Chapter-4

Factors Affecting GM Crop Adoption-a Literature Review

This chapter fulfills the dual objective of analyzing the literature in order to arrive at the factors that affect the adoption of GM crops (especially GM cotton) and then developing the research design for the current study. Section 4.1 provides a brief background of the research studies made on adoption and diffusion of technology in agriculture. Section 4.2 presents the review of literature on adoption of GM crops and Section 4.3 filters out the factors which have an impact on adoption of GM crops.

4.1 Studies on adoption and diffusion of technology in agriculture

The decision to adopt a new technology has been widely documented throughout the literature (Scandizzo and Savastano, 2010). Feder, et al. (1985) presents a literature review on adoption and diffusion of technology in agriculture. The decision making process of the farmers under various information scenarios have been studied by many researchers (Dillon, 1971; Anderson, Dillon, and Hardaker, 1977). Researchers have also examined the influence of farmers’ attributes on adoption of agricultural innovations (Rahm and Huffman, 1984; Caswell and Zilberman, 1985). According to Kopainsky and Derwisch (2009), the determinants of adoption and diffusion of new agricultural technologies are grouped into four categories-varietal (yield, input, uncertainty and riskiness of the variety), farm level characteristics (climatic conditions and quality of land), farmer characteristics (expertise and skill, knowledge about the variety, risk aversion, capital availability and credit accessibility) and institutional (consumer and market demand for improved varieties). In the past, studies have focused on technological innovations that increased agricultural productivity (Detre and Adhikari, 2010). In the 1970s and 1980s, several studies focused their attention on the adoption of environmentally preferable technologies. But, GM crops have implications for productivity, the environment and consumer preferences. Thus they represent a revolutionary form of farming compared to the technology adoption studied in the
literature in the late ‘70s and early ‘80s (Scandizzo and Savastano, 2010). Likewise, GM crop adoption must be studied in its unique set of scenarios. Here, literature is reviewed with the same perspective.

4.2 Literature review on GM crops adoption

4.2.1 Effect of target market characteristics on adoption

These are related to the demographic, psychographic and economic characteristics of the farmer.

**Demographic characteristics of the operator farmer** like age and education have affected the adoption of GE crop technologies positively and significantly, according to a study by Fernandez-Cornejo and McBride (2002). The study was conducted in USA using secondary data. Marginal effects were calculated through Tobit model which were then used to calculate the elasticity of adoption with respect to each of the significant explanatory variables. According to the authors, these factors may also reflect management quality in the sense that more educated or experienced operators are more likely to understand that the economic benefits of new technologies usually accrue to early adopters. More experienced workers (age) got the optimum height of the Bt plant by applying more fertilizers. Hence the experience had an effect on the outcome of the technology. Arshad et al. (2007) found that the awareness regarding the availability of Bt cotton seeds was found to be more among the educated farmers. In the same study, level of the farmer’s education was found to have positive impact on the satisfaction level. In contrast to this, Padaria et al. (2009) found the effect of education to be non significant. This was a survey based study undertaken in India to find out the factors affecting the adoption of Bt, using logit regression model. Study by Detre and Adhikari (2010), reported a negative influence of education. The authors conducted their study on a sub group of farmers-YBFR (Young and Beginning Farmers and Ranchers) in USA. They applied two limit Tobit model on ARMS (Agricultural Resource Management Survey) data (2004-06) to arrive at the said conclusion. Using ARMS data (for year 2003),
Banerjee et al. (2009) found out that the effect of age and experience was not significant in determining the adoption of GM technologies in agriculture.

**Psychographic characteristics of the farmers** were studied by Padaria et al. (2009), Alexander et al. (2002), Detre and Adhikari (2010), Fernandez-Cornejo and McBride (2002), Kopainsky and Derwisch (2009) and Kopainsky, Derwisch and Troeger (2011). One of the main traits is risk associated with the GM crops. It has been studied as the producer trait as well as the crop trait. Risk aversiveness of the YBFR was found to have an effect on adoption (Detre and Adhikari, 2010). Risk return profile of the crops was found to have a significant influence by Alexander et al. (2002). In the wake of risk management by the adopting farms, GM crop adoption was found to be positively associated with contracting (marketing or production) by Fernandez-Cornejo and McBride (2002). Contracting ensures a market for GE crops, reducing price and any market access risk that could result from uncertain consumer acceptance.

Another trait is trust in the new crop technology Kopainsky, Derwisch and Troeger (2011). Trust can even override or replace an empirical evaluation of the utility of improved seed (Kopainsky and Derwisch, 2009). Trust can be built through social exposure to improved seed, e.g. through marketing campaigns, free distribution of seed to key farmers and ensuing demonstration days. Maintaining trust can also be secured by branding. Branding can further stimulate demand in combination with strategies of pricing and new product supply. Other socio-psychological characteristics like scientific orientation, innovativeness, achievement motivation and positive perception were stressed upon by Padaria et al. (2009).

Other **economic characteristics of the operators related to cultivation** like size of holding, capital base etc were found to have a significant influence on adoption by Padaria et al. (2009). However, area under cotton, yield and gross farm income were not significant factors in determining adoption of GM technologies in cotton production in the study by Banerjee et al. (2009). According to Arshad et al. (2007), adoption was
higher in case of large farmers with sufficient resources compared to the smaller farmers with limited resources.

4.2.2 Effect of contextual factors on adoption

Effect of legal environment on adoption of GM crops was reported by Frisvold (2004). According to the author, government plays a significant role in the technology dissemination in the country. Need for the public extension system for capacity building of farmers was emphasized by Padaria et al. (2009). Public extension activities are generally performed through government support and are important for harnessing of the benefits of new generation technologies. According to Kopainsky and Derwisch (2009), the commercial crops react positively to the market instruments like input subsidies and price supports. Government effectiveness was also found to be indirectly related to adoption decisions at country-level (Hall et al., 2009).

Effect of technological environment was studied at the country level by Hall et al. (2009). According to the author, technological readiness of a country affects its adoption of GM crops. Technology also helps in developing varieties or sub categories of a product which may be better in terms of product features, costs etc. In case of GM crops, the factors like availability of a number of hybrids and varieties adapted to local conditions were also found to affect adoption positive (Frisvold, 2004; Arora and Bansal, 2011).

Other crop technologies could also affect the adoption and diffusion of GM crops. Past studies have tried to explore the relationship between adoption of GM—specifically HR (herbicide resistant) seed and conservation tillage and to determine the causal effects between them. For example, Fernandez-Cornejo and McBride’s (2002) cross-sectional study using USDA’s ARMS data for 1997 investigated a potential simultaneous relationship between HR soybean seed and CT(conservation tillage) practices using two simultaneously estimated binomial probit models; the study compared those results with two single-equation probit models. Their study suggested that farmers using no-till (a technique of CT) were found to have a higher probability of adopting herbicide-tolerant
seed. In a more recent study with time-series data for 1992-2004, Roberts et al. (2006) used a Bayesian analysis and a two-equation simultaneous logit analysis to evaluate the relationship between HR seed and CT practices. The study suggested that the farmers who had previously adopted CT practices were most likely to adopt HR cottonseed. They concluded that the simultaneous adoption of CT and HR cottonseed reduced soil erosion and residual herbicide use, as well as increased profit. However, with ARMS data for 2003, Banerjee et al. (2009) found that CT did not positively affect the adoption of GM cottonseed.

4.2.3 Effect of various elements of marketing strategy on adoption of GM crops

Effect of price of GM technology on its adoption has been widely documented in the literature. Motivated by the relatively low adoption rates in Argentina, Qaim and Janvry (2003) analyzed farmers willingness to pay (WTP) for Bt cotton seeds and the expected level of demand for the new technology under different pricing regimes. They found the demand for GM seeds to be price responsive, and the WTP to be much lower than the current market price of Bt seeds in Argentina. Hence, they argued that reducing the Bt cotton seed prices would not only increase farmer’s profits but would also be more profitable for the seed producing company. High price could result in the decline in the adoption rate for Bt cotton was concluded by Frisvold (2004). The study examined the role of economic factors in the diffusion of Bt cotton in USA and used dynamic diffusion model with multiple regression analysis. The study suggested that High price could result in the decline in the adoption rate for Bt cotton. Survey based analysis by Arshad et al. (2007) also quoted the high cost (price) of seed as a major reason for non adoption of Bt in Pakistan. Loganathan et al. (2009), asked fanners to rank the reasons for preferring a Bt cotton variety and the t problems being faced by them in the cultivation of non-Bt and Bt cotton and same were analyzed using Garret’s ranking technique. High cost of Bt cotton seeds was the most important problem reported by the Bt cotton farmers. According to Alexander et al. (2002), the adoption of Bt crops was also found to be negatively related to the prices of its substitutes (Alexander et al., 2002).
Contrary to the above, the seed price interventions by the state (to reduce the prices of Bt cotton seeds) were found to have little impact on the aggregate Bt adoption in India in a study by Sadashivappa and Qaim (2009), authors found a high WTP (close to the official market price) for Bt cotton seeds in India. According to them, the take off phase for Bt cotton had already begun before 2006 and thus the government seed price interventions had little impact on aggregate Bt cotton adoption. Instead, seed price controls might reduce the incentive of the company to innovate in the future. Thus government interventions should be implemented after careful analysis of the long run implications of the policy on agricultural innovations. However, the results of this study were contrasted by Arora and Bansal (2011) concluding that the price controls by state governments contributed to the surge in adoption rates in the country. They used three variations of dynamic logistic model on state level panel data for 2002-08.

The importance of Supply-side variables (place mix) such as initial availability of Bt seed adapted to local conditions and potential seed supplier profits on adoption was established for the first time through the study made by Frisvold (2004). This study estimated a dynamic logistic diffusion function to examine differences in the speed and rate adoption of Bt cotton throughout different parts of the United States. Further, it was found that the availability of a wide variety of hybrids had a positive effect on adoption (Arora and Bansal, 2011). Emergence of new hybrids (technological development) extended the choice portfolio for the farmers and had a positive influence on the diffusion rate for Bt cotton in India. The paper used Dynamic logistic models using generalized least square techniques on panel data to arrive at the said conclusion. Arshad et al. (2007) also revealed the fact that pesticide sellers could affect the adoption as they were consulted by the farmers for pest problems.

The factors like higher yield, higher profitability and lower pest problems( related to the product element of the marketing mix) were also cited as important factors behind
preferring Bt cotton (Loganathan et al., 2009). The same was supported by the studies made by Arshad et al. (2007) and Padaria et al. (2009). According to Arshad et al. (2007), the higher resource requirements like fertilizers and irrigation were found to have impacted adoption negatively. Farmers perceived High yield, less pesticide use, less labor requirement and easy picking of cotton as the major advantages of Bt cotton (Padaria et al, 2009). According to Frisvold (2004) adoption was affected by higher pest damage in the area in the previous years. Moreover, relative utility of the improved seed that is its ability to multiply the gross margins from conventional seed also have an impact on adoption (Kopainsky and Derwisch, 2009). Thus the GM crop characteristics which had an impact on its performance affected their adoption and spread.

Some of the studies have accounted for the limited role played by popular media sources used for promotion such as television, radio and newspapers in creating awareness about Bt cotton (Loganathan et al., 2009). The authors further opine that non-economic benefits and bio-safety measures should be given adequate attention in the media coverage and campaigns to facilitate adoption of Bt cotton in India. Lack of knowledge and information as a constraint in adoption was reported by Arshad et al. (2007). A few studies identify the role of promotional strategies like- marketing campaigns, free distribution of seed to key farmers and social exposure to improved seeds through scheduled demonstrations and branding to build trust (Kopainsky and Derwisch, 2009; Kopainsky, Derwisch and Troeger, 2011).

Some of the authors have also tried to uncover the need and content of training in order to facilitate adoption of GM crop technologies. According to Padaria et al. (2009), the socio-psychological characteristics like scientific orientation, innovativeness, achievement motivation and positive perception need to be stressed upon in the training programs to facilitate speedy adoption of technologies. Training in biosafety measures such as growing refugee crops so as to avoid building-up of the resistance by bollworms against the Bt toxin was pointed out by Loganathan et al. (2009).
4.3 Summery of the factors affecting adoption of GM crops

Thus the literature review reveals that there are a number of factors that affect the adoption of GM crops.

These factors pertain to the conceptual framework discussed in chapter 2. The summery of these factors is shown in Table 1

**Table 1: Factors affecting the adoption of GM crops**

<table>
<thead>
<tr>
<th>Target market characteristics</th>
<th>Contextual factors</th>
<th>Marketing strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic</td>
<td>Legal</td>
<td>Product</td>
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<tr>
<td>Psychographic</td>
<td>Technological</td>
<td>Price</td>
</tr>
<tr>
<td>Economic</td>
<td></td>
<td>Place</td>
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<tr>
<td></td>
<td></td>
<td>Promotion</td>
</tr>
</tbody>
</table>

*Source: literature survey by author*

**Demographic factors**

1. Effect of age was not found to be significant in determining the adoption of GM technologies in agriculture but it had an impact on the performance of the technology.

2. Studies are divided on the effect of experience on the adoption of GM crop technologies

3. Studies are also divided on the issue of effect of education on adoption but education was found to positively affect the awareness level of the farmers as well as their satisfaction from GM crops.
Psychographic factors-

1. Risk aversiveness of the farmers and their trust on the technology was found to affect the adoption positively. Adoption was also found to be associated with the practices that reduce the risk of GM crop technologies for the farmers.

2. Other factors Psychographic that could affect adoption were scientific orientation, innovativeness, achievement motivation and positive perception.

Economic factors of the farmers-

1. Size of holding, capital base etc was found to have a significant influence on adoption of Bt cotton in India. Adoption was also found to be higher in case of large farmers with sufficient resources compared to the smaller farmers with limited resources.

2. Area under cotton, yield and gross farm income were not significant factors in determining adoption of GM technologies in cotton production.

Contextual factors –

1. Government is found to have affected the dissemination of GM crop technology positively in the country and across the state. Further, the decision of a country to adopt GM crops is also affected by Government effectiveness.

2. Technological factors like availability of a number of hybrids and varieties adapted to local conditions were also found to affect adoption positively. Technological readiness was also found to affect adoption at the international level.
In exploring the relationship between adoption of GM crop technology and other agricultural technologies especially Conservation tillage, many studies suggested that adoption of CT practices affected the HR cottonseed positively. But according to a few authors this relation was found to be negative.

**Marketing strategy elements**

1. **Price** - most of the studies found the effect of the price of GM cottonseeds as significant for its adoption. Moreover, the adoption of Bt crops was also found to be negatively related to the prices of its substitutes.

2. **Product characteristics** - according to a number of studies the factors which enhance the profitability of the GM crops had a positive impact on its adoption. Thus while high yield, lower pest problems and less labor requirement affected adoption positively, high resource requirements had a negative impact.

3. **Place**: Distribution channel characteristics- such as initial availability of Bt seed adapted to local conditions and potential seed supplier profits have an effect on its adoption.

4. **Promotion**: Lack of knowledge and information as a constraint in adoption was reported. The need of training to improve adoption was also highlighted by the studies.

Table 2 presents the various components of the studies made on adoption of GM crops in detail from where the above mentioned factors were derived.
Table 2: Adoption related studies made on GM crop technology and Bt cotton

<table>
<thead>
<tr>
<th>Author and year</th>
<th>Objectives</th>
<th>Survey statistics</th>
<th>Area</th>
<th>Key analysis techniques used</th>
<th>Key Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexander et al. (2002)</td>
<td>To examine the diffusion paths of GE corn, soybeans and cotton, predict the adoption of those crops over the next two years, and explore the main determinants of the diffusion rate</td>
<td>1996-2000</td>
<td>USA</td>
<td>dynamic diffusion model and Maximum-likelihood methods were used to estimate the regressions</td>
<td>In case of Bt cotton, insecticides were viewed as substitute to adoption and hence the incentive to adopt the (substitute) Bt crops increases as insecticide prices rise. Risk return profiles of the crops were the major criteria for adopting/not adopting their GE varieties.</td>
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<tr>
<td>Fernandez-Cornejo and McBride’s (2002)</td>
<td>To examine the extent of adoption by US farmers, factors affecting adoption of these crops, and the impacts of bioengineered crops on input use and farm-level net returns.</td>
<td>Agricultural Resource Management Survey (ARMS) data for 1997</td>
<td>USA</td>
<td>Using two simultaneously estimated binomial probit models; the study compared those results with two single-equation probit models.</td>
<td>Study suggested that farmers already using no-till found herbicide-tolerant seeds to be an effective weed control mechanism that could be easily incorporated into their weed management program.</td>
</tr>
<tr>
<td>Frisvold, G.B. (2004)</td>
<td>The study examined the role of economic factors in the diffusion of Bt cotton in USA</td>
<td>Data for 27 state and sub-state regions in the United States for 1996-2003</td>
<td>USA</td>
<td>Dynamic diffusion model and Multivariate regression analysis</td>
<td>Regional differences in the speed and extent of Bt cotton adoption were explained by differences in availability of Bt seed adapted to local conditions, potential seed supplier profits, and economic variables affecting grower gains from adoption. Adoption was higher if yield damage due to pests was...</td>
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</table>
higher in previous year, increase in the price of Bt cotton seeds caused a decline in its adoption and state helped to increase adoption through special programmes on eradication of pests.

| Roberts R.K., English B.C., Gao, Q. and Larson J.A. (2006). | To evaluate the relationship between Herbicide Resistant cotton seed and Conservation Tillage practices | Time-series data for 1992-2004 | Tennessee cotton production in USA | Two methods were used-The first is comparison of conditional probabilities using Bayes’ theorem. Second is simultaneous estimation of Binomial logit models where two equations represent choices between adopted HR cottonseed verses CT practices | There is a synergetic relationship between two technologies for cotton production. Farmers who have adopted CT practices were more likely to adopt HR seed. |
| Arshad et al. (2007) | To examine the factors influencing the farmers’ adoption of Bt cotton in Punjab, Pakistan. | Interview: 65 farmers from the different districts of Punjab preliminary survey: in 2005 and survey: May to Nov2006 | Pakistan | Percentages were used to analyze the data. | Results indicated that the adoption was more in case of larger farmers with sufficient resources compared to the smaller farmers with limited resources. Farmers relied upon pesticide dealers for the consultation in case of pest problems in Bt as well as conventional cotton crop. There were many reasons for the non- |
adoption of Bt cotton, but the main ones were the higher irrigation and fertilizer requirements of the Bt cotton cultivars. Other reasons related to related to agronomic and management practices, which were may have been due to a lack of knowledge and information on the genetically modified insect resistance of Bt cotton. The higher seed cost was also a main factor in the non-adoption of Bt cotton.

<p>| <strong>Hall et al. (2009)</strong> | To investigate various factors influencing adoption of GM crops at country level. | 112 countries from various institutions. Adopters: 24 | Varios countr ies | Structural equation model (SEM) | It was found that being an exporter of maize and soybeans, agricultural area in the country, participation in the Responsible Care Program of the Chemical Manufacturer's Association, having the EU and/or Japan as main trading partners, and participation in international environmental agreements, significantly influence decisions about whether or not to adopt GM crops at the country-level. In addition, there are two variables that are indirectly related to adoption decisions at country-level, namely technological readiness and government effectiveness |
| <strong>Padaria et al. (2009)</strong> | To look into the factors affecting adoption of Bt cotton in India | An interview schedule based survey of randomly selected 120 adopters and 60 non-adopters of India | Logit regression model | The study revealed significant influence of size of holding, capital base, extension contact; innovativeness, achievement motivation, and perception about Bt cotton on adoption decision of the farmers for Bt cotton, whereas in contrary to a priori expectation, |</p>
<table>
<thead>
<tr>
<th>Study</th>
<th>Objective</th>
<th>Sample Information</th>
<th>Data Analysis</th>
<th>Findings</th>
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<tbody>
<tr>
<td>Loganathan et al. (2009)</td>
<td>To study the economic impact of biotechnologically engineered cotton cultivation in Tamil Nadu and the factors affecting the</td>
<td>Total sample size: 120 farmers - Bt: 76 Non Bt: 44</td>
<td>India Garrett ranking technique and The Cobb-Douglas</td>
<td>The study revealed that about one-third of the non-Bt cotton farmers were not aware about Bt cotton. Higher yield, higher profitability and lower pest</td>
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<td>Banerjee et al. (2009)</td>
<td>The overall objective of this study is to identify factors that led to the adoption of GM cotton in the United States. In particular, it studies the impact (or otherwise) of conservation tillage and conventional cotton used as refuge on the adoption of GM cottonseed.</td>
<td>Data from the 2003 ARMS (Agricultural Resource Management Survey data), Cotton production Practices and Costs Report and Cotton Costs and Returns Report</td>
<td>USA</td>
<td>To estimate the two binary logit models with the two definitions of genetic modification: one in which adoption of either Bacillus thuringiensis Bt) or herbicide resistant (HR) cottonseed was considered GM cottonseed adoption, and another in which adoption of Bt, HR, or stacked gene (SG) cottonseed was considered GM cottonseed adoption. Results indicate conservation tillage did not positively affect adoption of GM cottonseed with either of these definitions, while adoption of GM cottonseed in the previous year did. Conventional, non-GM cottonseed, used as “refuge,” also did not affect these adoption decisions for the study year. Labor expense, cotton acres on farm, HEL, refuge size, yield, tenure, gross farm income, and age were not significant factors in determining adoption of GM technologies in cotton production for the study year.</td>
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<td>Sadashivappa, P., and Qaim, M. (2009)</td>
<td>To analyze and discuss the role of government price interventions and its impact on Bt cotton seed adoption</td>
<td>Two of the farm survey rounds conducted before the government had set maximum retail prices (2002-03 and 2004-05), while the third round was carried out afterwards (2006-7)</td>
<td>India</td>
<td>Farmer’s mean WTP (Willingness to Pay) for all the three survey rounds was estimated and compared.</td>
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<td>Detre and Adhikari (2010)</td>
<td>To explored the factors that influence the adoption of GM crops by Young and Beginning Farmers and Ranchers (YBFR) in the U.S.</td>
<td>2004 to 2006 ARMS contained data on 19,638 farms that are classified as YBFR.</td>
<td>USA</td>
<td>A two-limit Tobit model regression</td>
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<td>Arora and Bansal (2011)</td>
<td>To find out whether and to what extent the government seed price interventions in 2006 have helped in increasing the diffusion rates. In the process</td>
<td>9 major cotton growing states, viz. Punjab, Haryana, Rajasthan</td>
<td>India</td>
<td>Three dynamic logistic models using generalized least squares (GLS)</td>
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such as technological development, cotton prices, etc. were also examined. (Northern zone), Madhya Pradesh, Maharashtra and Gujarat (Central zone), and Andhra Pradesh, Karnataka and Tamil Nadu (southern zone in 2002-08.

techniques based on panel data for 2002-08 were used. cotton technology (Bollgard I) also played a significant role. The study suggested that as cotton prices rise the incentive to adopt Bt cotton seed increases. Technological developments were also found to be positively impacting the diffusion rates. Introduction of 20 new hybrids and hybrids customized according to Argo-ecological conditions in north zone in 2005 also impacted positively. Part of the increased sales and adoption of Bt seed was due to the increase in the availability of locally adapted hybrids, i.e., technology development that had

| Kopainsky and Derwisch (2009) | The purpose of this paper was to develop an integrative framework about the determinants of farmer adoption of new technologies (including Bt cotton) in developing countries. | Secondary data sources were used to collect and analyze data for various regions in west Africa. | West Africa | System dynamics model integrating the findings from existing studies was developed. The model analyzed the behavior patterns that are generated by such structure. It identifies parameter constellations that cause observed behavior patterns for Part of the increased sales and adoption of Bt seed was due to the increase in the availability of locally adapted hybrids, i.e., technology development that had

Product adoption results from a dynamic interplay between the evaluations of the utility of improved seed varieties and trust in the quality of improved seed varieties. Trust can override or replace an empirical evaluation of the utility of improved seed. Individual and social learning both are important to stimulate and sustain adoption. Moreover, commercial crops like Bt cotton react to market instruments (input subsidies and price supports). Food crops, on the other hand, need both an intensive training and an intensive trust building component which can, for example, be offered by participatory breeding. In the absence of market instruments (input subsidies and...
| Source: literature survey by the author |

| Kopainsky, Derwisch and Troeger (2011) | A household survey with 211 farmers in Malawi focusing on their preferences for certain attributes. A dynamic simulation model was developed to assess the historical seed adoption pattern in Malawi and to assess branding as a policy measure to manage the trust stock. | Conjoint analysis was used to analyze the attributes. Then cluster analysis was used to group the values obtained through conjoint analysis. The data obtained by the cluster analysis was then used to split the adopter's population and assign the weights to each subpopulation. | Trust plays an important role and building and maintaining trust and is imperative to sustain or even increase adoption rates of improved seed. Maintaining trust can be secured by branding. Branding can further stimulate demand in combination with strategies of pricing and new product supply. |
But according to the conceptual framework, there are other factors too. These factors are—social environment, geographic environment and the effect of other stakeholders. These factors also significantly impact the marketing strategy for adoption of innovations. However, little effort has been made to present these factors in an integrated framework of marketing. The present study is an effort in that direction. It provides a conceptual framework (discussed in chapter 2) which integrates all these factors in a comprehensive framework. Research approach used to test and analyze these factors includes the primary data survey and the survey of secondary data. Primary survey is carried out to analyze the target market characteristics that affect adoption of GM cotton in India and how were they built into the marketing strategy. Secondary data survey analyzes the contextual factors and other stakeholders affecting the adoption of GM crops (especially GM cotton) and how were they tackled through its marketing strategy across globe and in India. the details of the research approach used are given in chapter 1. Next chapter deals with the secondary survey based analysis of GM crop (especially GM cotton) adoption across the globe.