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A SOCIAL MARKETING FRAMEWORK FOR INNOVATION AND TECHNOLOGY ADOPTION: THE CASE OF AGRICULTURAL EXTENSION IN INDIA

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ABSTRACT. Agriculture is the mainstay in developing economies and is a major source of livelihood for a large portion of the world's population. The field of agriculture and agribusiness has moved towards diversification, commercialization and sustainability. There is a crying need to protect the environment while improving global food security and building social capital in rural areas. As a result, it has become significant that new technologies and innovations in agriculture be disseminated to farmers so that they gain knowledge about innovations while ensuring their use in the ways originally intended. Agricultural Extension has an important role to play in this changing scenario of agriculture, business and policy. The objective of the paper is to propose a framework for new technology adoption in the context of agricultural extension using the lens of the theory of planned behavior and concepts of social marketing. The paper first presents a review of literature on the Training and Visit System and the Private system of agricultural extension and uncovers its drawbacks. As a potential solution to the existing inefficient systems, a social marketing framework for new technology adoption in agricultural extension is proposed using a case study of Agricultural Technology Management Agency in India. Findings from the case suggest that inclusion of a marketing component along with the existing educational approach to extension is likely to increase adoption of new technology and helps farmers overcome factors like input or market unavailability. It also helps in need based targeting rather than adopting a one-size fits all approach.

JEL codes: Q13; Q55; O31

Keywords: innovation adoption; technology adoption;
social marketing; agribusiness; agricultural extension;
training and visit (T&V) system; developing economies

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1. Introduction

Agriculture is the mainstay in developing economies and is a major source of livelihood for a large section of the world's population. It is assumed that much of the future population growth is likely to occur in the developing world (Singh, 2004). Due to rising world population, along with pressure on land relative to food production, agriculture has been undergoing total transformation all over the world. The field of agriculture and agribusiness has moved towards diversification, commercialization and sustainability, especially in countries like India (Rasheed and van den Ban, 2000). There is a pressing need to protect the environment (Oladele 2013, Swanson and Rajalahti, 2010) while improving national food security and building social capital within rural communities (Swanson and Rajalahti, 2010).

As a result, it has become significant that new technologies and innovations in agriculture be disseminated to farmers so that they gain knowledge about innovations while ensuring their use in the ways originally intended. Agricultural Extension, therefore, has an important role to play in this changing scenario of agriculture, business and policy. This paper defines agricultural extension as the application of scientific research and new knowledge to agricultural practices through farmer education. The domain of agricultural extension now encompasses various academic disciplines like agriculture, business management, public policy, marketing, health, innovation and technology studies.

The paper begins with a review of literature in this area to uncover various causes of the failure of the systems of agricultural extension. Next, it presents the extension paradigms that emerged subsequently and their relevance to the changing agribusiness scenario. Finally, a social marketing framework for new technology adoption in agricultural extension is proposed as a potential solution to mitigate risks of past failures. The framework is then discussed using a case study of Agricultural Technology Management Agency (ATMA) in India.

2. Literature Review

In this section, we first present an overview of the literature on agricultural extension as a method of technology transfer. Then we discuss the two important paradigms of agricultural extension in India, namely the Training and Visit (T&V) system and the system of private extension. We also review the causes of ineffectiveness of these paradigms. Finally, we examine the social marketing literature to build a case for a social marketing perspective in agricultural extension.

Agricultural Extension

The term agricultural extension came into being in early 19th century, in USA, when co-operative extension services in each state, in association with the Land Grant Colleges, were started (van den Ban and Hawkins, 1985). Swanson and Rajalahti (2010) list four major paradigms of agricultural extension, which are: technology transfer, advisory services, non-formal education, and facilitation extension. In the 1950s and the 1960s the extension services were institutionalized, often under the government run ministries of agriculture, coinciding with an increase in the confidence in advancement of technology. This led to the adoption of a diffusion model or technology transfer model of agricultural extension that, however, was saddled with much inefficiency. One of the most important reasons behind this was a distinct divorce of extension work from agricultural research (Ponniah et al., 2008). During 1974–1998, the Training and Visit system (T&V) in Agricultural Extension was promoted by the World Bank in over 50 developing countries.

The Training and Visit (T&V) System of Agricultural Extension

The T&V system derives its name from "frequent training and regular visits" of extension workers to the farmers' fields (Benor, Harrison and Baxter, 1984). This system involved building a lined professional extension service, which would be capable of guiding farmers to help them increase agricultural production and raise their incomes. The extension workers were trained with latest technology and they guided farmers by organizing frequent training programs.

This World Bank sponsored project was first implemented during the Seyhan irrigation project in Turkey and the Chambal project in India in 1974 (Anderson, Feder and Ganguly, 2006). It was a move from the earlier systems of extension where the extension workers were not able to focus exclusively on extension work (Swanson and Rajalahti, 2010). The T&V system involved a single line of command for extension workers, with their agencies (mostly government departments of agriculture) having full administrative command over the agricultural extension worker (mostly the village

level worker) (Benor, Harrison, and Baxter, 1984). The aim of the system was to bring simplicity in its objectives and operations. It worked on continuous feedback from farmers, extension agents and research staff. This enabled the extension system to adjust to the farmers' needs (Ponniah et al., 2008).

The extension village level worker visited a number of contact farmers to disseminate information and technology in the context of new farming practices. It was assumed that the contact farmers would diffuse the information further between other farmers of the village while conveying their feedback to the village level worker (Benor, Harrison and Baxter, 1984; Ponniah et al., 2008). Initially, the T&V sought to be effective by focusing on the main crops that were grown and the most common farming methods (Feder and Slade, 1986).

At the time of its inception the T&V was considered a very robust system of extension as it sought to overcome the problems of earlier approaches. One of the initial studies was conducted by Feder and Slade in 1986 on the impact of the T&V system of agricultural extension in Haryana, India. Coming up with positive results the authors concluded that T&V increased the number of contacts between the farmers and extension workers. Also, the T&V system had led to a significant increase in the major crops grown in the area under study (Feder and Slade, 1986).

Feder and Slade's findings are in concurrence with those of Benor, Harrison and Baxter (1984). The authors cited examples from three Indian states that had adopted the T&V system in the late 70s and early 80s. All three states had shown a significant increase in the areas cropped under various crops along with almost double yields in some cases. However, Moore (1984) reports that the celebrations came too soon. Even though it was designed to plug various gaps in the previous approaches, especially the lack of linkage between research and extension (Ponniah et al., 2008), there were many loopholes. Many researchers have concluded that T&V system was not as successful as intended (Anderson, Feder and Ganguly, 2006; Antholt, 1994).

Problems with the Training and Visit (T&V) System

Moore (1984) outlined several problems inherent within the system including the re-allocation of staff from one department to another and low motivation of the extension staff under the new system. The extension workers in previous systems had also been engaged in input supplies, which provided them with some avenues of informal income. Introduction of the new system meant that they were deprived of this income; as extension workers under the T&V system were not required to distribute inputs (Benor, Harrison and Baxter, 1984; Moore, 1984) and the supply of inputs was in limbo. Anderson et al. (2006) concluded that one of the major reasons for the decline of

the system was its lack of cost-effectiveness. The system was run so that the states received funds from the central government and the system was back to status quo once assistance was withdrawn (Moore, 1984).

The selection of contact farmers, especially in Asia, posed another hurdle in the proper diffusion of agricultural innovations. It was proposed initially that the contact farmers have a good standing in their villages and that they represent all the socio-economic characteristics of the farmers in that villages. More importantly, the contact farmers would be ready to try out new innovations, even on a small scale (Benor, Harrison and Baxter, 1984). However, since the contact farmers were more educated and had larger farms; their problems were very different from those of other farmers (van den Ban and Hawkins, 1985). The contact farmers, being less representative of the farming population, were unlikely to be emulated by other farmers (Anderson and Feder, 2004).

Further, the contact farmers were often not aware that they were required to disseminate information to other farmers of their village (Moore, 1984). A study in Pakistan also reports that the contact farmers and farmers with the highest degree of contact with the extension services were those who were more progressive than the others (Davidson, Ahmed, and Ali, 2001). Mostly, the contact farmers themselves were progressive. Therefore, the success and increase in yields could not be solely attributed to the T&V system (Weaving, 1991). Weaving (1991) also suggests other impediments occurring in the adoption of new technologies like lack of irrigation and unavailability of inputs as opposed to a lack of knowledge.

These early studies indicated that there was a divorce between research and extension (Moore, 1984). There was unavailability of inputs (Moore, 1984, Weaving, 1991), improper selection of contact farmers (Weaving 1991, Anderson and Feder 2004) and a distinct cost ineffectiveness in the whole programme (Anderson, Feder, and Ganguly, 2006). However, larger and more progressive farmers were more likely to gain from the T&V system as compared to the many small and marginal farmers.

Private Extension as an Alternative to the Public System of Extension

Debate relevant to public funding of agricultural extension raged during the 1990s. There were attempts to provide alternative institutional arrangements for extension due to reasons like the inability of government agencies to fund extension work, unwillingness of donors to support them, dissatisfaction with the quality of extension services, transformation in commercialization of agriculture, and increased specialization among farmers (Rasheed and Sadmate, 2000). This made way for the private system of extension, which includes extension services provided by farmers' associations, input companies, agricultural marketing and processing companies, consulting firms

that charge a fee for their services, publishing companies (Umali and Schwartz, 1994), non governmental organizations (NGOs), financial agencies involved in credit delivery, media, and web-based knowledge providers (Rasheed, 2012).

Problems with the Private System of Agricultural Extension

However, many problems, which in fact, led to a demand for a movement away from the public system of extension, were visible in the private system as well. Umali and Schwartz (1994: 10) state "for private consulting firms, the nature and extent of their extension activities will be largely determined by the net returns to providing the service." The direct implication of this was the category of farmers at whom the extension services were aimed. The extension services tended to target only those farmers whose returns are high enough to make the paid extension feasible (Umali and Schwartz, 1994).

In Pakistan, public and private extension services often provided overlapping and conflicting programs (Davidson, Ahmed, and Ali, 2001). Also, the crops covered by the private extension service providers were those grown to the largest extent possible. The ambit of private extension service providers did not cover small farmers. This was specifically true for input providers like seed and pesticide companies. Field sales personnel of marketing departments conducted the private extension services in these cases (Rasheed, 2012).

The ability to pay for extension services is another significant hurdle in the effective delivery of services. Despite a clear movement towards commercialization, Indian agriculture is largely subsistence-based and farmers are often not empowered to pay for extension services (Gowda, 2001). The income per unit area determines the willingness to pay for information (Rasheed and Sadmate, 2000). In countries like India, where a major part of agriculture is still subsistence-based (implying no or little expectations of incomes from farming) with many cases of sharecroppers cultivating the land, the willingness to pay for extension services is minimal. This inevitably excludes the small and marginal farmers from the ambit of private extension services. The role played by extension services is also of importance. Agricultural extension is meant to provide farmers with information regarding new technology or new farming practices proposed by research from time-to-time (Ponniah et al., 2008; Swanson and Rajalahti, 2010). A question of relevance then is: what would happen when the technology related knowledge sharing function of extension becomes a selling function?

One of the problems of the T&V system has been the unavailability of inputs (Moore 1984, Weaving 1991). While private extension does take care of this problem, especially in the case of agro-processing and input companies, it is limited to those who either grow the same crops for which products are available, or those who enter into contracts with companies.

The clash of interests between the input companies also comes into play in many such cases. For example, in the case of an agro-chemical company engage in Integrated Pest Management Extension (Davidson, Ahmed, and Ali, 2001). Our review suggests that private extension, especially paid extension, suffers from one of the major problems faced by public extension – the exclusion of many small and marginal farmers and, in most cases, is limited to the sale of inputs as opposed to the dissemination of technology.

The Role of Social Marketing in Agricultural Extension

Literature examining agricultural extension from a social marketing perspective is limited. Van den Ban and Hawkins (1985) made a case for a social marketing strategy in agricultural extension and a participatory planning process based on the needs of the farmers. However, there are researchers like Cheng, Kotler and Lee (2011), who suggest that social marketing finds more applications for sustainability in the environment as compared to the transfer of agricultural technology. We posit that research in this area can benefit greatly by drawing insights from the field of Social Marketing.

Lee and Miller (2012) provided seven best practices of social marketing. These include an agreement in terms of a clear purpose and focus, proper identification and description of the target audience, selection of a specific behavior, proper understanding of the audience barriers, consideration of the 4Ps (Product, Price, Place Promotion), formation of partnerships, and proper evaluation. While the context of their study is different; a deeper look suggests the absence (at least at the level of implementation) of some of these best practices in the T&V system and in the private extension systems later. For example, the selection of contact farmers is heavily biased towards those with comparatively larger land holdings and those capable of adopting these technologies (Anderson, Feder and Ganguly, 2006; Davidson, Ahmed and Ali, 2001). Much of the literature in social marketing lays emphasis on the four Ps of marketing – Product, Price, Promotion and Place (Andreasen 1994, Kotler and Zaltman 1971, Lee and Miller 2012). However, in practice, managers tend to place greater emphasis on marketing communications, even in non-business contexts (Rothschild 1979) which is likely to be detrimental as benefits in the non-business sector are often intangible in the short run.

In agricultural extension, dissemination of technology to farmers is an educational process aimed at bringing about change in human behavior (Dahama and Bhatnagar, 1985). Education attempts to persuade targets to behave in certain desired ways voluntarily but does not provide any direct reward or punishment for following or violating the desired behavior. It is marketing that attempts to manage behavior by offering reinforcing incentives (Rothschild, 1999). Accordingly, Rothschild (1999: 31) hypothesized that "Motivation to act voluntarily will be increased slightly through educa-

tion by discussing self-interest or increased moderately by accommodating self-interest through marketing."

Agricultural extension, being primarily an educational process, has probably missed out on the importance of marketing as a function, which is likely to encourage desired behavioral patterns in target adopters. An effective marketing strategy starts with an effective product based on the needs of the consumers (Kotler et al., 2009). This is cogitated as a social idea in the context of social marketing (Kotler and Zaltman, 1971). The price at which the product is available also assumes great significance. The price paid by the target adopter is not just the monetary cost but also includes psychological, physical, and social costs borne by target adopters (Kotler and Levy, 1969a; Kotler and Zaltman, 1971; Kotler and Levy, 1969b). For example, if a farmer who is motivated to adopt a new technology gets treated badly at an input shop then it is less likely that he would adopt the desired behavior. The "place" is the outlet where motivation gets converted into action (Kotler and Zaltman, 1971). It may be connected directly to the price to be borne by the target adopter. For example, if the place is at a great distance away from the village costing an individual's one-day earnings, the chances of adoption of the desired behavior will reduce. Similarly, promotions by way of communication also play important roles in the final adoption of an innovation.

The Theory of Planned Behavior in Marketing Literature

The theory of planned behavior in marketing can help explain adoption behavior. This theory is an extension of the theory of reasoned action. According to the theory of reasoned action, the intention of performing a behavior is often the best predictor of whether the desired behavior will eventually be performed (Ajzen, 1991; Montaño and Kasprzyk, 2008). The underlying assumption in the theory of reasoned action is that of volitional control over the behavior. In other words, a person is in full control of the various factors that play a role in the performance of that behavior (Ajzen, 1985). The theory of planned behavior also looks at the amount of control an individual has over the various internal and external factors which eventually accelerate or impede the performance of the desired behavior (Ajzen 1985, 1991). Therefore, the intention to perform a behavior gets converted into the performance only when the desired behavior is perceived to be under control of the person performing the behavior (Ajzen, 1991) and is called *perceived behavioral control* (Ajzen, 2002). According to the theory of planned behavior, control over behavior is dependent upon two components, *perceived self efficacy* and the *perceived controllability* (Ajzen, 2002). The perceived self-efficacy is the belief of a person about the level of control exercised over his/her own functioning and the various events which may have an effect over his/her life (Bandura, 1991). Controllability is the

belief of the extent that the performance of the behavior is under the control of the actor himself (Ajzen, 2002).

These perceptions assume a lot of importance in adoption of new agricultural technology. The farmer might not be aware of the methods of performing a certain task. He/she may lack the required skills, or more simply, lack any knowledge about the new technology. The perceived self efficacy therefore remains low. Even if the farmer becomes aware of a new technology and intends to adopt it in his/her own situation, the farmer might be constrained by the unavailability of all the inputs required. Similarly, absence of markets (something which might not be completely under the farmers' control) for a particular produce, may also deter the farmer from bringing about a change in his/her behavior, howsoever desirable, it may be. In this case the perceived controllability is low. In either of these two cases, the intention to perform a behavior may not be enough to predict actual performance of the behavior (Ajzen, 1985).

3. Research Method

Founded on the review of literature and insights from the theory of planned behavior, this paper attempts to examine innovation and technology adoption in the agricultural realm. This paper proposes a social marketing framework for technology adoption in agricultural extension (see Figure 2). This framework is discussed in detail using the case study of ATMA, which is introduced in the next section.

Specifically, data from two districts of India – namely Patna in the state of Bihar in Eastern India and Anand in the state of Gujarat in Western India have been used. While the case about ATMA in Patna is based mostly on secondary data, the one on ATMA in Anand is based on primary data, collected by the authors using personal interviews with various officials of ATMA, as well as through direct observations on the field.

4. Case Study: Agricultural Technology Management Agency (ATMA) in India

Even after the "demise" of the T&V system, extension activities in India were saddled with many problems. Some of the important problems faced by the Indian government included limited roles of the research centers in extension activities and lack of technically trained manpower. The major responsibilities for providing extension services were on the state Departments of Agriculture and the process was largely centralized.

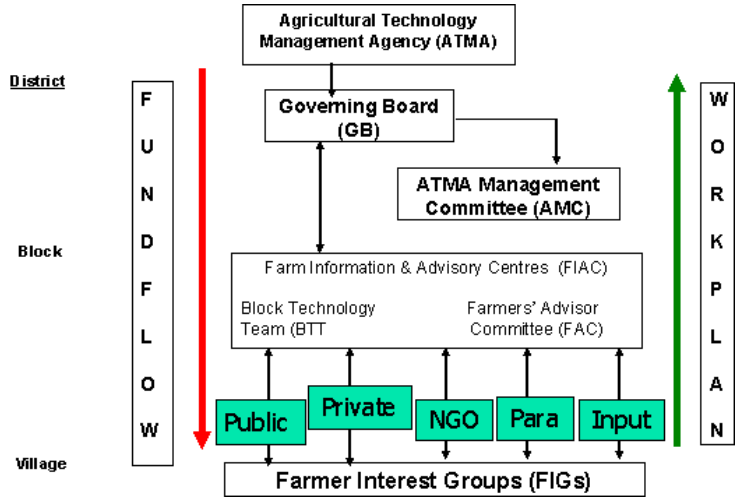
Agricultural Technology Management Agency (ATMA) arose out of a need for decentralization with a focus on agricultural diversification and an

increase in farm income (Singh et al., 2009). The Ministry of Agriculture of the government of India initiated ATMA as a pilot project in 28 districts across seven Indian states in 1998 under the Innovations in Technology Dissemination component of the World Bank funded National Agricultural Technology Project (Singh et al., 2009). It aimed to strengthen the research-farmer-extension linkages (TNAU Agritech portal, n.d.). It was essentially a bottom-up system of extension delivery and constituted the Farmers' Interest Groups and the Farm Women Interest Groups at the village level (see Figure 1). ATMA also tried to bring in non-government organizations (NGOs)/not-for-profit organizations in the formation of such interest groups (TNAU Agritech portal, n.d.). There was also an emphasis on the roles of agri-entrepreneurs in the extension process ("Guidelines for Centrally Sponsored," 2014).

The extension planning process in ATMA aims to balance interactions between research and the farmers. The researchers and the research stations make suggestions for technology transfer. The representatives of the Farmers' Interest Groups (FIGs) and the Commodity Interest Groups (CIGs), as members of the Block Farmers' Advisory Committees and the District Farmers' Advisory Committees, act as important partners in the preparation of the various action plans ("Guidelines for Centrally Sponsored," 2014). The research and extension priorities of the various districts are documented in the Strategic Research and Extension Plan (SREP), based mainly on the agro-climatic conditions of the district or the region and developed by the involvement of farmers using Participatory Rural Appraisal (Zonal Project Directorate n.d.). The involvement of farmer groups and women groups makes the extension programs more farmers accountable and helps in the better targeting of the adopters.

In 2014, ATMA was functional in 639 districts out of a total of 676 districts across India. However, the initialization of the agency has been staggered. Therefore while some of the districts (for example, Patna) had ATMA as long back as in 2002–03 (Patna was a pilot district), ATMA in Anand began its full-fledged operations in 2011–12. The major focus of the programs is on sustainable agricultural practices like Plant Health Management, Pesticide Management and the like ("Guidelines for Centrally Sponsored," 2014). Package of practices for crops hitherto not grown in a particular area, especially high value crops and commodities also become a part of the process; based on demand. For example in Patna there has been a focus on mushroom culture, Integrated Pest Management, organic vegetable cultivation (Singh et al., 2009). Similarly, in Anand there has been a focus on innovative technologies like paddy seedling transplantation for water conservation.

Figure 1 Organization Structure of ATMA



Source: http://vistar.nic.in

5. Discussion: Towards a Social Marketing Framework for Technology Adoption

In the framework illustrated in Figure 2, the dotted box shows the "social marketing component" that this paper proposes. It consists of three sequential steps, planning, education and marketing in that order, as the three vertices of a triangle. At the centre of the triangle is the core benefit to be achieved. These are explained as follows:

Core Benefit

At the centre of the framework is the *core benefit*, acquired by the changed behavior. This can be by an increase in sales on account of increased production, a decrease in the costs of production, or a combination of both.

Planning

The process ideally starts from the left bottom vertex, labeled as "Planning." This phase includes the Training Need Analysis (TNA) of the farmers, segmentation of the target adopters and targeting of the various stakeholders of the program. A proper analysis of the training needs helps the program managers to have a clear focus on the extent of training required for the target adopters, i.e. the farmers.

Under ATMA, a number of farmers who grow the same crop or are interested in cultivating and marketing the same commodity are brought together as Commodity Interest Groups (CIGs) which then serve as the nodal

points for the dissemination of the technology and information among the groups ("Guidelines for Centrally Sponsored," 2014). Since the needs of the farmers of one particular interest group remain the same, programs can be customized to suit their requirements. This helps not only in saving time but also helps in reaching out to farmers having similar needs.

In the case of ATMA, an innovative concept of targeting involves utilizing the services of the agri-entrepreneurs who are mostly input dealers. A large number of farmers gain information on farming practices from these input dealers. Our discussion with the officials of ATMA office at Anand revealed that the input dealers often act as a bridge between the demand and the supply of technology. The input dealers frequently remain in touch with the extension agency as well as the farmers. In addition to impact studies, the dealers' close associations with the farmers and extension agencies helps ATMA gather information from farmers and other target beneficiaries on the success of the extension program and on any other information/training needs of farmers. This was a complementary approach of keeping track of technological and educational needs of the farmers. Therefore, while extension planning in ATMA is essentially a bottom-up approach, the possible lack of articulation and communication skills in Indian farmers is overcome by involving the services of the input dealers.

Literature also suggests benefits of segmentation of the target adopters. For instance, Kotler and Roberto (1989) suggest that segmentation done to break down the target-adopter population into groups that have common characteristics helps in tailoring products according to the needs of the adopters. This is likely to lead to greater satisfaction and early adoption. Bringing together farmers into CIGs in ATMA is a step towards segmenting the target adopters, which facilitates the program planning process.

Education

Education has been defined as "...messages of any type that attempt to inform and/or persuade a target to behave voluntarily in a particular manner but do not provide, on their own, direct and/or immediate reward or punishment…" (Rothschild 1999: 25).

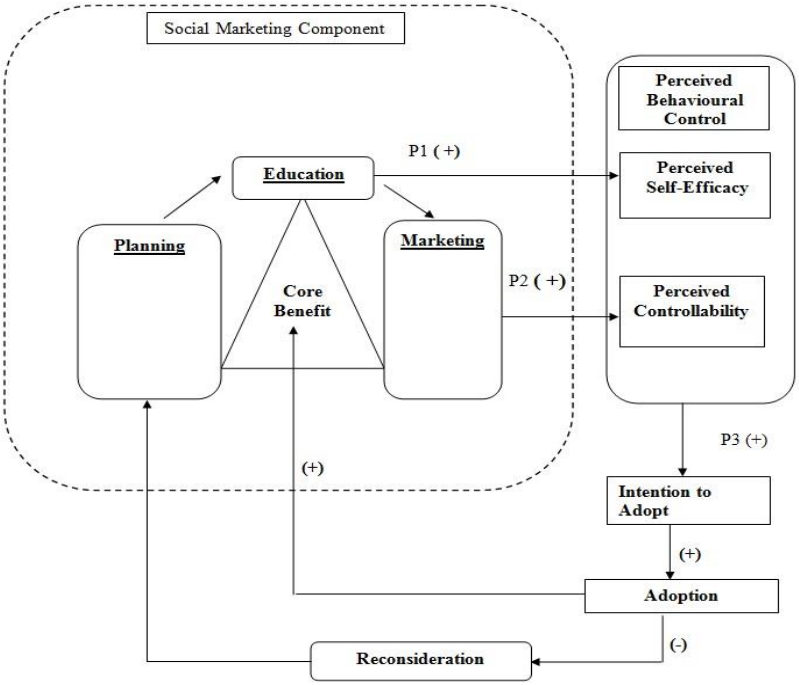
Education in ATMA is provided mainly by demonstrations and training sessions. Farmers are supplied with inputs by the agency and the demonstrations are held at the farmers' plots. This was also a practice followed in the T&V system. However, in the T&V system the contact farmers were larger farmers (e.g. Moore, 1984; van den Ban and Hawkins, 1985) and the selection of these contact farmers used to be improper.

In the case of ATMA, the demonstrations were held on the plots of those farmers who were actually interested in adopting a new technology (Singh et al., 2009). Also according to the guidelines provided by ATMA, half of the

trainee farmers were small and marginal farmers ("Guidelines for Centrally Sponsored," 2014). In addition; the farm schools also provide technical sessions and recurring training sessions to the farmers during the six critical stages of the crops. The demonstrations on the plots are combined with regular follow up advice to the farmers as well as taking feedback from farmers on the progress of the demonstrations. These demonstrations provide farmers guidance on the various technical aspects, which are required for successful adoption of a new technology.

The recurring training sessions help in recapitulation of the processes. The repetition of the important points at the various critical stages of crop production helps in reinforcement of information and knowledge shared during the demonstrations. At the end of these sessions, the farmers are expected to find themselves qualified and enabled to carry out the practices themselves. Rothschild (1999) also suggests that education creates awareness of the existing benefits and provides motivation to act in a desired way. Therefore, we posit: *Providing education about a new practice will increase the perceived self-efficacy of the target adopters*. This is represented as Proposition 1 (P1) in Figure 2.

Figure 2 Social Marketing Framework for Technology Adoption in Agricultural Extension



Marketing

Based on the relative advantage and economic advantage, an informed and motivated target adopter is likely to take up an idea (Rogers, 1983). However, there would also be an interplay of other factors, like locally available inputs, availability of credit, or the availability of markets for the increased produce, listed as factors essential for agricultural growth and acceleration by (Mosher, 1966). Marketing aims at providing the right product to fulfill the final goal of bringing about a behavioral change. Three levels of products have been described in the commercial marketing context. The first level is the *core product* that is the basic benefit or value, which accrues to the consumer. The second level is the *actual product* that includes the various product and service features. The third level, the *augmented product* looks at providing additional benefits along with the product (Kotler and Armstrong, 2012).

In the social marketing context, the *core product is* "*the benefit*, which the target audience wants and expects in exchange for performing the behavior" (Deshpande and Lee, 2013). Using an example of integrated pest management as a training module in the case of ATMA, the core product is the *idea*, i.e. less use of agricultural chemicals for farming to reduce the input costs. The actual product or the specific service, therefore, becomes integrated pest management. The augmented product resulting in additional benefits can be for instance, linkage with input suppliers who would provide the necessary inputs like marigold seeds, pheromone traps other biological pesticides, or linkage with markets for selling the marigold flowers harvested in the process.

The place where the target adopters actually seek goods and services should ideally not be so far off that they become inaccessible. Therefore, such a place should preferably be geographically near the target adopter, like the local input shop or the village consumers' co-operative. Promotional communication should be used to emphasize the benefits of the desired practice. Rangan, Karim, and Sandberg (1996) proposed a matrix examining costs and benefits incurred to the individual. They argue that change becomes easier when the costs are low and the tangible personal benefits are high.

For the trainee farmers in ATMA, the inputs are provided in the form of input kits. The provision of the input kits is a precedent to the demonstrations and the farm school training sessions described in the previous section. This provision is however, limited to the first season for one particular set of farmers. If a farmer is motivated enough to adopt the practice the next season onwards, he/she is not provided input kits directly, but is given detailed information about the various input suppliers. Though there is no provision for linking farmers directly to the credit agencies, the farmers can obtain

loans under various other Indian government schemes; notably the National Agricultural Development Scheme.

In some districts, for example in Patna, ATMA has made arrangements for input provision to and buy-back of the produce of the farmers through a public-private partnership (Singh et al., 2009). Communication about the benefits of the adoption of new technology is often provided in the form of couplets in local languages. Such communication is generally painted on the walls of the offices of ATMA or in other public places, which the farmers generally frequent, for instance the agricultural produce marketing yard. The assured market provided to the farmers serves to overcome one of the biggest obstacles faced by farmers in adoption of any new technology; that is the unavailability of markets and hence un-remunerative returns on the investments.

Private partners provide help in the training and demonstration sessions as well as in provision of inputs (Singh et al., 2009). This feature of ATMA could not be found in all the districts across India right till 2014, since the implementations of the guidelines were staggered. However, the provision of inputs and assured markets ("firm linkages with the markets") was definitely one of the most important provisions of the guidelines of the agency ("Guidelines for Centrally Sponsored," 2014: 37). The provision of assured markets and inputs therefore goes a long way in increasing farmers' control over external factors like the market. Of course, environment is one of the biggest factors outside farmers' control. Agriculture as a profession has probably always considered this as a given.

According to the theory of planned behavior discussed in the literature review section, two components determine the adopter behavior – perceived self efficacy and perceived controllability. Our first proposition suggests that education about a new practice is likely to increase self-efficacy. We also propose that the marketing function is likely to address the various external factors like unavailability of inputs, unavailability of credit, and unavailability of markets, which might stop the farmer from adopting an innovation.

Therefore, we posit: *Provision of a marketing function in an agricultural extension program will lead to greater perceived controllability*. This is represented as Proposition 2 (P2) in Figure 2.

Adoption

The theory of planned behavior also suggests that greater perceived behavioral control leads to greater intention of adoption of a particular behavior. This can further be used to predict the actual adoption (Ajzen, 1985; 1991; 2002). The addition of a marketing function is likely to increase the perceived controllability of the target adopters. The previous sections provided an idea of how, on one hand the educational component increases the perceived self-

efficacy of the farmers; a linkage with the markets (both backward and forward linkages), on the other hand; increases the perceived controllability of the farmers.

The adoption of any new technology is, however, gauged either on the basis of the actual adoption or an adoption index or the intention to adopt. Full-fledged implementation of ATMA in Anand district started in 2011–12. Therefore, the figures for the actual adoption of a new technology (using the example of Paddy Seed Transplanter) were arrived at on the basis of the intention to adopt. Sixty percent of the trainee farmers expressed their desire to adopt the new technology in the next cropping season. For the district of Patna, where the establishment and implementation began in 2002–03, however, the actual adoption figures were available, and they point towards a large-scale adoption of various new technologies (Singh et al., 2009). These technologies were related to cultivation of completely new crops as well as new age farming practices, like Integrated Pest Management and Integrated Nutrient Management. Another factor that has been encouraging is a large percentage of small and marginal farmers who have adopted new technology.

Therefore, we posit: *A social marketing approach in an agricultural extension program is likely to increase the intention to adopt a new technology*. This is represented as Proposition 3 (P3) in Figure 2. Table 1 presents a summary of social marketing components of the proposed framework in the case of ATMA.

Table 1 Analyzing the case of ATMA using the Social Marketing framework

Social Marketing Component	**Data from ATMA case**
Planning (Training Needs Analysis and Segmentation)	Bottom-up planning process, where the farmers' interest groups and farmers' representatives put forward demands for particular training programs. Formation of Commodity Interest Groups (CIGs), which are targeted to provide training and technology to farmers cultivating one particular type of crop. The needs of one particular group of farmers are thus taken care of.
Education	Demonstrations on the plots of the farmers along with reinforcement of the knowledge so provided. The recurring training sessions to take care of the latter are provided at the critical stages of the crops, which help in increasing the timeliness and contextuality of the training messages.
Marketing	Provision of inputs to the trainee farmers in the first year and providing information for procurement of the inputs, next year onwards. Buy-back arrangements with private parties in many districts. Communication in local language in form of couplets, highlighting the benefits of new technology, at places frequented by the farmers.

Reconsideration

Reconsideration is the last box in the framework that provides a feedback loop into the planning sub-component of the social marketing part in the framework (Figure 1). If adoption of the technology does not happen as envisaged then one needs to reconsider the whole extension program from the beginning. This gives managers and extension workers the necessary space to evaluate the factors that might have gone wrong during the implementation. It also provides an opportunity to reflect on the process and to try alternative solutions. This also provides insights and learning for implementing similar programs in future.

5. Conclusion

The Training and Visit (T&V) system was the main system of providing agricultural extension services to farmers in developing countries. However, it suffered from some systemic problems and was considered financially unviable. Private extension introduced as an alternative to the T&V system of public extension focused more on the sale of products and inputs as opposed to the dissemination of agricultural information. A glance through the two major paradigms of agricultural extension conveys the problem of unavailability of inputs. Extension workers in the T&V system were not allowed to sell inputs to farmers. While the private system of agricultural extension did manage to get around the problem, it focused more on the sale of products and inputs rather than dissemination of agricultural information. Literature also suggests that both the systems were not tailor-made to suit the needs of farmers but were more in the nature of one-size-fits-all.

These deficiencies led us to explore technology adoption in agricultural extension from a fresh perspective. This paper argues that a social marketing approach will lead to a smoother transition from motivation to action, especially when the goal is to bring about a desired behavioral change. The literature review provided a basis for looking at various aspects of commercial marketing technology in order to bring about a desired behavioral change within the farming community.

We propose a framework, which includes a new social marketing function in addition to the educational function, which is considered as a hallmark of agricultural extension. The social marketing approach proposed in the framework also requires the segmentation of target adopters on the basis of similar needs. The marketing function is likely to offer the new technological innovation at the right place and the right price, which includes not just the monetary costs but also the social and psychological costs. We further discuss the framework using a case study of the Agricultural Technology Management Agency (ATMA) in India. Findings from the ATMA case

suggest that inclusion of a marketing component along with the existing educational approach to extension is likely to increase adoption of new technology and helps farmers overcome factors like input or market unavailability. It also helps in need based targeting.

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