consumed in the cities come from the countryside. Sustaining the extant balance between urban food demand and rural food supply has remained a problematic equation for practitioners of food security in most African countries, for instance in Nigeria and Côte d'Ivoire. Indeed, the integrated framework for the classification of food security by the United Nations (UN) (2009) in its international report on World Food Security affirmed that around 78% of food products that were consumed in the cities came from the countryside. In addition, food production and distribution have been observed as the main source of income for most rural dwellers in Africa, and for most of the participants in the informal sector within urban spaces on the continent.

Besides the poor quality of inputs, several problems have been observed regarding the wasteful distribution of agricultural products from rural areas to urban centres across Africa. Such problems have included the poor organisation of cooperative farming and trading organisations, and a lack of a communication platform to engage markets in the production and distribution processes. Consequently, relevant solutions are deemed necessary to enable an imperative balance between the growing demand for food products in the cities and the options offered by the farmers producing food crops in rural areas. The issues of communication and information between the two binary poles (that is, rural producers and urban consumers) in the processes of food distribution and consumption in Africa have to be addressed to guarantee sustainable sectorial output. While mobile telephone services were available as far back as 1996, no major impact was recorded on the agricultural sector. Indeed, the introduction of mobile phones into Nigerian and Ivorian socio-economic spaces has had minimal or negligible outcomes for the agricultural sector. Today, Nigeria has more than twenty operating mobile phone companies, covering a considerable percentage of the country's landmass of 923,756 square kilometres and Côte d'Ivoire has about ten mobile phone companies with an almost total coverage of the country, which is a penetration rate of 315% as of 2009 (UN 2009). Areas of high agricultural production have 98% coverage from all companies. In Nigeria, a similar trend has been noted. Indeed, both countries (Nigeria and Côte d'Ivoire) have had most mobile phone facilities installed since 2002. Meanwhile, on a comparative note, accessibility to ICT facilities has been quite encouraging in West Africa relative to other regions of Africa.

However, the impact of ICT on the enhancement of communication and rebalancing of information between rural production areas and urban consumption areas of food products in Africa has not been particularly noted, especially as it pertains to food security. Therefore, the content gap

that drives this book is that, despite the fact that many rural communities in Africa have been sufficiently covered by various mobile service providers, a significant proportion of the rural farmers have not been making use of relevant facilities in the process of food production, transportation, and distribution in their respective countries. This situation seems contradictory. Essentially, the real impact of mobile telephony on transportation (and distribution) of agricultural products from the rural areas to the urban centres depends on the perception or the use to which the agricultural practitioners put their mobile phones, in cases where they possess the devices. Thus, if these practitioners (that is, the rural farmers, transporters, wholesalers, and retailers) do not view mobile phones as tools for socio-economic improvement that rebalance communication and information between rural agriculturists and urban consumers, and as being capable of enhancing their incomes, it will ultimately be difficult to grasp clearly the impact of mobile phones on the food value chain.

Evidently, the challenge of climate change has resulted in an urgent desire to reconstruct the way food sufficiency is projected in Africa. Ensuring food security amidst a changing climate should be a top priority for policy advancement in Africa. More significant is the issue bordering on the agricultural productivity and incomes of rural farmers, which of course has implications for the quality of their livelihoods. Within resource-dependent contexts affected by more frequent and intense climatic manifestations, redefining the approach to food security involves embracing the notions of *change* and *transformation*. This includes the adoption of “climate-smart” practices, the use of emerging tools and technologies, and in some cases, the need to reconcile emerging technologies with the long-standing techniques of agricultural practice on the continent. As a matter of importance, the attainment of sustainable food sufficiency should be focused on. Above all, it involves identifying new ways of solving problems, of making decisions, of accessing and processing information, and of applying knowledge to agricultural practices in order to achieve more resilient production systems (Ospina 2012).

Nevertheless, evolving evidence from the field suggests that ICTs are playing an increasing role as enablers of *change* and *transformation* within vulnerable contexts. Mobile phones, radio, internet-based applications, and social media are being integrated as part of strategies to adapt to, mitigate, and monitor climate change, especially within agricultural communities in Africa.



Table 1. Schema for connecting specific ICT frameworks with feasible food security outcomes in Africa

	<b>Specific ICT Interventions</b>	<b>Expected ICT Outcomes</b>
<b>Agricultural Production</b>	<p>—Text messages (SMS) to farmers via mobile telephone devices could be utilised as mechanisms for making available the latest and best possible practices (for instance, SMS messages could be sent regarding where, when, and how to apply soil nutrient enhancing substances like fertilisers).</p> <p>—Radio jingles and expert discussion forums could offer a reliable framework for disseminating information on improved land management practices in rural agricultural producing areas. For instance, knowledge on how to improve soil fertility, how to preserve harvests, and how to profitably market produce could be derived via local radio stations.</p> <p>—Interactive video programming could enable a comparative participatory mechanism for rural agricultural producing communities to come together to discuss and document related outcomes of applying pre-existing and new farming inputs. For example, outcomes of using traditional and climate-compliant seeds under the regime of changing climatic conditions. This could be particularly relevant in the process of crop selection (drought or saline resilient seedlings).</p>	<p>—ICTs would be relevant in enabling the sustainable monitoring and evaluation of the agricultural production system, especially in respect of advisory services provisioning from experts on precision farming.</p> <p>—ICTs could be useful in raising awareness of veritable production and marketing mechanisms, which would in turn not only improve the quality of farmers’ livelihoods, but also make the drive towards food sufficiency realistic. For instance, routine awareness programmes on improved land management practices would naturally translate into higher crop yields.</p> <p>—ICT interventions could facilitate impactful crop diversification through adequate documentation and sharing of the outcomes of utilising traditional knowledge and experience of utilising climate tolerant seedlings.</p>

	<p>—Internet-centred applications such as the geographic information system (GIS), remote sensing, and data mapping could be useful in agricultural production, especially in the minimisation or aversion of risks.</p>	<p>—Reduction or aversion of risks, particularly those that are associated with changing climatic conditions could be attained via relevant ICT interventions.</p>
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Inferring from the above schema, the attainment of related goals of specific ICT interventions vis-à-vis sustainable food security in Africa is basically linked to a series of factors that are presented thus:

- i. Acknowledging the role of field facilitators (for instance, agricultural extension workers, local-based functionaries and youths) who can obliterate the gap between scientific knowledge and technical climate change data, and their practical application in the field.
- ii. Building the capacity of local stakeholders to benefit from the full potential of ICT tools (e.g., identifying and interpreting relevant information, establishing contact with broader agricultural networks and experts, exchanging technical information with local and external peers).
- iii. Raising awareness among policy-makers on the importance of integrating ICT tools into climate change strategies as well as into broader poverty reduction programmes that tackle the multiple stresses that threaten food and nutrition security at the local level.
- iv. Tackling issues of access and connectivity in remote rural areas to ensure that farmers, fishers, herders, and foresters have access to a diverse range of ICT services.

However, there seems to be a plethora of traditional knowledge and emerging adaptation and mitigation experiences that various African countries can share and disseminate with the help of ICT tools.

Nevertheless, merely making information available cannot be sufficient since the main challenge for engaging ICTs in regard to food security transcends the provision of information. It pertains to ensuring that the knowledge and information made available actually reach the appropriate stakeholders—that they are appropriated by local audiences and, most importantly, that agricultural producers are able to apply it or act upon it in order to strengthen their livelihoods. Essentially, ICT-enabled information and knowledge should contribute to informing the decision-making processes of local actors, to strengthening their capacity to deal with uncertainty, and to building new bridges of collaboration and exchange towards more resilient, food-secure agricultural systems.

While Africa accounts for more than 60% of all arable land globally, countries on the continent have been spending nearly \$50 billion a year on food imports because vast portions of this land remain uncultivated (African Agriculture Status Report 2013). Of course, the ongoing food crisis on the continent could be directly linked to this untoward situation. To reverse the trend, African countries are increasingly adopting ICT as a tool for agribusiness reform and crop and animal production management. More than ever, technocrats, government officials, professional farmers, and entrepreneurs in African agribusiness are advancing the adoption of ICTs as a strategy to fast-track improved yields in crop and animal production because of the increasing need to feed more people across Africa, where more than half the continent's one billion population live below the poverty threshold. Thus, agricultural experts, farmers, young innovators, ICT companies, and government officials on the continent are focusing their attention on improvements in agricultural practices that can be brought about by technological innovation, capacity building, and creating enabling policies and infrastructure.

The statistics confronting Africa are instructive in the new drive on the continent for the adoption of ICTs to bring about food sufficiency. As aptly observed in 2014 by former Nigerian minister of agriculture Dr. Akinwumi Adesina, Africa is a continent with enormous potential for agricultural growth, yet one where food insecurity and malnutrition are widespread and persistent. To him, the scourge of poverty in the world is unacceptable. Drawing a parallel from current data, he noted that while many gains have been made in reducing global poverty, nearly 50% of the world's people still live below the poverty line (Abiodun, Agugoesi, and Ndubuisi 2014). According to the former minister, "nearly 850 million of the 7.1 billion people in the world, or one in eight, are hungry . . . malnutrition is the cause of 45% of deaths in children under five years old; that is 3.1 million children each year." He observed that while global

wealth in 2013 reached a new all-time high of \$241 trillion, up 68% within the past 10 years, “the challenge is that we are having more poor people despite high economic growth rates. Today, seven of the 10 fastest growing economies in the world are in Africa. Much is said about a rising Africa on the global economic stage. To be sure, there is a new energy and dynamism across the continent. It can be seen in an emerging middle class, improved governance, and a heightened interest by foreign investors. But amidst this excitement, there remains a disturbing paradox”: poverty amidst plenty.

An enduring disconnect has existed between the nature of economic growth, the driving sectors and the growing number of poor people. The growth in Africa is being driven largely by the oil sector, mineral extraction, telecoms, and financial services. “But we must recognize that over 70% of the world’s poor are in the rural areas and depend on agriculture for their livelihoods. Therefore, to substantially reduce poverty, we must start by transforming the rural economies and the way to do this is to transform agriculture,” the former minister remarked. He further buttressed his argument by saying that the agriculture sector growth is pro-poor growth. A 1% growth in agriculture GDP leads to a reduction in poverty of more than three to four times compared with growth driven by the non-agriculture sector. According to him, the key is to generate wealth from agriculture, and expand opportunities for millions. In other words, the rural economy should be made the new wealth economy through the ICT framework. What are needed are economic ladders out of poverty. African leadership had, over time, needlessly shifted the focus from developing the rural economy by diverting attention to the development of the urban cities and “scarce foreign exchange had been spent on importation of food products for the urban areas, to keep the price of food down.” As such, African countries had become net food importers.

Besides, a major contributor to poor performance of agriculture in Africa has been the fact that it had been treated as a development sector, as a way to manage, rather than eliminate, poverty. It is imperative for actors (policy makers and practitioners) to desist from treating agriculture as a routine development programme rather than as a business. Before the oil breakthrough, in the 1960s, Nigeria was self-sufficient in food production. Nigeria was also a major global producer and exporter of cocoa, crude palm oil, cotton, and shelled groundnuts. The discovery of crude oil changed the landscape, as the country soon became over-dependent on this resource as the economic driver of growth, export income, and development. One tragic result of Nigeria’s dependence on oil was an abandonment of the nation’s farmers and food processors.

In Nigeria and Côte d’Ivoire for instance, corruption had equally found its way into the agriculture sector, as government officials in collusion with middlemen had continued to divert enormous funds brought in from both oil revenue and income from cocoa and coffee, respectively. The procurement of seeds and fertiliser had always been tainted by sleaze on the part of government functionaries. In Nigeria and Côte d’Ivoire, investments in rural infrastructure had been relied upon; as such, rural economies had slid into poverty and unemployment. Nigeria had notably become a food-importing country, spending an average of \$11 billion a year on wheat, rice, sugar, and fish imports alone. For an economy that is import-dependent is also a “poverty manufacturing economy” (Adesina 2014). Nigeria, like most African countries, has no business importing food because the country’s fundamental resources included abundant land, water, and human capital. Of the abundant arable land on the continent, Nigeria has an estimated 84 million hectares. However, published statistics showed that Nigeria only cultivates 40% of this land and only 10% of it optimally. Second, Nigeria is also home to two of Africa’s largest rivers, the Niger and the Benue. Much of the country receives adequate annual rainfall to support farming. Third, Nigeria is also blessed with a large and young workforce to support agricultural intensification. According to Adesina, this is a “workforce for whom we need to create jobs and opportunity. And Nigeria’s 180 million consumers offer a large domestic market to support increased food production and processing.”

In addressing associated challenges, the Nigerian government had launched the “Agriculture Transformation Agenda” as also being obtainable in Côte d’Ivoire. The first action under this agenda, according to Adesina, was to cut out the rent-seeking middlemen who for decades had cheated farmers. An Electronic Wallet System was launched. The system allows smallholder farmers to receive subsidised electronic vouchers for seeds and fertilisers directly on their mobile phones to pay for farm inputs from private sector agricultural input dealers. The impact was instant and dramatic. The system has been working as initially projected. Within the last three years, the system has reached six million smallholder farmers and has enhanced food security for 30 million persons within rural farm households. Women farmers—who had not received fertilisers and seeds for decades under the old government system—now had better yielding fields through subsidised farm inputs on their own mobile phones. Nigeria is the first country in Africa to develop an electronic wallet system for reaching farmers with subsidised farm inputs on mobile phones. The impact is already being noticed beyond Nigeria. Several African countries,

Brazil, India, and China have expressed an interest in adopting Nigeria's Electronic Wallet System in their own agriculture sectors.

The revolutionary impact of ICTs on the agriculture sector is spreading throughout the continent. In some parts of Africa this was kicked off with land reform, which is a core requirement in food and animal production. Security of land is especially crucial for women and youths. In Rwanda, for instance, the experience with land reform was such that within four years the country was able to digitise 10 million parcels of land in the country, and 8.4 million titles were approved for farmers. The cost of land titles was as low as \$1.60 in rural areas. Connecting the digitised land information system to banks allows the poor to use land as collateral. Meanwhile, the subsisting, obnoxious "land use decree" in Nigeria that gives ownership of all lands in the country to the government has remained a huge disincentive to investments in agriculture. "Land registration and titling are essential for the poor to use their land as collaterals for securing loans and for building their assets."<sup>1</sup>

## Methodological Modelling

Since the principal focus of this book is to present how the application of various ICT frameworks in agricultural practice in Africa could play a pivotal role in the continental drive towards sustainable food security, a comparative research design is therefore engaged with the following purposes: to determine the actual volume of commercial negotiations being conducted daily between rural food producers and urban food consumers; to analyse the proportion of female farmers who engage ICTs in processes of food production and distribution relative to male farmers; to identify which ICT application(s) is preferred and is most widely used and to which food product(s) it is engaged; and to infer if any operational (and institutional) policy supports exist to encourage the application of ICTs by participants in the processes of food production and distribution across the length and breadth of Africa.

With the aid of the "most different systems design" (MDS) method, the impact of the application of mobile phones on the processes of food production and distribution in Nigeria and Côte d'Ivoire are juxtaposed. Mobile phones are conceptualised as Variable "X," food production/distribution from village to city as Variable "Y," and the

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<sup>1</sup> Nigerian Minister of Agriculture Akinwumi Adesina, quoted in "Will Africa Adopt ICT for Food Security?," *Africa Telecom & IT*,  
<http://africatelecomit.com/adopting-icts-for-food-security>.

application of mobile phones to food production/distribution as the intermediate Variable “T” to explain the link between “X” and “Y” in all the selected communities in Côte d’Ivoire and Nigeria (that is, in areas of food production [rural] and areas of food consumption [urban]). This research is largely predicated on a diagnosis framework since useful case studies in both Nigeria and Côte d’Ivoire have been utilised. The study engages research participants that cut across individual rural producers and cooperative-based rural producers and urban individual buyers/urban direct consumers and urban market-based middlemen/retailers surrounding the production areas of interest.

Specifically, in Nigeria, the research was domiciled in the south-west. The village of Ilo (rural production area) that serviced the town of Ilesha (urban consumption area) (both situated in Ilesha East Local Government Area) and the village of Aba Iyagani (rural production area) that serviced the town of Ile-Ife (urban consumption area) (both situated in Ife Central Local Government Area) were selected as the study locations. In Côte d’Ivoire, production areas in the south-west—that is, locations within the radius of high production of foods—were selected. These regions are: the Soubré region, an area with very high production of food; and Korhogo, an area with very low production of food. Soubré is a town in south-western Côte d’Ivoire. The inhabitants of the region of Soubré are from the Kru group.<sup>2</sup> The sites or villages that were visited during the fieldwork in this region included Soubré town, Koreyo I, Logboayo, Sokozoua, and Oureyo. Furthermore, Soubré is an important agricultural area that produces some of the best quality cocoa and coffee. Our reason for choosing this area is that it will give us insight into an area that has an active and lucrative agricultural sector. Korhogo is a town in the northern area of Côte d’Ivoire. It is the capital of the Savannah Region of the country. It is also the fifth largest city in Côte d’Ivoire. In the local language Senufo, *korhogo* means “inheritance.” In addition to visiting Korhogo, interviews, discussions, and observations were also carried out in Gbalogo, Gbaméleguekaha, Takalé, and Natchokobadara. Because of its geographical location (that is, situated in an arid zone), the region of Korhogo is not as fertile as the region of Soubré. Korhogo is, nevertheless, the location of many agricultural projects that focused on enabling food security in Côte d’Ivoire.

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<sup>2</sup> The Bete constitute the vast majority of the indigenous population, followed by Bakoué and some Kouzié. Soubré is a prefecture and the capital of the new region of Nawa, born from the split of the former Bas-Sassandra. The region includes the sub-prefectures of Soubré, Liliyo, Oupoyo, Okrouyo, Buyo, Méagui, and Grand Zattri.

Figure 1. Map of Osun state, Nigeria (Research Locations 1 and 2).

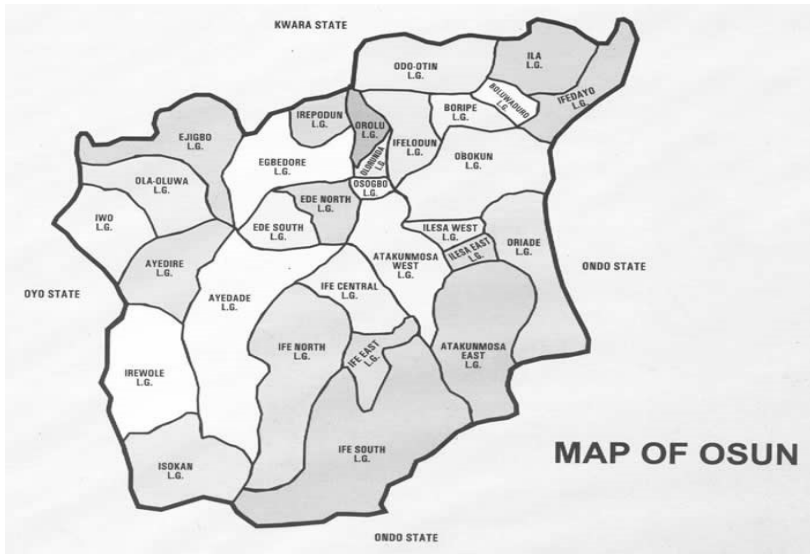


Figure 2. Map of Soubré, Côte d'Ivoire (Research Location 3).

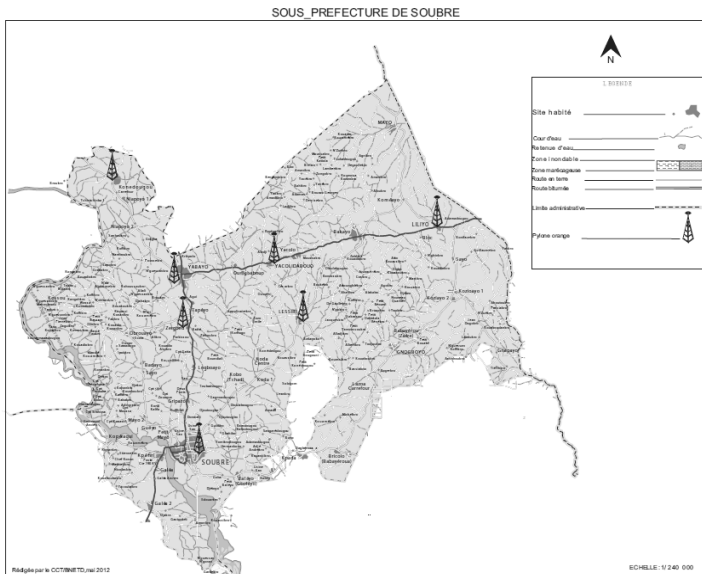
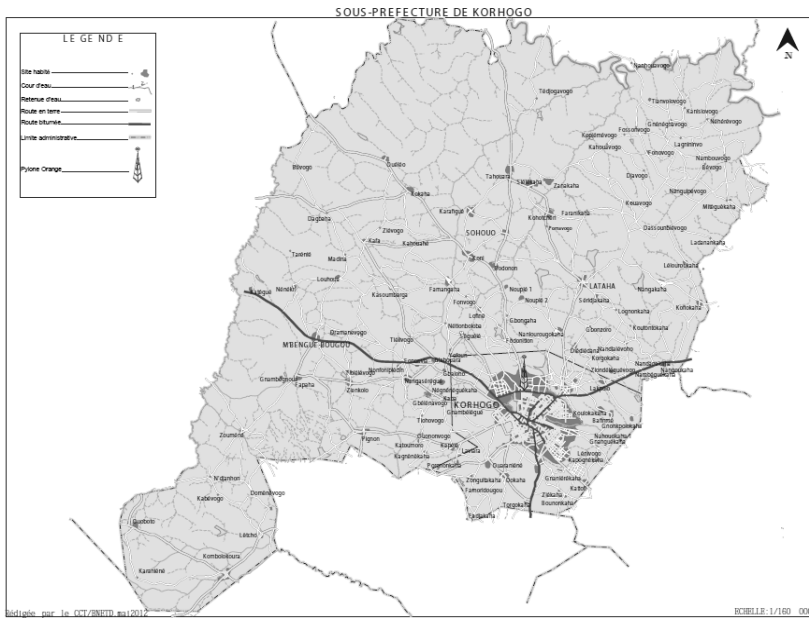




Figure 3. Map of Korhogo (Research Location 4).



Moreover, due to variations in perception of use of mobile phones between the rural producing areas and the urban consuming areas, the application of the “theory of spatial dynamics” has become expedient in this investigation. The study engaged a comparative spatial model with in-depth analysis of each location of production and consumption.

### Sources of data

Relevant data used in this work have been derived from these qualitative sources: document and literature review, in-depth interviews, key informant interviews, focus group discussions, and observations. The document and literature review entailed a comprehensive and analytical desktop review of applicable institutional and operational policies and other documents on the subject under investigation: the usefulness of ICTs in the process of enabling regular food supply from the countryside to urban centres, bringing sub-Saharan Africa into consideration. The purpose of the review was primarily to gain a deeper understanding of the specific impacts of ICTs, particularly mobile phones, on the drive towards food security in

Africa. Relevant research studies and evaluations already conducted by individual academic researchers and other research agencies on the subject at stake in Africa were equally undertaken. The aim of this review was to assess current knowledge on the relationship between ICTs and food production and distribution from rural African settlements to urban African centres. Current empirical literature that puts into cognisance variables such as gender, geography, policy, and so forth vis-à-vis the use of ICTs in the processes of food production and distribution were explored.

To buttress the study's specificities, IDIs were conducted in all locations of the research in Nigeria (Ilo and Ilesha in Ilesha Local Government Area and Ile-Ife and Aba Iyagani in Ife Central Local Government Area) and in Côte d'Ivoire (Soubré and Korhogo regions) putting into consideration variables such as gender, age group, farming focus, and geography in the process. In each of the four selected study locations in south-west Nigeria (that is, Ilo, Ilesha, Ile-Ife, and Aba Iyagani), four IDIs were conducted. In Côte d'Ivoire, seventeen IDIs were conducted in all sub-prefectures and villages within the two regions selected for the study, that is, Soubré and Korhogo. This action assisted in unravelling the specific impacts of application of mobile phones on rural farmers and urban buyers/consumers on productive food production and distribution. The interviews were conducted between September 2013 and March 2014 at the study locations in Nigeria, and between September 2013 and February 2014 at the study locations in Côte d'Ivoire.

Two face-to-face, key informant interviews (KII) (one female and one male) were conducted in each of the four study locations in south-west Nigeria, while a total of eighteen KII were conducted in all the sub-prefectures and villages that constitute the regions of Soubré and Korhogo in Côte d'Ivoire. Essentially, the KIIs were conducted to provide first-hand information on all the locations selected for the study and to provide leeway in gaining access to people of research interest.

Sixteen focus group discussions (FGDs) comprising eight participants each were conducted in each of the study locations in south-west Nigeria (that is, Ilo, Ilesha, Ile-Ife, and Aba Iyagani). The sessions were held thus: females, aged 18–39 years (Ilo and Ilesha); males, aged 18–39 years (Ilo and Ilesha); females, aged 40 years and above (Ilo and Ilesha); and males, aged 40 years and above (Ilo and Ilesha); females, aged 18–39 years (Ile-Ife and Aba Iyagani); males, aged 18–39 years (Ile-Ife and Aba Iyagani); females, aged 40 years and above (Ile-Ife and Aba Iyagani); and males, aged 40 years and above (Ile-Ife and Aba Iyagani).

In Côte d'Ivoire, a total of eighteen FGDs were conducted in all the sub-prefectures and villages that constitute the regions of Soubré and Korhogo. During all the sessions of the FGDs in Nigeria and Côte d'Ivoire, individuals of the same sex and age group worked with the researchers as co-facilitators of discussions for their respective groups. This was done to enable a free and conducive atmosphere for the exchange of information.

On a general note, the focus group sessions as a whole enabled the researchers to derive pertinent information from the people in a much more natural setting than would have been obtainable in one-to-one interviews. However, in combination with the key informant interviews, in-depth interviews, and observations, the focus group sessions provided a veritable platform for gaining access to various cultural, social, and agricultural peculiarities of the research subjects. Indeed, unexpected issues of significance to the entire study were thrown up, intermittently, for subsequent exploration.

For the purpose of participant observations, relevant farming, distributive and transactional spaces, and settings for food production and distribution within the study locations in Nigeria and Côte d'Ivoire were selected for collection of observational data. By virtue of such a participatory approach, relevant first-hand information and other useful hints on individuals' dispositions towards the applications of mobile phones for agricultural production and distribution were derived from the interactive process. That is, information was obtained on their attitude to a shift from the routine, non-economic use of GSM to its use to request fortified crop seedlings from agricultural extension workers and its actual application for marketing and distribution of farm produce from the village to the city.

The procedures for engaging mobile phones by both rural farmers and urban retailers (and wholesalers) in the processes of food production and distribution were given adequate consideration; other participants who do not use mobile phones in their day-to-day agricultural production and distribution practices were equally well captured in this work. Non-probabilistic sampling orientation in the likeness of purposive (and snowball) techniques were employed in selecting the required participants in the study. Initially, the selected respondents (KIIs) were engaged in gaining further access to other members of their respective groups. All the IDI and FGD participants were selected while considering the length of their agricultural and business experiences, genders, and locations in both Côte d'Ivoire and Nigeria.

Equally, for the collection of useful observational data through observations, relevant public and private spaces and settings were purposively selected in all the study locations in Côte d'Ivoire and Nigeria. As a whole, the study put into cognisance specific areas of study within the study locations in the sampling process, that is, Ilesha, Ilo, Ile-Ife and Aba Iyagani in Nigeria and Soubré and Korhogo, Côte d'Ivoire. Through the sampling procedure, the study had incorporated individuals who worked as independent farmers, cooperative farmers, farm labourers, truck drivers, traders, and regulatory organisations involved in agricultural production and distribution.

### **Procedure for data gathering and analysis**

Essentially, a pilot study had preceded each of the main surveys in Nigeria and Côte d'Ivoire. This was done to pre-test the potentiality of the research instruments that were engaged in the study, and indeed, to get accustomed to the study's locations. All the data gathered to explore the role of ICTs, notably mobile phones, in the processes of food production and distribution were based on prevalent situational peculiarities in each of the study locations in Nigeria and in Côte d'Ivoire. Our investigations in all the study locations so far took place from September 2013 to April 2014.

The interview guides for the study are presented as appendices. The subjects of the interviews and discussions include those who used mobile phones and those who did not use mobile phones in their day-to-day routines.

Texts of the information collected during interviews (that is, from the KIIs, IDIs, FGDs, and observations) were first transcribed from the tapes. These, with all data gathered from the participant observations, were coded and interpreted appropriately using manual content analysis and qualitative software packages: software Sphinx Lexica, WeftQda.

## CHAPTER TWO

# CONTEXTUALISING ICT AND FOOD SECURITY IN AFRICA

Ostensibly, the usefulness of ICT has cut across every stratum of human life. As such, its significance in modern-day agricultural production cannot be over-emphasised. In particular, the role played by the deployment of various applications of the global system for mobile communications (GSM) in enabling food security within the African context has been conspicuous. Due to the lack of reliable storage facilities (silos), the non-existence of facilities for processing perishable produce into finished products, and the poor road network (that inhibits the timely transportation of food products from the countryside to urban centres), the advent of GSM services on the African continent has been quite timely.

For nearly three decades, that is, from 1970 to 1989, the dominant issue in various discussions centring on food production, distribution, and consumption in Africa has been the functionality of the existing network for getting food products from rural producing areas to urban consuming centres. Meanwhile, the period of the 1950s and 1960s had seen an unwholesome drive toward the development of the cash crop sub-sector (primarily for foreign earnings) to the detriment of domestic production of food crops by various African governments. From the period of the mid-1990s there has been a significant renewal of interest, for instance, by the Food and Agriculture Organization (FAO) (1996), in smoothening the process of supplying urban settlements with food products from rural communities due to the immanent challenge of the urban explosion; nevertheless, the goal of sustainable food security has remained largely unrealised in most countries in sub-Saharan Africa (especially in the urban centres), including in Nigeria and Côte d'Ivoire. The push has been predicated on the need to respond to the increasing demand for food in the urban consuming areas by developing domestic capacity for production. This would essentially imply reduced dependence on imports, and a focus on at least cost routing for food items. This approach has also had the potential for social regeneration since a web of interpositions has existed amongst sprawling urbanity, poverty, and food insecurity (Molony 2007).

Notable earlier studies have analysed the nexus of food production and supply from rural areas to large cities in Africa. For instance, Goossens, Mintem, and Tollens (1994) focused on food supply from various Congolese villages to the city of Kinshasa; Chaléard (1996) focused on the supply of food products to the Ivorian cities of Abidjan and Bouake from the countryside; and Akinsanmi (2005) explained extant dynamics within the Nigerian configuration. According to Argenti (2007), there is an urgent need to give “priority to improving the efficiency of marketing systems and links between areas of food production and consumption in order to facilitate access to food and thus improve food security. Ordinarily, the processes of food production and distribution would entail several spatial scales: first, there is the suburban or rural areas where the production and collection of food products take place; second, there is the intervening logistical space of exchange and redistribution that stretches from rural collection to the urban markets; and finally, we have the urban centres as the locations for final disposal and consumption of food products from the countryside. Nevertheless, if rural food producers are to derive maximum benefits from the process of supplying the urban centres with food products, an efficient communication system is deemed expedient. This would enable timely connections between the rural producers and urban retailers/consumers. Aside from having better pricing for their food products, routine wastage that has often been an offshoot of the lack of a reliable storage system would be curbed, or at least, lessened.

While examining the spatial dynamics of urban–rural relations, Courade (1985) suggests that the impact of the urban centres on the development of the countryside depends largely on the modes of peasant organisation and the structuring of rural areas of food production. In most cases, urban demand for food products (from the rural areas) will continue to be an engine of change provided that extant agricultural supply chains, that is, communication and transportation, are efficient, and transaction costs are as low as possible. The introduction of GSM services in most sub-Saharan African societies at the onset of the twenty-first century has presented veritable possibilities that have made related individual and group intents realistic. For instance, the ability for numerous participants to utilise mobile phones in the processes of food production and distribution (that is, rural farmers, transporters, retailers, wholesalers, final consumers etc.) in Nigeria and Côte d’Ivoire has prevented undue wastage of farm produce, and by implication, enhanced the extent of profitability of rural agriculture and urban food distribution.

As noted by Obasanjo (2011), in this age of ICT, opportunities for new ways for conducting agricultural business and for enhancing farming