ICT Adoption For Bridging South African Black Farmers’ Knowledge Gap

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Abstract

South Africa’s post-apartheid Black farmers, commonly referred to nowadays as emerging farmers, need knowledge support to be successful in agricultural productions. An ICT-based knowledge support can assist in increasing access to their agricultural knowledge. However, bridging the knowledge gap using ICT will involve addressing ICT-related infrastructures provision challenges. In this paper, challenges hampering agricultural support provision in South Africa, particularly amongst emerging farmers in the quest to expand beyond subsistence farming, are discussed. It also addresses the need for the provision of a sustainable ICT-based knowledge support infrastructure, which would enable bi-directional interaction amongst agricultural stakeholders.

Keywords

ICT Agriculture; Agricultural Knowledge Provision; Knowledge Support; Emerging Farmers

Introduction

Addressing social issues such as food, security, poverty, unemployment, health and equity of any society or country is a challenge. Agriculture plays a crucial role in sustainable development and in hunger and poverty eradication. As indicated in the South Africa National department of Agriculture annual report (2001), about 70 percent of the rural population derived their livelihood from agriculture. The Native Land Act of 1913 barred Black people from mainstream agricultural practices and encouraged those with interest in generating income through farming to migrant farm labour. This livelihood strategy for many Black farmers, as indicated by Kinnear et al (sa:1) and Donovan (1994:275), was in the form of wages, pension and remittance.

Agriculture and land are well acknowledged as potential resources for poverty alleviation. Cultivating the land for productive purposes requires minimal training and education, particularly when the objectives of cultivation are not about income generation but subsistence. The mission is to achieve sustainable food security, reduce poverty and generate employment to its teeming population of unemployed, particularly the youth. The democratically elected government of South Africa has been seeking ways to promote the involvement of every willing individual in its commercial agricultural sector.

However, commercial farming is a knowledge intensive occupation. According to Omekwu (2003:445), it is a multidisciplinary or interdisciplinary field of human knowledge and endeavour through which knowledge could be drawn from pure and applied sciences, the social sciences, medicine and the arts. Mack, Ravin and Byrd (2001:1) indicated that all human work, even the most physical labour, involves cognitive capabilities.

The desire of the South African government to transform the landscape of the agricultural sector by encouraging the involvement of the Black segment of the population goes beyond the provision of land, finances, minimal training and seasonally paid mentorship; rather, a more pragmatic approach of sustainable on-the-job educational support is employed. Furthermore, to realise the transformation of Black farmers into market-oriented farming and improved their production potential, bridging South African Black farmers’ knowledge gap is not an option, but a requirement.

In farming, as in any other professions, knowledge is required for its various segments and activities in order to be successful. For instance, in agricultural land preparation, seeds, seedlings, fertilizers, pesticides, harvesting, and post-harvest handling require that farmers or their employees be adequately equipped with the intellectual capability or relevant intellectual support for evaluating and incorporating new experiences and information. Intellectual capability is vital for integration of ideas, experience, intuition, skill and lessons learned; enabling the potential to create value is essential.
A vast majority of Africa’s smallholding farmers, as indicated by Kelly et al (2003:380-383), rarely use modern inputs because a farmer who has no knowledge of inputs and who lack training on how to use them will be unlikely to adopt them. In the new dispensation of democratic South Africa, government has redressed the injustice of the past, through land redistribution programme which will enable interested Black South Africans into the mainstream of market-oriented farming.

South African farmers are globally acknowledged to be well versed in modern agriculture. However, this claim can only be attributed to a segment of South African farmers, particularly the Whites who, in decades past, enjoyed enormous support from the government; however, their Blacks counterparts were not as privileged. While the well-developed commercial agricultural sector is mainly in the hands of White South Africans, the Black farming sector, on the other hand, remains at the subsistence level in the rural areas (Kinnear et al, sa:1; Donovan, 1994:275; Lyne & Darroch, 2004:1).

The results of decades of discriminatory policies and exclusion that characterised South Africa’s farming landscape, where Black South Africans were restricted to substandard education, lack of complementary agricultural support infrastructure, such as capital and extension services, are bound to be some overriding handicaps with which Black farmers will continue to struggle (Karuiki, 2004:35). As indicated by Lyne and Darroch (2004:2), the current political and economic crisis in Zimbabwe clearly illustrates that land redistribution without requisite intellectual capability for factors of agricultural production’s utilization (Wong & Aspinwall, 2006:634) does not guarantee political stability and economic growth.

A number of techniques are currently adopted by the democratically elected government of South Africa to address the existing Black farmers’ knowledge gap including: Mentorship, use of community radio, Agric television, extension services provision, workshops and conference attendance, farming group and association.

**Problems: The Potential of ICTs in Enabling Seamless Agricultural Knowledge Uptake**

South Africa is known worldwide for its agricultural sector with a dual structure consisting of a well-developed commercial or market-oriented farming and subsistence or risk-free farming. Those involved in market-oriented farming have gained substantial experience through formal agricultural education involving the use of scientific research-related activity and the privilege of prior experiential learning from notable commercial farms directly owned by family, relatives or friends.

The Black South African groups with subsistence farming experience are not as fortunate; they lack formal agricultural education, and their involvement in farming has been restricted to taking orders or instructions from a superior who often are from the segment with commercial farming experience. Monocropping farming is never an option for those involved in subsistence; besides, allocated farm land to this group of farmers is generally small; while mixed farming is considered to be more sustainable and economically viable.

Therefore, agricultural practice knowledge of these segments of farmers, particularly in market-oriented farming, is non-existent. These groups of farmers are considered nowadays as Black emerging farmers, that is, those intending to transform to commercial farming. In essence, they will have to understand how to manage farming involving one produce rather than mixed produce, manage large expanses of land with professional employees rather than those that can be subsistencely managed, relying more on scientific research reports rather depending on traditional farming approaches.

In order to provide agricultural knowledge support to these groups of emerging farmers who lack formal education and prior experiential knowledge in commercial or market-oriented farming, there must be the moving away from support approaches that could be considered as knowledge push, which do not take into consideration the farmers’ background and prior learning in farming. There is the need to explore better alternatives to existing agricultural knowledge support strategies, which could enable emerging farmers’ transformation and, at the same time, allow improved farmers—interaction, collaboration with all agricultural sector stakeholders, and sharing their experiences and requirements.

The problem is not that agricultural knowledge providers in South Africa are incapable of generating high-quality, innovative knowledge materials. On the contrary, there is a vast supply of potential agricultural knowledge generators, and a significant demand for their work. The problem, as indicated by Gruber, Tenenbaum and Tenenbaum (1994:3), is that
the infrastructure for development and delivery of generated knowledge materials is extremely inefficient. Knowledge materials are often developed in isolation without coordination, and media resources are seldom re-used. Therefore, traditional delivery, such as knowledge libraries, is limited by physical proximity, training seminars held in auditoriums, and hotel boardrooms. Black emerging farmers are proportionally unevenly distributed, thus hampering access to personalised, just-in-time, and on-the-job learning.

**Study Objective**

The main objectives of this study were to understand the existing challenges hampering the transformation of South Africa’s emerging farmers into market-oriented farming and to evaluate the overall performance of using traditional agricultural knowledge diffusion approaches as a means of providing agricultural knowledge support, particularly to those in the rural community, in order to enhance sustainability. The study also aimed to evaluate how ICT could be implemented to provide the needed agricultural knowledge support infrastructure for farmers’ transformation.

**ICT Usage for Knowledge Support Provision**

ICT has revolutionised the way we live, communicate, share and re-use knowledge. The interactive process of making the right information or knowledge available in a comprehensive manner to people of common interest is known as knowledge sharing that as indicated by Vikas (2002:2) can take place at all levels. However, to enhance equitable sharing, knowledge must be placed in the public domain to discourage its exploitative use by only a handful of users.

Considering the importance of an effective and efficient means of information and knowledge transference, communication and distribution, and in order to promote the continuous improvement of competitiveness and leadership in information technologies and skills, ICT can be applied to effectively and efficiently support the further development of the agricultural sector in South Africa.

ICT is considered as the most viable platform alternative that may be used to enable South Africa’s Black farmers’ transformation because of various services and tools that could be made available when providing required personalised support in the agricultural domain. The continued evolution of the internet provides a platform for individuals to establish interactions with remote knowledge support systems which are able to recognise their personal attributes for services and information or knowledge delivery.

Multimedia resources and a host of applications that could be used to provide the required agricultural knowledge in a synchronous and asynchronous mode, affording the user the opportunity to learn and respond to issues without the time constraints make ICT a viable platform; which happens to be the bane of the traditional agricultural knowledge support.

The synchronous or asynchronous resources of ICTs for knowledge support may be independently applied without being integrated, depending on the user’s preference. However, the integrations of both synchronous and asynchronous mode set of applications are more acceptable today for knowledge support. A platform of tools where dynamic services could be provided 24/7, affording personalisation, enables the users to learn at their own pace with additional options of storage for future use. Meanwhile, it is equally possible for any willing users to share their personal experiences and suggestions with others online.

The application of ICT for agricultural knowledge support is a paradigm shift from the tradition of using radio, television, farmer days’ shows, board room conferences/workshops/symposia, printed media and the likes where knowledge support services are often restricted by location, duration, cost and space. The heterogeneous nature, as indicated by Van der Walt and Coetzee (2003:1), and the specificity of knowledge required by Black farmers who often feel difficult to cluster together, render the use of community radio inappropriate and inefficient. Radio is, however, commonly regarded as cost effective, considering the reach of its coverage. But knowledge support is not only about the breadth and width of coverage; it is also about the value, adoptability, relevance to current activities, and usefulness of the disseminated knowledge by the end user.

**The Study Context**

The research approach was designed to understand existing agricultural knowledge support of the Black South African farmers commonly referred to nowadays as “emerging farmers” to denote their involvement in commercial or market-oriented farming in contrast to their previous subsistence farming practices. Participants were selected using purposeful, or
judgemental, and snowballing sampling approaches. The participating Black farmers have minimum of secondary education, but those without basic education in agriculture have been excluded in agricultural education prior to 1994. Those involved are able to interact with technology, such as using internet browsers, emailing and instant messaging. It was also pertinent that those with basic agricultural education were excluded because of their capability to understand agricultural terms required for solving farm challenges and interpreting agricultural research results that people without agricultural education will require further explanation from established commercial farmers or knowledge support service providers.

Knowledge support service providers to this group of emerging farmers were also included as participants in order to understand challenges they encountered in their bid to provide the needed support to these farmers. Knowledge support service provider participants were identified by the participating emerging farmers; because the researcher wanted to ensure that knowledge support services providers have been directly involved with emerging farmers.

**Data Collection**

The qualitative interpretive research approach was adopted because it enabled the researcher to collect empirical data directly from the subjects themselves while sitting with the respondents presenting their views, perceptions and detailed expectations. The strategy contended that knowledge and understanding are subjective and ideographic, and truth is context-dependent and can only be obtained after the entry into the participants’ reality.

The researcher was able to observe subtle communications and other events that were not anticipated, which added credibility to the data, but could have been difficult to noticed, if other approaches had been utilized (Babbie, 2005:296). The study adopted a grounded theory research design.

A grounded theory research design, as indicated by Babbie (2005:304), attempted to derive theories from an analysis of patterns, themes, and common categories discovered in data sets, enabling the researcher to be scientific and creative at the same time. In other words, the researcher must be able to see the reality or “proposed model” from the data, based on theoretical explanations or categories produced through comparisons of literature or experience against the actual data sets and, at the same time, the researcher must adhere to procedures that help to overcome biases.

**Data Analysis**

In this study, data analysis was carried out by treating each research respondent on its own merit, and then cross-participants’ analysis followed. The researcher collated the number of answers on each research question answered. The empirical data obtained through the use of tape recorder from semi-structured interviews were transcribed verbatim, reviewed and coded to create data sets. In the process of reviewing transcribed data, responses were treated according to the research questions they responded to and in the process created data sets, categorised under the sub-headings of the question themes. The researcher then produced inductive themes according to each of the research questions. These themes were then compared with the outcome of the literature review and experience from the field, with the focus on overcoming biases in order to develop an agricultural knowledge support model.

**Research Results and Discussion**

Data were collected from the participants utilizing a semi-structured interview, observation and discussion. Participating emerging farmers expressed their inability to secure the needed agricultural knowledge support and the challenges involved in seeking for solutions from locations that are most often far from their base of farming operations. While participants’ agricultural knowledge service providers expressed their inability to meet the heterogeneous need of the farmers and the lack of resources, such as human capital and transportation to move across farm locations that are geographically dispersed with uncommon needs, both expressing their willingness to contribute to any web-based platform that could foster interaction and collaborations between agriculture sector stakeholders.

Challenges militating against the use of traditional agricultural knowledge supports of SA emerging farmers

In this study, a strategy of agricultural knowledge support to enable South Africa’s Black emerging farmers’ transformation for optimal agricultural production was proposed, with the aim of providing one point of access, interaction and collaboration amongst farming stakeholders. This type of one point
of access, interaction and collaboration on issues relating to farming support which are currently in disparate sources and locations, lacking the needed coordination that may enhance farmers’ quick decision making is required. While knowledge support experts are often required to provide personalised support to farmers whose needs are heterogeneous in nature, however, there is no single platform, currently in existence, that could enable knowledge support experts to attend to individual farmers’ needs. In other words, farmers will have to individually visit knowledge sources centres or the knowledge support sources directly or visit individual farms.

The existing use of information technology for agricultural knowledge support includes technologies such as radio, television, computers, video tapes, CD/DVD and even the World Wide Web; however, the lack of interaction amongst knowledge providers, brokers (extension workers) and users render them inadequate for the support of Black farmers whose educations in agricultural practices are limited in relation to market-oriented farming. Moreover, knowledge provision and support through the use of these media are often in a compressed format, requiring further interpretation and use linear approach for information gathered from various sources. The information is subsequently prepared through various stages of editing before publishing to the general public or recipients. Besides, individual farms’ and farmers’ attributes are never considered as relevant to the focus of published material.

This approach of knowledge support faces varied challenges including

- Knowledge is sometimes not delivered when required by the recipient
- Compression of knowledge to accommodate allotted space and time
- Knowledge is treated as a static commodity which may not change over time
- Knowledge is expert-centred; not user-centred or user-friendly
- Contextualization of knowledge requires further analysis and interpretation
- Since knowledge is generated from various sources before presentation, users are not likely to be able to confirm from the sources any challenges encountered during implementation
- Sources of knowledge are difficult to be verified before adoption.

ICT and the internet in particular are capable of providing the resources required to foster one point of access, interaction amongst farming stakeholders and the integration of disparate agricultural knowledge sources.

The empirical study clearly indicates the enormous need of user-centred agricultural knowledge support of South African Black farmers. Incidentally, the existing techniques of agricultural knowledge support are more appropriate and will add value to those with previous basic agricultural expertise who may require further understanding of specific farming practices. Thus, the study’s empirical findings bring to the fore the importance of providing agricultural knowledge support infrastructure that could enhance direct interaction and collaborative effort of farming stakeholders, which could help in proffering solutions to farmers’ varied problems and forming their farming educational foundation which currently lacks.

The educational task here is the ultimate goal of agricultural extension. This consists of communicating knowledge to farmers and helping them to adapt their farming methods to take full advantage of proven and acceptable technology that will improve the quality of rural life, as well as increasing the quantity and quality of a country’s food, fibre and forestry production. But the effect of such communications, according to Singh (1981:2), Punya and Karl (2000:788), has not
been quite as pronounced as one might expect. This is evidenced by inadequate knowledge, understanding, skills and sometimes negative attitudes relating to change that characterises small-scale farming communities.

Currently, according to Bembridge (1993:19), South Africa’s extension services are ineffective due to management and institutional problems. A traditional farmers’ day, in which experts address the farming community advising them what they should or should not do, is an inefficient way of meeting the farmers’ needs (Oettle & Koelle, 2003:5). This is particularly the case with South Africa’s emerging farmers who are the beneficiaries of land reform and distribution.

However, the study did not focus on the participants’ familiarity with technology and their ability to navigate web-based knowledge support. It is assumed that given the participants’ level of education, navigating web-based knowledge support should not be a problem because, as indicated in the findings, most of the participants have at one time or the other used the internet as a platform for searching for information.

While many of the existing techniques having been utilized to support emerging farmers could be described as traditional in agricultural practices all over the world, South African Black emerging farmers see them as inadequate to meet their aspiration and peculiarity; moreover, all the participating emerging farmers do not regard them as a viable means of agricultural knowledge support which could enhance their transformation to market-oriented farming.

For instance, most of the participants complain about the duration for which a mentorship programme is expected to last, since it is well acknowledged that farming seasons are difficult to predict and the hostile attitude of most farmers’ mentors who often prefer to buy out the beneficiaries of land reform programmes. The well-publicised use of community radio and television broadcasts also come with their own challenges, since all programmes are expected to be pre-planned before being broadcast. Therefore, it may be difficult to include all situations, particularly the prevailing circumstances that the farmers are at when the programmes are planned. Besides, interpreting research outcomes to the specific requirements of individual farmers within the broadcast duration is an unfeasible request.

Skills and experience required for subsistence farming are most often from farm owners, their families, and extension services, whereas market-oriented or commercial farming does not necessarily depend-on farm owner skills and experience, but rather on those of skilled farm employees. In South Africa, most skilled farm employees or about 85% of those that can be considered as highly educated in agricultural practices are not currently considered as emerging farmers. These groups of highly skilled farm employees are currently not obliged to work for Black emerging farmers. In other words, Black individuals that could be employed to work in Black commercial farms are lacking and, at the moment, are not well versed in agricultural practices due to the segregation of the past (Donovan, 1994:275).

In order to promote collaboration in a user-centred approach, knowledge sharing, creation, integration, dissemination and technology transfer amongst service providers and emerging farmers, as well as the farmers’ capacity building, a web-based knowledge-support infrastructure which has the potential of providing rich and complex shared knowledge, must be utilised.

Knowledge management, as pointed out by Kille (2005: 5), provides an integrated approach to identifying, managing, and sharing all of an organisation’s knowledge assets, including the expertise and experience of individual employees, with the ultimate goal of helping an organisation attain its mission and goal.

The multi-disciplinary nature of the agricultural field, contributes in no small way to the current challenges hampering Black emerging farmers’ transformation, considering their background and their lack of formal agricultural education which, in effect, contribute to their inability to interpret and adopt scientific research findings. In order to proffer sustainable solutions to the multi-disciplinary challenges, a multi-disciplinary measure is needed, of which ICT platforms are capable of providing support.

In user-centred multidisciplinary research, as pointed out by Schumacher and Feuerstein (2007), new product or service development that fails, does so, not for lack of advanced technology, but because of a failure to understand real users’ needs. There is a higher motivation in involving users at the earlier stages of the research and development process. This is in order to better understand the relationship between new innovative concepts and related users’ behaviour within specific situations, as well as the potential cognitive workload in interpreting received signals.

Sharp, Rogers and Preece (2007:418) pointed out that
the best way to ensure that development continues to take users’ activities into account is to involve real users throughout development. This, according to Duin et al (2008), has proved to reduce business risks, such as the invention and acceptance of products and services and their application.

With the advent of Internet and the latest collaboration technologies, teamwork is no longer limited to a small group of people in an enterprise and it could spread to all stakeholder-suppliers, customers or other members of interest. Thus, groups of people organized in public self-organizing workgroups and specialized communities (communities of interest, and practice) generate knowledge that is shared, not individualized (Janev & Vranes, 2004:469). Internet and web technology in particular has undergone changes with initiatives, such as blogs, wikis, flickr and podcast as indicated by Kolbitich (2007); and ordinary users are enabled to get more involved in content creation.

Therefore, there is a need to approach South African Black farmers’ transformation into market-oriented farming, with a user-centred multidisciplinary concept, and an integration of end-users and other stakeholders; the techniques of which, as indicated by Duin et al (2008), remain a difficult task.

In order to elaborate on this view, a knowledge-based model of an agricultural knowledge-support is presented in Figure 1.2. The diagram illustrates an interactive forum to enable collaborative discussion and shared meaning.

**FIGURE 1.2 AGRICULTURAL KNOWLEDGE-SUPPORT PORTAL-MODEL** Source: Akinsola (2009)

The virtual innovation laboratory aims to enhance joint research work amongst a virtual network of researchers, subject specialists and other agricultural role players. The knowledge bureau facilitates the linking of specialists and researchers to farmers or intermediaries (for example, extension agents or NGOs) who can help to resolve perennial issues in agricultural research. The knowledge repository facilitates access and knowledge re-uses, and the e-learning services are meant to host all learning resources, artefacts and tools for online education to interested farmers or their families. These will be deployed, based on web services, an ontological approach and the semantic web.

**Conclusions**

Bridging the knowledge gap of South African Black farmers using traditional agricultural knowledge support strategies is inadequate and inefficient. This is as result of the dual and complex nature of the South African agricultural sector, coupled with the intellectual competence required to function in a dynamic and multi-disciplinary market-oriented farming environment, where quality and quantity are dominant scales for economical viability. Agricultural education provision to Black farmers is a necessity to help develop their domain knowledge, and to improve their competency level. The required education can only be beneficial when provided simultaneously with active farming practices. In other words, Black farmers need a platform of dynamic knowledge support where personal attributes and unrestricted interactions with other stakeholders for clarification could be accomplished.

Bridging Black farmers’ agricultural knowledge gap holds tremendous benefits, including sustainable employment, food security, poverty alleviation, an active manufacturing industry, an improved national economy and, probably, crime reduction. Moreover, consideration must be given to the complexity of harnessing agricultural knowledge from desperate sources to meet the heterogeneous Black farmers’ needs.

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