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# Understanding adoption behaviour of small farmers from cognitive and contextual perspectives

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## Abstract

**Background/Objectives**: To propose an extended version of agriculture technology adoption model with cognitive and contextual factors such as coopetition, status quo bias, and self-efficacy.
**Methods/Statistical analysis**: The research is proposed among small farmers in Neemrana block Alwar, Rajasthan in India. Data were collected from 143 small farmers from 20 villages located in the Neemrana block through survey questionnaire. Hierarchal Regression analysis has been applied to analyse data.
**Findings:** Previous research has explained adoption behavior from social, psychological, economic, and political perspectives. This research explained adoption behaviour from cognitive and contextual factors. Results suggested that self-efficacy, coopetitive network, and perceived usefulness of technology have positive and significant effect, whereas, status quo bias has negative and significant effect on farmer's adoption behavior.
**Application/Improvements:** The study is a contribution to the literature of agriculture extension program. It has major implications for policy on agriculture development.
***Keywords*:** Adoption, Coopetition network, Ease of use of technology, Perceived usefulness of technology, Self-efficacy, Status quo bias.

## 1. Introduction

Agriculture sector in India has been struggling for quite a long time in national as well as global competitive market. On the other side, non-farm income is gradually taking a prominent place, contributing about half of the income of rural households [1]. Several factors such as small and fragmented land holding, inefficient market system, risk aversion, and high input costs, etc. have been attributed to the decreasing trend in the growth of agriculture in India. To deal with the farmers' plight, government has been focusing on increasing adoption of improved technologies/practices related to productivity, market, and institutions through extensive extension programs like trade fairs, educational tour, Information, Education, & Communication (IEC), training, awareness generation, and demonstration trials. Despite such a large scale efforts, the current scenario is not promising, as 22% farmers dislike farming, 62% farmers are willing to leave farming if they find jobs in the city, and 37% farmers don't want their children to become farmers [2]. The bottleneck of extension programs are limited coverage of marginal and small farmers and sustainability. There is urgent need to focus on agricultural production and increase farm level productivity because it still supports 57.8% of rural population and we need to meet out the food grain demand of 1,300 million Indian [3]. And, this can be achieved only when marginal and small farmers who constitute the largest share in farmers' population strengthen enough to participate equally in food grain production. Adoption of improved technologies/practices generally looked from the economic and farmer friendly perspectives however, failed to grab farmers' attention. Closer examinations of the factors reveal that the reasons are more complex. For example, a study by [4] observed that despite progress in irrigation, electricity supply, availability of fertilizer and better seeds, areas under cropping is declining rapidly, fertilizer use has gone down, diversification towards high value crop has also slowed down and consequently there is a stagnant or slow growth of agriculture.

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Why don't farmers' simply adopt cost-effective and friendly practices? Another phenomenon has been observed that once the implementing agency exists, farmers go back to their original way of working. Why adoption is not sustainable? Adoption of new methods and practices is fraught with several challenges. For example, it is not the objective characteristics or cost-benefits derived from an econometric model that determine the adoption of technology, rather the subjective evaluation of the characteristics of technology that determine the adoption behaviour of farmers [5]. In the technology acceptance model (TAM), perceived usefulness and perceived ease of use are two important determinants that affect adoption of a technology. But, it is cleared that being cost effective and farmer friendly technology are not enough to convince farmer regarding its adoption. Based on the original model of TAM, the paper tries to build a model extends to a new model of technology adoption in agriculture by incorporating the constructs of coopetition, status quo bias, and farmers self-efficacyto understand the role of cognitive and contextual factors in agriculture technology adoption. The study has implication for the policy makers, researchers, and development practitioners. The paper will help to improve the effectiveness of extension programme and will be able to identify and reduce barriers to adoption. The results of this study are meant to attract the attention of policymakers and practitioners who are interested in the design and implementation of projects and programs fostering agricultural innovation and who may want to take into account the effects of social interaction and social capital.

## 2. Literature Survey

### 1. Technology adoption in agriculture

A varied number of variables have been studies in association with adoption of improved technologies in agriculture consist of demographic, social, socio-economic, institutional, and psychology [6-8]. Looking at the vast literature, the present paper confined its focus on cognitive and contextual factors which are least studied in terms of adoption of agriculture technologies. Under cognitive perspective, theory of planned behaviour (TPB) has been extensively applied to understand adoption in the field of agriculture [9-11]. Theory of planned behaviour explained behaviour as a function of intension with the help of three constructs attitude, subjective norms, and perceived behaviour control. Attitude includes an individual's evaluation of a given innovation. Subjective norm measures his perception of how others are important. Perceived behavioral control measures an individual's perception of his voluntary control of the adoption process. In [9] added three more constructs self-identity, moral obligation, and habit besides attitude, subjective norms and perceived behaviour control. In [10] integrated theory of planned behaviour with the theory of expected utility. In [11] observed that farmers with who adopted new technologies, scored higher on psychological constructs of TPB in eastern India.

Similarly, other than TPB, the Technology Acceptance Model (TAM) theorizes that in technology adoption the relationship between external variables and intention to use technology is mediated by perceived usefulness of the technology and ease of use of technology [12]. TAM has shown some mix results in the field of agriculture. TAM has been largely tested positive in the context of effect of information and communication technology (ICT) on agricultural income. However, [13] found out that positive but partial effect on the adoption intention. The study of [14] showed similar results in which perceived ease of use and perceived usefulness indirectly influence the intention to adoption.

### 2. Understanding adoption behaviour: a cognitive perspective

#### 1. Status QUO Bias

Individuals and groups often resist change or are reluctant to accept a new set of behavior not because they think that the behavior has little utility for them but because they prefer the present state of affairs to the changed state because of their loss aversive tendencies, this is referred to as status-quo bias.

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In [15] many recent studies, status quo bias was found to be a major deterrent in adoption of new technology or a new method of work [16-18] provide a deeper understanding of poor's eccentric behavior by focusing on WHY instead of WHAT question. Poor have limited resources which make them more conscious of utilizing them. It compels them to spend on their immediate needs and desire rather than investing in increasing their income sources. Poor people are more powerless, depressed, and anxious and think they have no control and few choices in life [19]. Poor try to avoid risk involve in adopting new things as they already facing lot of risks in other issues of their life which make them dubious and skeptical about new things. The concept of saving is largely untouched phenomenon in poor life as their income is proportionate to the expenditure and they hardly maintain a bank account. Similarly, farmers find it difficult to hold on to even very small sums of money for the period from harvest to planting. In [18] urged for "nudge" a one step ahead of convincing. In [20] observed problem of self-control and present bias effect in which people are generally procrastination decision if it involve an immediate cost and do things when there is an immediate reward. This case is more sensitive in case of poor farmer where arranging and giving money is big thing. It becomes crucial when product is new in the market, unknown to them. Activities where the costs if incurred immediately while the reward delayed as activities having immediate costs. Other activities, such as seeing a movie or taking a vacation, are pleasurable to perform, but may create future costs. We refer to activities where the reward is received immediately while the cost is delayed as activities having immediate rewards.

In [21] explained status quo that is, doing nothing or maintaining one's current or previous decision. A series of decision-making experiments shows that individual disproportionately stick with the status quo. They are satisfied with their status quo bias. Explanations for the status quo bias fall into three main categories. The effect may be seen as the consequence of 1) rational decision making in the presence of transition costs and/ or uncertainty. Status quo inertia is the presence of uncertainty in the decision making setting. That uncertainty increases manifold when a person is poor and product is new in the market. 2) Cognitive misperceptions. One type of individual cognitive misconception is loss aversion. Individual weight losses are heavier than gains in making decisions. This is phenomenon they label loss aversion. Taking the status quo as the reference point, the individual weighs potential losses from switching as larger than potential gains. Because of loss aversion, the individual is biased in favor of the status quo. 3) Psychological commitment stemming from misperceived sunk costs, regret avoidance, or a drive for consistency. The basic tenet of cognitive dissonance theory is that the individual finds it difficult to maintain two conflicting stances or ideas simultaneously and consequently seeks cognitive consistency. Individual choose their beliefs in accordance with a wish to minimize cognitive dissonance. The self-perception theory holds that individuals survey their own behavior much as an outsider would in order to draw inference about their own underlying attitudes and preferences. Initial choices are imposed; subjects will create inferences suggestions that the original choice was appropriate. Individual who infer their attitudes and preferences from past actions (whether rationally chosen or not) will tend to persist in these actions. In [22] observed that farmers who are satisfy with their current agricultural practices are more stick to the status quo.

Hypothesis 1: Higher the status quo bias of a farmer, lower will be the adoption thus has negative relationship.

## 2. Self-efficacy

Self-efficacy is probably the best known and arguably the most extensive theoretical foundation and research support to explain an individual behaviour [23]. Self-efficacy, conceptualized by [24] is an individual's belief in one's capability to organize and execute the courses of action required to produce given attainments. More the confidence/belief an individual has in her capability, more effort, motivation and persistence will be exhibited by his/her to accomplish tasks [24]. The definition of Bandura highlighted three major aspects of self-efficacy [25]. First, self-efficacy is a comprehensive summary or judgment of perceived capability for performing a specific task. Second, self-efficacy is a dynamic construct which changes over time with new information and experience. And, third, self-efficacy involves a mobilization component involving the construction and orchestration of adaptive performance to fit changing circumstances.

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The concept of self-efficacy is stemmed from the social cognitive theory which explicates psycho-social functioning of a person as a casual structure constituted of behaviour, cognitive and other personal factors and environmental events operate as interacting determinants that influence each other bi-directionally [26]. The cognitive theory overcomes the shortcoming of other theories that explain a person's psychosocial behaviour as unidirectional causation either influenced by environment or by internal disposition. Self-efficacy is a psychological driver that explains a person's behaviour as an interaction of internal as well as external determinants. Self-efficacy plays an influential role in determining an individual's choice, level of effort and perseverance. It is the key to high academic achievement, social influence, learning and mastering educational tasks and overcoming substance abuse [27]. The efficacy-performance relationship however, is a positive and cyclic one [28]. Positive in a sense that if one increases the other will also increase and cyclic in a sense that performance affects self-efficacy which in turn affects performance. In [29] observed that farmers who grow multiple crops and jute have high level of self- efficacy. Farmers with low self-efficacy have difficult to adopt new agriculture technology. His study also revealed demographic factors like age, years of cultivation experience; land size, family size, and educational level have no significant correlation with self-efficacy.

Hypothesis 2: Higher the self-efficacy of farmer, higher will be the adoption.

## 3. Understanding adoption behaviour: a contextual perspective

Adoption of technology and new methods in agriculture has certain contextual uniqueness which is not shared by theories focused on individual level behaviour change. For example, a farmer is an individual entrepreneur but his/her activities have direct relationship with the activities undertaken by other farmers in the community whether it is land use, water harvesting, use of chemical fertilizer, etc. The interconnections among the farmers in a densely populated society like India where the farm lands are small in size and are in physical contiguity. Therefore, the interdependence is more pronounced in the context of agriculture in India compared to sparsely populated countries where farmers are territorially separated by large spaces which actually marks the boundaries between individual farmers rather strongly.

Thus, in India, the agrarian community, because of its traditionally segmented landholding and strong kinship relationship with the village level forms a rather homogeneous community. Therefore, farmers within the villages not only share resources but also share ideas and group norms become a dominant factor. Most farmers within the village conform to the majority ways of conducting farm level activities. In a recent study on system of rice intensification (SRI) it was reported that the farmers' adoption of SRI technology depended not only on their financial capital but also on social capital [30]. It has been observed that farmers cooperate at various levels within the community. It is observed that strong social networks based on social interaction among households, help farmers gain ideas, skills, services and information which influence their actions [31]. Research on inter-firm relationship has suggested that simultaneous cooperation and competition among firms have lent to certain strategic advantages known as coopetition [32]. However, coopetition is largely examined in the context of inter-firm relationship and has not been applied to the field of agriculture. Farmers are also individual entrepreneurs and villages are akin to an industrial cluster, given this similarity it is logical that the coopetition will play a significant role in adoption of technology. Coopetitive network not only helps to know the opinion of others but also an interaction between actors and the reaction of opinion of actors that affect one's behaviour regarding adoption.

### 1. Coopetition network

Understanding of coopetition network needs an economic sociology approach which allows seeing social network loaded with economic factors like finance and technology. Economic resources cannot be generated in isolation, it requires social network to access theses resources. A social network not only provides access to financial capital but also helps to convert financial capital into a positive outcome by applying it into some opportunities identified by the network itself.

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Coopetition is defined as a simultaneously collaborative and competitive relationship [33], [34], which takes place between two or more firms within the same value chain position, that is, between horizontal actors [35]. Rather than opting out for cooperation dominant strategy or competition dominant strategy, reaching out to a balancing position of coopetition provides better competitive advantage. Coopetitive strategy increases the size of the current market, creates new market [35], provides access to the valuable resources & greater bargaining power, and improves production methods, [36], and increases innovation performance [37]. In [38] find out that coopetition has positive effect on innovation capabilities and capacity through allowing various actors to come together to share common purpose, challenges, and solution to overcome those challenges. It allows collective wisdom in a complex environment. The similar results confirm by [39] coopetition positively affect radical business-model innovation. Coopetition allow competitors to share their risks and costs with each other which increase their innovation and market performance [40]. Coopetition strategy is only successful under certain conditions trust and dependency right balance [41].

Understanding of coopetition networks at farmer level is still limited in scope. In the agriculture value chain, vertical network between farmer and other actors such as supplier and buyers has been studied but less focus has been given to horizontal network that is between farmers. To boost the networking among farmers, cooperative and Farmer Producer Organization (FPO) structure have been evolved, yet the core principle remain the same cooperate at market level and compete at production level. Ironically, in the both the organizational structures, farmers mostly follow reverse order. Understanding the dynamics of coopetitive network can be solution to increase the effectiveness as well as sustainability of extension program. Farmers are mostly unaware about the coopetition network that they can actually utilize them for strategic advantage. Farmers can be trained to maintain the contrasting relationship of cooperation and competition in the same network for gaining profit.Thus, co-existence of cooperation and competition in a same network refer to as coopetitive network. Socio-economic factors like farm size, farm productivity, age, education, access of improved knowledge largely give a fair picture of what affect farm income. On the other hand, coopetitive network explained how interactions among actors provide access and utilization of resources thus affecting farm income.

Agrarian community is a close knit community which can be define by presence of strong social networks among farmers, money lenders, traders, suppliers and other value chain actors. These value chain actors interact with each other for exchange of resources like seeds, pesticides/insecticides, fertilizers, tools & machines, money, knowledge, etc. either free or on a cost basis. Mostly farmers discuss about seed variety, insecticides and share water for irrigation and machineries for farm operations on a cost basis. Farmers less interact on crop selection, collective purchasing of agri-inputs (seeds, fertilizers and insecticides/pesticides), advice on improved agronomical practices and collective marketing. In [42] explained that farmers reciprocate with each other more for seeds/plants and tools/implements and less for advice. The effect of such kind of network reflect in their imitating behaviour growing same crops using traditional agronomical practices with minimum diversification, mostly selling through middleman only and individual purchasing of agri-inputs.

The lack of cooperation in some aspects indicates farmers are more interested towards strengthening backwards linkage as compare to forward linkages. This disparity in cooperation point out about the presence of competition among farmers. Despite knowing that bulk marketing and purchase of inputs can be economical, they avoid cooperation and prefer to do individually. Farmers attended training program don't like to share their knowledge acquire in training, link with NGO and government officials, variety, prices on which they are selling to traders, etc. Farmers prefer to work based on their own flexibility and affordability. There are few agri-input sellers and it is likely that many farmers from the same village approaching the same agri-input seller but buying separately. When asked, their answers composed of different statements like we use different seed variety, we don't discuss, we prefer to go whenever we have time, we prefer to do work with our own flexibility.
Hypothesis 3: Coopetition positively affect farmer's adoption behaviour

**2. Ease of use of technology and perceived usefulness of technology**

In [43] elaborated that in agriculture, at initial stage of adoption, perceived ease of use of new technology positively affect attitude towards adoption. At later stage, perceived usefulness is unavoidable aspects of adoption.

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In [44] found out that the perceived ease of use of the information communication technology (ICTs) is positively influencing the behavioral intention to use ICTs at the farm. In [45] observed that perceived ease of use influenced decision of adopting precision agriculture based on the advantages and disadvantages. In [46] found out that perceived usefulness has direct affect o farmers' agricultural information acceptance. In [47] research showed that that the perceived usefulness, positively and significantly affect intention to adopt rice organic farming from both of semi and conventional farmers. In [48] found out that perceived ease of use and perceived usefulness are an important construct in determining acceptance of AGROWIT an agriculture knowledge management system (KMS) to agriculturists. In [49] found out that perceived ease of use and perceived usefulness positively affect solar water pump (SWP) technology usage among farmers.

Hypothesis 4: Ease of use of technology will have positively affect farmer's adoption behavior.

Hypothesis 5: Perceived usefulness of technologywill has positively affect farmer's adoption behavior.

## 3. Methodology

### 1. The context

Neemrana block of Alwar district, Rajasthan is recognized as the prominent industrial area of Rajasthan state. Although, being an industrial area, agriculture and dairy are primary livelihood activities of community. Major crops of the area are bajra, cotton, til, wheat, mustard, onion, chilli, brinjal, okra, etc. The same primary livelihood sources are facing threats like hailstorm at the time of harvesting, delayed & erratic rain, depletion of ground water for irrigation to near exhaustion, low productivity, high cost of cultivation and poor marketing system leads farmers to a considerable economic loss.Young generation of farmers are not interested in agriculture and have been migrating to nearby cities like Gurugram, Delhi, Jaipur and Alwar.

### 2. Sample

Data were collected from 143 small farmers from 20 villages located in the Neemrana block. With the help of local NGO, a list of 200 farmers was prepared. The researcher administered a survey questionnaire written in both English and Hindi versions. The survey questionnaire included items capturing technical adoption, self-efficacy, status quo bias, perceived usefulness of technology, ease of use of technology, and degree of cooperation. The scaled items were originally written in English and later translated into Hindi; back translation procedure was used to maintain the item equivalence. Each questionnaire took approximately 30-40 minutes to complete.

All the farmers in the sample were male. The age of farmers varied between 28 to 68 years with an average age of 50 years (SD=9.95). All farmers were educated, their education level range with minimum $5^{th}$ standard and maximum $12^{th}$, none farmer was bachelor degree holder (SD=1.98). Farmers were involved in agriculture range from 50 years to minimum 5 years with an average experience of 29 years. Land size of farmers range from 32 acre to 4.80 acre with an average land holding of 1.32. Net income vary from Rs.53,349 to Rs.13,63,801 with an average net farm income of Rs. 2,20,666.

### 3. Measures

Technology adoption- Technology adoption captures the adoption of modern or improved agriculture technology which includes integrated nutrient management, integrated pest & disease management, integrated water management, farm machinery, marketing, finance, collaboration, and climate change. Technology adoption was measured as dichotomous variable and respondents were requested to indicate 'Yes' or 'No' over adoption of particular activity under aforementioned heads. Technology adoption showed high reliability (Cronbach α=0.75). Farmer self-efficacy- Farmer self-efficacy is farmer's own belief in performance farm related activities. The respondents were ask to indicate their level of satisfaction on a five point Likert scale from 1 (strongly disagree) to 5 (strongly agree) consists of 13 items. Farmer self-efficacy showed high reliability (Cronbach α=0.82). Status quo bias- Status quo refers to the farmer adamant in adopting new technology and adherence to the current technology. The respondents were ask to indicate their level of confident on a five point Likert scale from 1 (strongly disagree) to 5 (strongly agree) consists of 7 items.

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Status quo bias showed high reliability (Cronbach α=0.72). Perceived usefulness of technology-The participants responded on five point Likert scale from 1 (strongly disagree) to 5 (strongly agree) consists of 9 items. Perceived usefulness of technology showed high reliability (Cronbach α=0.72). Ease of use of technology-The participants responded on five point Likert scale from 1 (strongly disagree) to 5 (strongly agree) consists of 11 items. Ease of use of technology showed high reliability (Cronbach α=0.80). Coopetitive network- The participants responded on five point Likert scale from 1 (strongly disagree) to 5 (strongly agree) consists of 21 items. Coopetitive showed high reliability (Cronbach α=0.86).

## 4. Results

Prior to analysis all predictors, Technology adoption, Farmer self-efficacy, Status quo bias, Perceived usefulness of technology, Ease of use of technology and Coopetitive network were examined through SPSS (version 25) for missing values, univariate outliers and normal distribution. Correlation, mean and standard deviations of all measures are presented in Table 1. Although, technology adoption variable was measured as binary variable but in linear regression, it was counted a continuous variable because of summing up of items in each heads. Technology adoption is positively and significantly related to coopetitive network, self-efficacy and ease of use of technology, but no significant correlation with status quo bias, perceived usefulness of technology. Self-efficacy is positively related to all other variables.

*Table 1. Correlation matrix*

| | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| 1. Technology adoption | 1 | .609** | .617** | .087 | .012 | .515** |
| 2. Status quo bias | .187** | .170* | .263** | 1 | .316** | .148 |
| 3. Self-efficacy | .617** | .742** | 1 | .263** | .377** | .688** |
| 4. Coopetitive network | .609** | 1 | .742** | .170* | .543** | .809** |
| 5. Ease of use of technology | .515** | .809** | .688** | .148 | .490** | 1 |
| 6. Perceived usefulness of technology | .312** | .543** | .377** | .316** | 1 | .490** |

*Notes ** Significant at the level of 0.1 (2 tailed)*
** Significant at the level of .05 (2 tailed)*

To test our hypotheses, I subjected the data to hierarchical regression analysis. Value inflation Factors (VIFs) were calculated to rest for multicollinearity among the predictors. The VIFs values were within the level of acceptable limit of five as suggested by Cohen, Cohen, West, and Aiken (2003). In model 1, self-efficacy and status quo bias were entered. The predictors together accounted for (R=.42; p<.001) with about 38% variance in the technology adoption.

*Table 2. Results of hierarchical regression analysis with intention to adopt technology as depended variable*

| Variable | Technology Adoption | | | |
|---|---|---|---|---|
| | Model 1 | | Model 2 | |
| | Beta | VIF | Beta | VIF |
| Self-efficacy | .639** | 1.075 | .320** | 2.491 |
| Status quo bias | -.281* | 1.075 | -.141* | 1.177 |
| Coopetitive network | | | .573** | 3.931 |
| Perceived usefulness of technology | | | .157* | 1.547 |
| Ease of use of technology | | | .048 | 3.103 |
| R | .422** | | .755** | |
| R square | .387 | | .570 | |
| R square Change | .379** | | .554** | |

*Notes ** Significant at the level of 0.1 (2 tailed)*
** Significant at the level of .05 (2 tailed)*

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In the model 2, cooperative network, perceived usefulness of technology and ease of use of technology were entered, the results showed a significant improvement of overall multivariate relationship (R=.75; p<.001). The linear combination of self-efficacy, status quo bias, coopetitive network, perceived usefulness of technology and ease of use of technology accounted for 75% of the total variance in the dependent measure as shown in Table 2.

## 5. Discussion

The research provides a new approach to look technology adoption from cognitive and contextual perspective thus contributed to the existing literature of the technology adoption in agriculture field. The first hypothesis about negative relation between status quo biases on intention to adopt was supported. Status quo bias prevent person to adopt new technology as he is highly satisfy with the current practices as he things that change is not require. The satisfaction actually gives a feeling of whatever he is doing is right and tries to deny or delay the adoption. As suggested by [21], farmers avoid adoption because new technology brings uncertainty and a lack of money further push away the decision of adoption. Farmers weight losses more profoundly as compare to profit which supposed to generate at the time of harvesting, thus avoid adoption.

Hypothesis 2 and 3 supported as self-efficacy and coopetition have positive and significant effect on intention of technology adoption. Self-efficacy shows farmer believe in his own capacity which help in adoption as they think that they can apply and manage new technique successfully. The results are in line with [29] that farmers with low self-efficacy tend to have low adoption rate as compare to farmers with high self-efficacy. Agriculture is full of risk and uncertainty because of volatile market. Numbers of suppliers (i.e. producers) are greater than the buyers who follow the same path, produce similar produces and sell into the same markets. Cooperation at production front, encourage farmers to share resources and new techniques among themselves, while competition at production level also encourage adoption in order to have more production at lower production cost than others. At market front, cooperation among farmers will advance them toward bulk marketing and competition will help to produce better quality produces. However, intensity and balance of cooperation and competition are important factors that decide the positive and negative effect of coopetitive network on performance. Hypothesis 4 about the positive relationship of ease of use of technology with technology adoption was not supported. The results are in contrast of results observed by previous studies. This study shows that easy use of technology has no effect on encourage farmers to adopt a technology. On the other hand, hypothesis 5 about positive and significant effect of perceived usefulness of technology on farmer's adoption behaviour shows that usefulness of technique has more effect than the easiness in apply that technique.

## 6. Conclusion

This study will help to improve the effectiveness of extension program and will be able to identify and reduce barriers to adoption of improved knowledge and practices. With an aim to improve income from agriculture, Government of India has increased Research & Extension expenditure from Rs. 31,073 million in 2000-01 to Rs. 61,552 million with a growth rate of 5%. Government has been spending this amount through various schemes such as Rashtriya Krishi Vikas Yojana, Gramin Bhandaran Yojana, National Food Security Mission, National Agriculture Insurance Scheme, Agriculture Technology Management Agency, Gramin Beej Yojana, Krishi Vigyan Kendra, Kisan Credit Card and the Loan waiver scheme. Government reaching to farmers through various extension tools like Farmers Training, Demonstrations, Exposure Visits, KisanMela, Mobilization of Farmers Groups and Setting up of Farm Schools. But, looking at the expansion and number of farmers, the fund seems to be shortfall because statistics shows that only 40.6% farmer households received extension assistance. More surprisingly, only 11% of the service came from government extension agencies/agents, rest come from progressive farmers, radio, newspapers and private commercial agents.

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The proportion of expenditure and its impact data indicate towards a lacuna in the existing extension program. The research shows that status quo bias comes as a hurdle in adoption process. Adoption can be increased by inclusion of self-efficacy and coopetitive networking can help in effective amalgamation of extension tools into actual application by farmers. A co-opetitive environment will help to create competition at production level where farmers will compete with each other to increase quality produces. It will actually increase cooperation among them because so that they competitive in the market. Because cooperation promoted through extension services shows that only 10% of the farmers are members of a farmer organization. Coopetition network create competitive environment at local level which can be further strengthen to link with external market. The results of this study are meant to attract the attention of policymakers and practitioners who are interested in the design and implementation of programs fostering agricultural innovation and who may want to take into account the effects of community level as well as individual level factors.

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