World Applied Sciences Journal 36 (7): 871-878, 2018
ISSN 1818-4952

DOI: 10.5829/idosi.wasj.2018.871.878

Scaling Up and Scaling Out of Agricultural Technologies in Africa: Imperative for IAR4D Concept

A.O. Fatunbi

Forum for Agricultural Research in Africa (FARA), 12 Anmeda Street, Roman Ridge, Accra, Ghana

Abstract: Agriculture in Africahas taken the center stage of the development discourse in the last decade;it has attracted an unprecedented attention which led to the enactment of different frameworks and policy interventions to foster development in the sector. The Forum for Agricultural Development in Africa (FARA) in response developed the Integrated Agricultural Research for Development (IAR4D) concept to mid-wife the desired change. The concept provided the guideline to generate relevant research outputs and mainstream the same to generate development outcomes and impact in a sustainable fashion. The IAR4D concept uses the Innovation platform as it operational framework and created a partnership arrangement between the public and private actors to jointly work in a commercial mode on the identified constraints around specific commodity value chain and system of production to foster change. The IAR4D proof of concept research showed a substantial improvement on the livelihood of the smallholder farmers and their income. This was made possible by structured adoption of technologies and effective market arrangements prior to production. To bring the efficacy of the IAR4D concept to scale in Africa, an effective scaling strategy that will endear broad based use of the concept is proposed. Such scaling strategy will integrate the IAR4D concept it into the institutional structure for conducting agricultural research and development in Africa countries. This is explicated as a veritable strategy to bring technologies to scale in Africa.

Key words: IAR4D · Innovation platform · Scaling strategy · Impact · Agricultural Research and Development

INTRODUCTION

The need to translate research outputsinto tangible developmental outcomes in Africa has been expressed by policy makers, development partners and scientists in recent years. This was due to slow progress in the developmentof the sector and its associated social and economic ills. African agricultural development has been hampered over the years because of the institutional orientation to research, coupled with thelinear approach which gives little or no consideration to multiple stakeholders considerations and end user requirements for research outputs.The Forum for Agricultural Research in Africa (FARA) took up this challenge following its inauguration in 2002. FARA carried out an intensive consultation with its stakeholders*viz.,* the scientists, farmers, extension, private sector, development partners etc. across the world. The consultation identified several constraints including; poorly developed agricultural markets, inappropriate policies, natural resource degradation, low productivity, poor product development, inadequate nutrition and gender inequality as key constraints confronting steady growth of the sector. The consultation also recognized the need to treat these issues in a comprehensive, but holistic manner; thus, an approach that foster the needed change must create a shift in paradigm around the way agricultural research activities are conducted.

The Integrated Agricultural Research for Development (IAR4D) was proposed to tackle these constraints. The IAR4D created a departure from the conventional linear approach to agricultural research and development by engaging multiple stakeholder along the commodity value chains. The approach also triggereda synergy among disciplines and institutions to foster a change in the way research and development is carried out by all actors; ranging from farmers to researchers and policy makers at the national and international levels.

Corresponding Author: Dr. A.O Fatunbi, Forum for Agricultural Research in Africa (FARA), 12 Anmeda Street, Roman Ridge, Accra, Ghana.

The Sub-Saharan Africa Challenge Program (SSA CP) coordinated by FARA, carried out research activities to prove the efficacy of theIAR4D concept in comparison with other approaches. The mission of SSA CP was to add valueto and enhance the impact of agricultural research for development in SSA. It aims to provide an example of how processes for systemic innovation can be organized among researchers, farmers, policy makers, market chain actors and rural communities [1]. The ultimate goal was to use IAR4D to improve rural livelihoods and increase food security and sustainable natural resource management throughout the sub-Saharan Africa (SSA). The IAR4D proof of concept research provided an empirical evidence of the efficacy of the concept in fostering effective identification of research issues, development of relevant research outputs leading to high adoption of technologies and other research outputs. The concept also fostered the generation of solution to various issues in the processes of translating research outputs to development outcomes and impact. Thus, IAR4D concept was proven to lead to higher income for the different stakeholders on the innovation platforms, it led to drastic reduction in income inequality etc [1].

The use of the IAR4D concept has experience gradual increase in use by different stakeholders involved in Africanagriculture. The CGIAR has mainstreamed the concept into its different systems research programs, while NGO's and other development partners are using the same in implementing their research activities. Despite the slight sporadic scaling, there is the concerted need to come up with an effective strategy to scale up and scale out the concept to foster broad based development impact across the continent.

The transformation of African agriculture is believed to be rooted in the quality of science that is channeled to foster the development of needed technologies. However, development partners have the notion that Africa already has large quantities of technologies that lie fallow with the research institutes. Although there is no empirical evidence to substantiate this assertion, it is widely believed that the needed action in Africa should be the scaling of proven technologies to achieve broad based impact and growth in the sector. There is a dart of information on any proven mechanism to bring technologies to scale across board and this currently constitute a research puzzle among researchers and development practitioners. The use of the agricultural innovation systems approach has been projected due to its robust nature and proven capacity to ensure wide adoption of technologies. Thus, this opinion papers aims to explicate the characteristics of the IAR4D concept and the innovation platform as a tool to foster the scaling of agricultural technologies for broad based impact in Africa.

Intricacies of the IAR4D Concept: The IAR4D concept is based on the innovation systems approach which involves multi stakeholders' collaboration and partnerships towards resolving the multi-faceted challenges in agricultural research and development. The essence of proffering diverse solution to the challenges is to foster improved livelihood and quality of life of the stakeholders, especially the smallholders' agricultural practitioners. The IAR4D concept relies on active interactions among actors to identify, analyze and prioritize challenges and source and implement solutions using feedback, reflection and lesson-learning mechanisms from different processes. This requires drawing on the knowledge of the relevant actors at each stage. The IAR4D concept enables the creation of a network of actors that facilitates learning and resolution of technical, social and institutional constraints that limit the potentials for growth in agricultural research for development. The key purpose of IAR4D is to generate and/or facilitate innovative solutions to address challenges in AR4D rather than mere research products or technologies. Often, as the IAR4D involves complex mechanisms and interactions, it could facilitate fundamental changes in the broader policy and institutional framework. The approach largely builds on the experiences of previous approaches, including integrated soil fertility management (ISFM) and integrated natural resource management (INRM) and encompasses market and policy domains [2].

The concept of IAR4D is that of an action research that engages several relevant stakeholders as it integrates the technological, natural resource management, policy and institutional dimensions in resolving a development challenge. The goal is to find an innovative commercial, social and institutional solution in responding to agricultural development challenges in the face of changing market and policy conditions. Its strength lies in its ability to engage policy and market, in addition to fostering systemic linkages among actors under diverse contexts. Therefore, the approach enables actors to have a stake in the process of generating, disseminating and using knowledge for socio-economic gains.

The IAR4D seems to be an iterative process that makes crafting a precise definition difficult, notwithstanding, a group of scholars [3] summarized the concept as comprising a set of individual and

organizational behaviors that promote the integration of stakeholder concerns, knowledge, actions and learning around a theme of mutual interest. FARA [4] describes the concept as an action research approach for investigating and facilitating the organization of groups of stakeholders (including researchers) to innovate more effectively in response to changing agricultural and NRM contexts for improved developmental outcomes. In general terms, IAR4D is regarded as a broad set of processes that, through their interactions, lead to the generation and use of knowledge [3].

IAR4D is considered as a framework for engagement and partnership of multi-stakeholders along the commodity value chain for the purpose of learning and sharing information and knowledge that may be innovatively applied in specific and/or broad terms to resolve challenges to increase productivity and enhance the livelihoods of the concerned actors. It is an innovation process that seeks to empower actors in technical, social and economic terms and in such a manner that they are never left worse, off than when they were first expose to it.

As an integrated approach, the IAR4D shortens the period it takes for actors in research and development to achieve meaningful outcomes as benefits for adoption. It is an approach that allows for quick diagnosis of challenges as well as exposes opportunities for enterprising actors to explore development products and services that promote visible means of livelihoods.

The IAR4D goes beyond its acceptance as new approach to doing things to include changes in personal skills, mindsets and attitudes of actors as well as the organizational practices and culture and the ways in which these organizations interact to achieve the desired outcomes, as part of the wider 'innovation system'.

The IAR4D Principles: The guiding principlesof the IAR4D concept include; (1) the integration of *perspectives, knowledge and actions of different stakeholders around a common theme or 'entry point'*.The concept encourages the collation of the perspective of the different stakeholders on the constraint around the commodity of interest and system of production. These perspectives are analyzed and it defines the entry point for generation of solutions, implementation of action and lesson learning in such a way that a win-win situation is achieved. (2) Integration of learning through working together. The IAR4D concept recognized that stakeholders have relevant knowledge that could be harnessed in sourcing solutions. The integration of the different actors also fosters mutual learning and the complementary effect towards the generation of innovation. Learning takes place at individual, organizational and institutional levels. (3). *Holistic analysis of change.*The IAR4D concept considers all the issues that surround and affect the needed change. It follows the systems configuration and recognized that an alteration in any of the component of the system will create a new equilibrium with tradeoff. The magnitude of the tradeoff will determine the benefit of the change. (4). *Analysis, action and change at different levels.*IAR4D concept applies the innovation systems perspective and understands that research is not the only driver of change and development. The agricultural innovation systems perspective sees research as only one of the sub-processes of the framework that encompasses the value chain and the knowledge and information system, as well as policies and institutions that determine the change process.

In addition to the foregoing, the IAR4D ensures a smooth public-private partnership in ARD, it essentially carries out activities in a commercial mode to ensure socio-economic benefit to the stakeholders. It simultaneously addresses research and development as a fused continuum for generation of innovation. This bridges the gap between knowledge and technology generation and its use. It fosters the understanding that research should lead to development, while the tradeoff from development efforts represent the subject of new research endeavors. IAR4D essentially generateInnovations that benefit all stakeholders on the platform. This ensure a win-win scenario based on investment by the different stakeholders, since it works in a commercial mode, the concept demands investment from partners which is followed by returns on investment. The sustainability of the action on an IAR4D platform requires the contributions of the policy makers in terms of development of informed policies and provision of infrastructures.

These principles imply a new way of doing research to ensure development outcomes and impact. The approach gives attention to (a) intensification of subsistence oriented smallholder farming systems; (b) prudent management of natural resources while intensifying their use; (c) development of more efficient markets; (d) creation of enabling policies; (e) attention to development of new product; and (f) consideration for nutrition and gender as crosscutting issues. To foster the integration of the various dimensions of agriculture development, IAR4D requires additional supportive

mechanisms in terms: (i) promotion of organizational and institutional changes to enable cross-disciplinary research and development and multi-institutional collaborations; (ii) capacity building for stakeholders on the innovation platform *viz.,* farmers, other private sector partners, extension agent and scientists; (iii) information and knowledge management; and (iv) continuous monitoring and evaluation with a systemic approach to impact assessment.

The essential character of the IAR4D concept that supports the scaling of agricultural technologies is its unique blend of research and development confines. This necessitates an operation in a commercial modeand ensures effective partnership of the public and the private sector actors. It is known that where commercial opportunities abound, users will necessarily embrace the use of needed technologies that will aid production and profit.

Characteristics of Scalable Technologies: Scaling agricultural technologies will require a good understanding of the nature of technologies itself; technology is defined as the sum of knowledge of received information, which allows things to be done [5]. Thus, agricultural technologies represent a flow of new knowledge on the use of the available resources in a more efficient way to yield better outputs. Technologies do have certain characteristics that defines the scope of scalability.(1). Technologies are often location specific, location specific variables define them such as climate, topography, soil type etc.These variables given, are considered during the technology generation process to ensure that the technology meets the specific needs. This does not preclude the possibility of having technologies that could perform well across wide range of locations and conditions. To pitch technology up for scaling it is essential to characterize such technology and define its scope and relevance. (2). Social and cultural delineations also affect Technologies; certain technologies may not be socially acceptable in some location due to socio-cultural and religious issues, as such its scalability will be limited to cultures where the content of such technologies are acceptable. (3). Technology does not deliver good benefits alone but in a group of complementary technologies and other well aligned institutional conditions, this is vital to the scaling potential of such technologies. It is necessary to consider technology packageswith the notion of scaling, part of the packaging should also include complimentary issues, *viz.,* institutional arrangements, trainings, input delivery, output market etc. that enhances the delivery of outputs from such technology.

Theory of Scaling: Available knowledge on scaling technologies projected two categories; the scaling out and scaling up of technologies. Other school of thoughts using special definitions labelled it as horizontal and vertical scaling. These refers to the same activities that are expected to complement one another to achieve broad based benefit from the technologies. Scaling out refers to process and actions that provide access to and facilitate*effective use*of specific or group of technologies for benefits. It refers to placing technologies in the hands of many more users within and outside the geographical location where it was generated and piloted. Scaling up refers to Provision of appropriate *institutional support*to aid the adoption, use and successful benefit from specific technologies. Scaling up often require the creation of awareness and leveraging policies support across the governmental hierarchy to provide the enabling environment for specific technology or group of technologies to generate benefits. The scaling up processes can take many forms and range fromnational outreach covering the entire population to a policy reform spurred by a successfulpilot. This can take the form of expanding, replicating, adapting and sustaining successfulpolicies, program or projects in a geographic space and over time to reach a greaternumber of rural and urban poor [6]. Scaling up is also referred to as Vertical scaling, connoting an expansion higher up the ladder. It is institutional in nature and involves other sectors/stakeholder groups – from grassroots organizations to policymakers, donors, development institutions and international investors. Some scholars explained that scaling up could have both horizontal and vertical dimension with the former referring to adoption and the latter to institutionalization [7].

Other school of thoughts [8] sees scaling up as embracing the two dimensions ofproject expansion to cover a wider audience or clientele and bringing about institutionalchange.

Horizontal scaling is the geographical spread and expansion to more people and communities within the same sector. It could also be referred to as a scaling-out processacross geographical boundaries. Horizontal scaling is also known as ‘scaling out’. Thus, theequation

Horizontal scaling up = scaling out = adoption

While
Vertical scaling up = institutionalization = decision making at higher levels.

The difference between 'horizontal scaling, vertical scaling and'institutionalization'. It accents that 'horizontal scaling' is a geographical spread to covermore people and communities through replication and adaptation and involves expansionwithin same sector or stakeholder group [7]. The decision making is at the same social scale whereinstitutions are convinced to accept and internalize the underlying principles of an innovationso that these remain as guiding principles of practice even after the interventions has end. The outcomes differ in many respects from the linear process of disseminating a new variety because these complex research outcomes as envisaged in innovation systems thinking involvesmultiple stakeholders and work with several different components of a complex system, wherein immediate research outcomes may be less applicable for others.

Vertical scaling, thus,refers to expanding an innovation beyond the original participants and objectives of the pilot.This almost certainly implies an increase in the geographical scale of the project in which thetechnology is adapted and applied. However, the key variable is that decisions are being made at a higher level. The sustainability condition within scaling up implies leaving people with the adaptive capacity to deal with problems as they arise.

Institutionalization occurs when the development of adaptive capacity involves a range ofactivities, including training; building networks, creating functional organizational structures,and gaining institutional support to have the technologies become an internal part of aninstitution in a sustainable way. This implies not only a change in the way people work, but alsoa change in the written and unwritten rules of the institution and a change in the way peoplewithin that institution think.

Thus, scaling up requires adapting knowledge and technologies to end-users, be they farmers or institutions and to variable conditions. Scaling up will require adaptation of technologies, understanding ofunderlying principles, capacity building and substantially greater investment.

Mediator of Technology Scaling: Technology scaling could go in two different directions, one is the sporadic scaling and the other is planned scaling of technologies.

The sporadic scaling of technology refers to the spread of the technologies to more users without any stimulation or effort to orchestrate the spread. Sporadic scaling is governed by the principle of social awareness and the human need to scout for superior solution to its problems. The guiding philosophy is that a superior technology cannot be hidden", it will necessarily be discovered and used. A few factors affect sporadic scaling of technologies, these include; (1). The superiority of the technology over the current practice. This could be in terms of input required, time, potentials provide good yield under hardy conditions, resistance to pest and diseases, low drudgery etc. Farmers and other stakeholders along the value chain are constantly in search of cheaper options to boost profit, when this exist such technologies will often "escape from confinement" in the research station and become wide spread among users. (2). Market pull for specific commodities often have an interplay on the scalability of the required technology. Availability of output market is reported to influence the production of agricultural commodity and other enterprise along its value chain. This will spur the demand for the required technologies to enhance the production and profitability. Hence, market led technology generation is an effective way to ensure adoption and getting widespread scale. (3). Social awareness and societal change could also lead to sporadic scaling of technologies. In recent times in Africa, a handful of megatrends have changed the production and marketing style for agricultural commodities, an example in the growth in the middle class and its associated social awareness. This has led to the demand for more healthy and nutritious food and better packaging for specific class of consumers. This has created more awareness for organic food and a demand for affordable technologies that can enhance the production of organic food and the profitability of its enterprise. Such technologies will not require comprehensive efforts to go to scale since it is already created by social change. (4). Invention characteristics of the technologies refers to the ability of the specific technology to provide solution to a well-known problem with debilitating effects. Technologies generated with this capacity and complimentary conditions like, ease of use and availability of the needed inputs will generally get to scale without strong efforts to get the users to adopt.

Planned scaling of technologies seems to be the current crave of the Africa agricultural research and development fraternity. This crave relies on the speculative mantra that "African agricultural research has generated a lot of technologies that remains on the shelves in the research stations and university because they have suffered lacks adoption". As such efforts, should be diverted to getting these technologies to scale rather than an investment in science to generate more technologies. This mantra appeals to the sensibilities of ARD stakeholders are under pressure to orchestrate the development of the agricultural sector in the short run. However, the author of this opinion is not aware of any well researched and documented evidence of this claim, neither of any comprehensive inventory of available agricultural technologies at the country level. A few documentations exist on inventory of innovations in a few countries e.g. the JOLISA studies of 57 innovations in Benin, Kenya and South Africa; and recently the Program of Accompanying Research for Agricultural Innovation (PARI) commission studies in 12 African countries to develop the inventory of agricultural technologies and innovation. The need to carefully orchestrate scaling of proven technologies from different pilots will however require an effective strategy. This is because of the wide variation in the basic characteristics of technologies and "One cap fit all" kind of strategy may not deliver the desired end. Nonetheless, there are some common mediator for planned technology scaling, they include; (1). Technologies developed with planned benefit pathways in view. These kinds of technologies can easily be structured into a planned scaling strategy; however, such technologies must be demanded by the end users that are engaged in a well-structured Multistakeholders platform. The key elements that ensures the functionality of an effective Multistakeholders platforms has been reported elsewhere [1, 5]. Such criteria include joint identification of problems, sourcing solutions, learning lessons and more importantly operation in a commercial mode with coherent business plan. This clearly shows the pathway for benefits and the scaling strategy will target the stakeholder category that require the technology. (2). Technology packaging refers to a balanced technology make-up that takes into consideration the circumstances of the end users in terms of wealth status, education, social awareness etc. Although African agriculture is gradually growing, technologies that will still fit the system should largely be embedded in the seed, it should be easy to practice, endear less drudgery, require low external input and be accessible and affordable by the smallholder farmers. In the short run, exotic technologies that require hi-tech input and knowledge to operate may not be scalable. Lessons from previous interventions including the hybrid maize varieties, the multiple fertilizer combinations, use of agrochemicals faced problems of scaling as they require training and retraining to yield their technological advantages. Often technologies deliver advantages in a group of other complementary technologies and institutional conditions, this should be factored into the technology packaging. (3). Market stimulation, technology packaging for scaling will necessarily need to consider the input and the output market need for the technology to orchestrate profitability for the end users. Essentially the issues of commodity competitiveness in terms of quality and price need to be considered all along the process of technology packaging for scaling, where technologies lead to better profit it thrives well within an orchestrated scaling framework. An important action to market availability is the consistent development of new value chains and product from the commodity, this is vital to sustain profitability once the existing market becomes saturated. Market saturation is a common occurrence with introduction of superior technologies that target productivity, where new avenues that will take the commodities are not pre-thought, it has the tendency to halt the scaling and affect its use. Implicit in the market stimulation mediator is to carry out diligent market science and packaging of commodity to ensure consistent profitability.

Innovation as a Precursor of Technology Scaling: The concept of agricultural innovation is vital to achieving structured scaling of agricultural technology. Innovation refers to knowledge, technologies and inventions that have been used and it has resulted into socio-economic benefits. Technologies is a vital component of the innovation process and it should not be considered as innovation. Technologies needs to be accompanied with other institutional environment for it to yield its outputs and benefits. For technologies to enjoy scaling it must obviously be easily translatable to good profit and socio-economic benefit along the value chain.

The vital elements for orchestrating agricultural innovation are illustrated in Fig. 1. A multi-stakeholder platform is a necessity to foster the interaction of stakeholders with personal stake in commodity of interest or the systems of production. Other stakeholders that influence the value chain are also engaged to interact in identifying problems, sourcing solution options including the technologies and modification of the institutional arrangements and learning lessons. The interaction of the stakeholders.

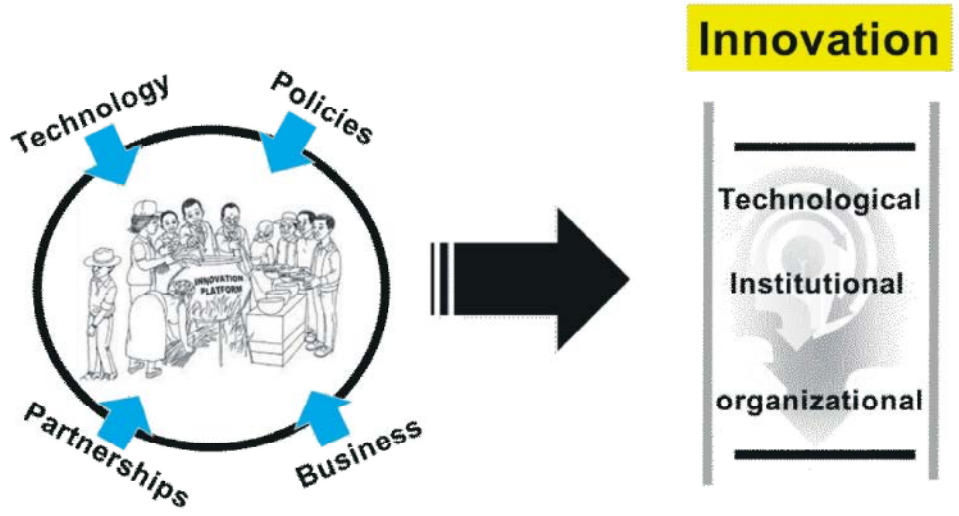

Fig. 1: Vital elements for generating agricultural innovation.

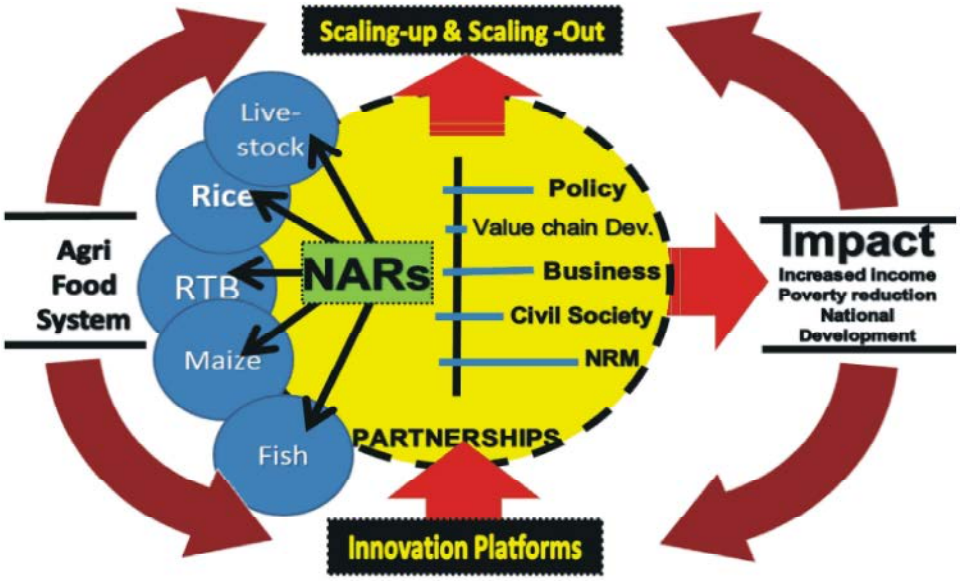

Fig. 2: A conceptual framework for technology scaling using the AIS approach.

Scaling the IAR4D Concept for Broad Based Agricultural Growth: The IAR4D concept is implemented on an innovation platform, this is physical or virtual platform that engages multidisciplinary stakeholders drawn along the commodity and system value chain to interact to identify problems, source solution and implement solution options till an innovation is generated. The set up and operationalization of the IP has been reported elsewhere [9]. The efficacy of the IP has also been proven and documented by many authors [10, 11].

Attempt to scale the IAR4D concept and the innovation platforms is believed to have the potentials to ensure the realization of broad based benefit from research outputs. Fig. 2 showed a conceptual framework within which the strategic innovation platforms are created at the higher governmental level to developpolicies and infrastructural development for scaling. The establishment of the strategic platforms is the first step in scaling up technologies, it will provide all the technical and organizational frame to institutionalize agricultural innovation systemsin the country. This effort should be followed up by establishment of the operational innovation platforms forspecific commodities. Relevant technologies will be taken up by the different innovation platforms based on needs and commercial opportunities that are created. This will promote smart adoption of superior technologies and foster the use of technologies at scale.

CONCLUSION AND RECOMMENDATIONS

The development of agriculture is hinged on broad use of technologies, knowledge and inventions. These technologies are developed by research organizations on the continent and they have the potentials to yield improved outputs from farming activities. Most agricultural technologies in Africa are hardly used beyond the environment where they are tested or developed, thus, creating island of successes across the landscape on the continent. Previous efforts to bring technologies to scale did not achieve the desired results due to various reasons ranging from the nature of technologies itself, i.e. its transient nature and potentials to become irrelevant as problem situation changes. Secondly, the appropriateness of technologies with regards to the priority problems of the end-user and the cost and affordability of the technology and its various elements. This paper argue that technologies are adopted and used when they have economic potentials *viz.,* the generation of sufficient profit from farming enterprise that require the use of the technologies; the ease of use for the technology, the relative availability and affordability of the inputs required for the technology etc. Apparently, technologies that are adoptable are equally scalable to more individual's users for benefits. To foster broad based scaling, the agricultural innovation systems approach and the innovation platform processes the characteristics and stakeholders compliment to ensure continuous action in business mode and learning for benefits to all stakeholders. Broad based scaling will thus require wide adoption of the innovation systems approach and establishment of the operational innovation platforms for different commodities and systems of production. The establishment of the strategic innovation platforms may also be necessary to contribute policy interventions and infrastructural development to aid continuous growth of the operational innovation platform.

REFERENCES

1. Adekunle, A.A., A.B. Ayanwale, A.O. Fatunbi, A. Agumya, F. Kwesiga and M.P. Jones, 2013. Maximizing Impact from Agricultural Research: Potential of the IAR4D Concept. Forum for Agricultural Research in Africa (FARA), Accra, Ghana.
2. Von Kaufmann, R., 2007. Integrated Agricultural Research for Development: contributing to the Comprehensive Africa Agricultural Development Programme (IAR4D in CAADP). p 63–73. In: Bationo A, Waswa B, Kihara J and Kimetu J eds. Advances in integrated soil fertility management in sub-Saharan Africa: challenges and opportunities. Springer, Netherlands, pp: 1091.
3. Hawkins, R., R Booth, C. Chitsike, E. Twinamasiko, M. Tenywa, G. Karanja, T. Ngoobo and A. Jan Verschoor, 2009a. Strengthening inter-institutional capacity for rural innovation: experience from Uganda, Kenya and South Africa. pp: 313-325. In: Sangiga P, Waters- Bayer A, Kaaria S, Njuki J and Wettasinha C eds. Innovation Africa: enriching farmer's livelihoods. Earthscan, UK.
4. FARA. 2007. Sub-Saharan Africa Challenge Programme, Medium Term Plan 2008–2010. Forum for Agricultural Research for Africa, Secretariat, Accra, Ghana.
5. Fatunbi, A.O., A. Youdeowei, S.I. Ohiomoba, A.A. Adekunle and O.O. Akinbanijo, 2016. Agricultural Innovation Platforms: Framework for Improving Sustainable Livelihoods in Africa. ForumforAgriculturalResearch in Africa (FARA), Accra Ghana.
6. UNDP. 2013. Guidance Note. Scaling Up Development Programmes
7. Menter, H., S. Kaaria, N. Johnson and J. Ashby, 2004. Scaling Up in Pachico, D and Fujisaka, S (eds.) Scaling up and out: Achieving widespread inpact through Agricultural research. CIAT, Columbia.
8. Gündel, S., J. Hancock and S. Anderson, 2001. Scaling-up strategies for research in natural resources management: A comparative review. Chatham, UK: Natural Resources Institute (unpublished report).
9. Adekunle, A.A., A.O. Fatunbi and M.P. Jones, 2010. How to set up an innovation platform. A concept guide for the Sub-Saharan African Challenge Program. Forum for Agricultural Research for Africa (FARA) Secretariat, Accra, Ghana, pp: 10.
10. Adekunle, A.A. and A.O. Fatunbi, 2012. Approaches for Setting-up Multi-Stakeholder Platforms for Agricultural Research and Development. World Applied Sciences Journal, 16(7): 981-988.
11. Pamuk, H., E. Bulte, A.A. Adekunle and A. Diagne, 2014. Decentralized Innovation Systems and Poverty Reduction: Quasi-Experimental Evidence from Central Africa. European Review of Agricultural Economics 42(1):99-127.