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## An Appraisal of Factors Influencing Adoption of Agricultural Innovations: Insights from Selected Developing Countries

### Abstract

Research has revealed that different factors influence adoption of agricultural innovations by farmers. These factors include characteristics of innovations comprising relative advantage, complexity, compatibility, trialability and observability as discovered by Rogers (1983), and technology characteristics, information sources, knowledge, awareness, attitude, and group influence (Odalele, 2005, p. 250). The diffusion model was considered the main theoretical model for agricultural extension and the development of agricultural advisory services (Padel, 2001, p. 40). The diffusion process influences the success or failure of agricultural development programmes. Factors influencing adoption of agricultural innovations were appraised by reviewing selected empirical studies. This could influence agricultural communication agents to consider the interaction of factors in the diffusion and adoption process in designing their communication strategies in the light of improving adoption.

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*Tools of the Profession*

## **An Appraisal of Factors Influencing Adoption of Agricultural Innovations: Insights from Selected Developing Countries**

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### **Introduction**

Research has revealed that different factors influence adoption of agricultural innovations by farmers. These factors include characteristics of innovations comprising relative advantage, complexity, compatibility, trialability and observability as discovered by Rogers (1983), and technology characteristics, information sources, knowledge, awareness, attitude, and group influence (Odalele, 2005, p. 250). The diffusion model was considered the main theoretical model for agricultural extension and the development of agricultural advisory services (Padel, 2001, p. 40). The diffusion process influences the success or failure of agricultural development programmes. Factors influencing adoption of agricultural innovations were appraised by reviewing selected empirical studies. This could influence agricultural communication agents to consider the interaction of factors in the diffusion and adoption process in designing their communication strategies in the light of improving adoption.

The conventional wisdom is that constraints to the rapid adoption of innovations involve factors such as, limited access to information, lack of credit, aversion to risk, inadequate farm size, inadequate incentives associated with farm tenure arrangements, insufficient human capital, absence of equipment to curb labour shortages preventing timeliness of operations, chaotic supply of complementary inputs and inappropriate transportation infrastructure (Feder, Just & Zilberman, 1985, p. 255). Although factors influencing adoption have been widely researched, it is the consideration of these factors that has remained largely unexplored in developing countries due to several challenges (Servaes, 2002).

An appraisal of how the factors influencing adoption of agricultural innovations interact could promote adoption. The study reviewed empirical studies of diffusion of agricultural innovations in five selected developing countries: Uganda, Thailand, Indonesia, Zimbabwe and India.

### **Interaction of factors in the diffusion and adoption of agricultural innovations**

A study conducted by Howley, O'Donoghue and Heanue, (2012) in relation to advanced breeding technologies such as AI by Ugandan dairy farmers revealed that the age of the farmer, and years of awareness of the AI technology (compatibility), total farm milk production and sales (observability), extension visits per year, and quality of AI services provided to the farmers (communication strategies) were associated with adoption and use of AI technology. Therefore, it was concluded that experience with AI is positively associated with the likelihood of its use. Age was negatively associated with AI use in that relatively older farmers were found to be much less likely to use AI than younger age cohorts. In that study, compatibility in the form of awareness, observability of the benefits of the new innovation and communication in the form of extension visits influenced farmers to adopt the innovation. However, the older the farmers, the less likely they use advanced reproductive technologies.

In a study on adoption of sweet pepper cultivation in Thailand by Schipman and Quain (2010) between 1999 and 2007, adopters were more often female and were younger and better educated than non-adopters. Age negatively influenced adoption behaviour, whereas education had a positive impact. Given the complexity of sweet

pepper cultivation (that is, greenhouses with hydroponics systems), it was understandable that younger and better-educated farmers were more likely to adopt the innovation (Schipman & Quaim, 2010, p. 364). Market and information accessibility (communication channels) had a positive influence on adoption, which was as expected and was shown in other studies as well (Schipmann & Quaim). Notably, age negatively influences the adoption of more complex technologies and younger farmers adopt more advanced technologies than older ones. Education has a positive influence on adoption of complex technologies. Communication also, was a positive influential factor in adoption.

The FAO conducted a study among rice farmers in Indonesia, during the wet season of 1992-1993 (Feder, Murgai, & Quizon, 2004). The study compared costs of rice farming inputs and outputs among ten farmers who had participated in Integrated Pest Management Farmer Field Schools (IPM-FFS) during the previous wet season with practices and outputs of ten farmers who had never participated in farmer field schools. Overall, the IPM farmers achieved 21 percent more rice harvest yield on a per hectare basis (6.9 tons versus 5.7 tons), for 97 percent of production costs, when compared to their non-IPM farmer counterparts. The significantly lower input costs for IPM farmers were largely attributed to minimal usage of commercial pesticides. The study findings suggested that FFS have a positive effect in influencing adoption. It is discernible that if this innovation was to spread to more farmers, it could have been adopted for its relative advantage of cheap input costs, low labour costs and high yields.

A study by Maumbe and Swinton (2000) in Sanyati in the Midlands Province of Zimbabwe examined the adoption of different cotton pest management practices by smallholders in transition from conventional calendar-based chemical pest control to Farmer Field School-Integrated Pest and Production Management (FFS-IPPM) strategy. The study revealed that an extension approach, FFS influenced adoption of IPPM. Therefore, investment in IPPM farmer education and literacy programmes targeted to non-adopters was anticipated to have long-term beneficial impact on IPM use. Success of IPM adoption depends on farmer's knowledge and

awareness of the technology (compatibility). The findings indicated that extension delivery is an important driver in the adoption process.

The study conducted by Rao (2008) in India indicates that use of information and communication technologies such as the e-Choupal, enhances better decisions on various agricultural practices among users as compared to non-user farmers. Users of e-Choupals were more educated, belonged to higher social category with higher income and had larger landholdings.

### **Implications**

Overall, communication of agricultural innovations has emerged as the major desirable prerequisite in adoption of innovations as revealed by the findings of the studies reviewed in all the five countries and should therefore be as effective as possible. Considering the dynamic state of media technologies, extension workers' ICT skills need to be improved in developing countries so that they could transfer these to farmers since ICTs have proved effective in delivering a variety of information which enhances better decision-making. Age and education have also emerged as major influential factors in adoption.

All the studies indicated that while age is negatively associated with adoption, education and social class is positively associated with adoption. Therefore, effective strategies such as diligent stakeholder analysis are required to motivate all farmers to adopt modern and high yielding technologies considering the dynamic state of knowledge. Communication of agricultural innovations should be contextualised as much as possible in order to tailor it to suit the needs and situations of the particular farmers. Agricultural institutions should spearhead the upgrading of their communication agents' knowledge and skills so that they communicate effectively to improve adoption of innovations that are high yielding. Most importantly, a diligent stakeholder analysis, multi-media and multi-strategy approaches to agricultural communication should be considered in order to increase adoption and consequently productivity since agriculture is the main source of livelihood in developing countries.

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