NEW ERA AGRICULTURE MAGAZINE

Leveraging ICT for Effective Agricultural Extension Services

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Abstract:

Although agriculture can be a significant driver of economic growth in emerging nations, for many years, yields in these nations have fallen well short of those in developed nations. The application of enhanced agricultural technologies, such as cropping methods, seeds, and fertilizers, is one possible way to boost yields. By offering agricultural extension services, public-sector initiatives have tried to get beyond information related obstacles to the adoption of new technologies. The quick expansion of mobile phone coverage in developing nations offers a special chance to promote technological adoption through information and communication technology (ICT)-based extension programs, despite the fact that such initiatives have been heavily criticized for their limited scope, sustainability, and impact. The possible ways that ICT could support agricultural adoption and extension services delivery in poor nations are described in this article. After that, it examines current ICT for agriculture initiatives, classifying them according to the services offered and the mechanism (voice, text, internet, and mobile money transfers). Lastly, we point out some design and implementation barriers to these programs and offer some suggestions for doing field-based research on how these programs affect farmers' welfare, technological adoption, and knowledge.

Introduction:

It has long been acknowledged that agriculture has the capacity to spur economic expansion. However, over the past few decades, agricultural productivity and yields have significantly trailed behind those in

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industrialized nations, despite the significance of agriculture for growth. The underutilization of better agricultural technologies, which has remained relatively low in developing nations since the 1970s, is one possible explanation for this yield rise that has stalled. One The factors that influence technology adoption as well as possible obstacles to it have been identified by numerous economic studies. Common elements found in the theoretical and empirical literature include education, money, tastes, risk preferences, complementing inputs, and access to knowledge and learning, while the precise factors influencing technology adoption vary depending on the context and the type of technology. Among these, the function of expensive and asymmetric information has drawn the most attention. Agricultural extension services, which are generally characterized as providing farmers with information inputs, are one way that governments and international organizations have tried to address some of the perceived information failures associated with technology adoption. In 2005, there were over 500,000 agricultural extension workers globally, and 95% of them were employed by public agricultural extension institutions. However, there is still little proof of the influence of public extension programs on agricultural knowledge, adoption, and productivity, even after decades of funding and experience with them. Additionally, the systems themselves have come under fire for their exorbitant prices, scalability issues, and lack of accountability. Knowledge transfer through commercial and public information systems is made possible by the quick development of information and communication technologies (ICT) in developing nations. More than 60% of people in sub-Saharan Africa, Asia, and Latin America had access to mobile phone coverage in 2009, demonstrating the tremendous expansion of mobile phone coverage over the preceding ten years in these regions. The adoption of mobile phones has increased in tandem with this expansion in coverage: According to the ITU (2009), there were roughly 4 billion mobile phone users globally as of 2008, with 374 million in Africa, 1.79 million in Asia, and 460 million in Latin America. Mobile phones were initially mostly used by wealthier, metropolitan, and better-educated citizens, but in recent years, both rural and urban populations in some of the world's poorest nations have begun to use them.

For the impoverished in rural areas, mobile phones drastically lower the cost of information and communication. This gives rural farmers additional ways to use ICTs for agricultural extension services in addition to giving them access to information on

agricultural innovations. Since 2007, mobile phone-based applications and services have proliferated in the agricultural sector, offering voice, short messaging service (SMS), radio, and internet-based information on market prices, weather, transportation, and agricultural practices. Even if these programs are novel, there are drawbacks, and it's unclear if they will replace the current agricultural extension systems. Moreover, there is still little actual data about their influence. Thorough impact assessments are required to gauge the influence of such services on farmers' welfare, adoption, and knowledge as well as their cost-effectiveness. This is how the remainder of the paper goes. Mobile phones have the ability to enhance farmers' access to information and agricultural adoption in general, as well as make it easier to implement agricultural extension programs, current ICT-based agricultural extension initiatives are surveyed, and possible design and implementation issues are noted. A framework for calculating the causal impact of ICT-based agriculture initiatives is described.

Using ICTs in Agricultural Extension

Information and communication technologies (ICTs) have long played a role in providing advisory services. Traditional ICT methods like radio and television have been important channels for distributing weather updates and agricultural guidance in developing nations. Additionally, rural information centers have helped share details about prices and product quality. Some agricultural ministries have worked to incorporate ICTs into their information services by setting up centers at the district level. As mobile phones have become more widespread, there has been a shift away from these traditional approaches toward mobile-based solutions, including voice calls, text messages, and internet services. These various initiatives can be classified based on how they deliver information (through voice, radio, SMS, or internet) and their main objectives.

Voice-based agricultural information services operate mainly through telephone systems, offering guidance on farming techniques and market opportunities. These services often feature call centers or dedicated hotlines where farmers can receive agricultural extension support. The technology used varies in complexity - from basic telephone systems (both landlines and mobile phones) to more sophisticated computing and telecommunications platforms.

Radio dial-up and broadcasts include regular radio broadcasts that provide market prices or other agricultural information, as well as dial-up radio that feature a series of short segment audio programs. The radio system often features a regularly updated menu of pre-recorded agricultural content. In some

cases, the systems allow farmers to ask questions via SMS and the responses are disseminated via the radio.

SMS-based agricultural extension services utilize text messaging platforms to gather and share information in several ways. The methods include: collecting data through SMS questionnaires, allowing users to request specific information (like market prices or production data) by sending coded text messages and receiving responses via SMS, and broadcasting mass text messages about agricultural topics to farmers.

Farmers can access agricultural information through e-learning programs, which are typically delivered via telecenters and internet kiosks that provide computer and internet access. These various ICT platforms distribute different types of information, including:

- Market pricing
- Weather updates
- Technical farming advice
- Information about local suppliers and buyers

Most services tend to focus on sharing market prices, weather data, and transportation costs. This focus likely stems from the fact that such information is:

- Relatively straightforward to gather and distribute
- Objective in nature
- Less susceptible to measurement errors

However, this information does have the drawback of becoming outdated quickly and requiring frequent updates. Programs that provide guidance on agricultural techniques and input usage are less common, probably because this type of information is more complex and challenging to communicate effectively.

While ICTs offer promising alternatives to conventional information dissemination methods in agriculture, several challenges exist:

1. The effectiveness of ICT-based extension depends heavily on the type of information being shared. Simple data like market prices and weather updates can be easily transmitted via mobile phones, potentially replacing traditional methods. However, more complex information about farming practices and inputs might need to work alongside, rather than replace, traditional approaches.
2. SMS-based platforms, despite being the simplest to implement, have significant limitations:
   - Can only contain limited information
   - Require users to be literate
   - Need basic technical knowledge
   - Work well for simple, standardized information but struggle with complex communications

3. Voice-based question-and-answer services can overcome text-based limitations and handle more nuanced information, but face their own challenges:
   - ☞ Complex development requirements
   - ☞ Need for natural speech production capability
   - ☞ Though some progress has been made (as seen in Kenya, Uganda, and Zimbabwe) with mobile phone-accessible audio files
4. Since private sector companies often develop and manage these applications, implementing them in agricultural extension likely requires public-private partnerships.

These factors indicate that ICT-based extension services could fundamentally transform agricultural information delivery in developing countries. This highlights the importance of evaluating whether these new approaches actually provide more effective and efficient information delivery to farmers in developing nations compared to traditional methods.

Future Thrust

ICT development in developing nations has brought new technologies and chances for information access to underdeveloped nations. Agricultural extension, which has long struggled with issues of scale, sustainability, relevance, and responsiveness, is one of the mechanisms for knowledge sharing. These novel strategies are being tested in a number of pilot projects in Bangladesh, India, and sub-Saharan Africa. ICT-based agricultural extension, like traditional agricultural extension, runs the risk of becoming unsustainable, a "fad," and having little effect on the welfare, adoption, and understanding of low-income households. Pilot programs must therefore be evaluated through rigorous impact evaluations that not only evaluate the causal impact but also its mechanisms; ascertain whether these approaches are complementary or a replacement for traditional extension; identify the kinds of information that are best suited for these programs; determine the demand for these services and, consequently, their potential sustainability; and determine their cost-effectiveness.

References

1. Goyal, Aparajita. 2010. “Information, Direct Access to Farmers, and Rural Market Performance in Central India.” American Economic Journal : Applied Economics, 2(3) : 22-45.
2. Hayami Y and V. Ruttan V. 1971. Agricultural Development: An International Perspective. Baltimore, MD: Johns Hopkins Univ. Press
3. Herberich, David H., Steven D. Levittt and John A. List. 2009. “Can Field Experiments Return Agricultural

Economics to the Glory Days?" American Journal of Agricultural Economics. 91(5): 1259-1265.

4. Holloway, Garth John and Simeon K. Ehui. 2001. "Demand, Supply and Willingness-to-Pay for Extension Services in an Emerging-Market Setting." American Journal of Agricultural Economics. 83(3): 764-768.
5. Imbens, Guido and Joshua Angrist. 1994. "Identification and Estimation of Local Average Treatment Effects." Econometrica. 62: 467-476.
6. International Telecommunication Union (ITU). 2009. Measuring the Information Society: The ICT Development Index. Geneva, Switzerland: ITU.
7. Jensen, Robert T. November 2010. "Information, Efficiency and Welfare in Agricultural Markets." Agricultural Economics. 1: 203-216.
8. Ligon, Ethan and Elisabeth Sadoulet. 2007. "Estimating the effects of aggregate agricultural growth on the distribution of expenditures." In Background Note for the World Development Report 2008. Washington, DC: World Bank.