

Factors Affecting the Adoption of Agricultural Technology in Bijnor District of Western Uttar Pradesh

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ABSTRACT

Agriculture plays a significant role in addressing poverty, hunger and malnutrition and livelihood security of millions of people in India. Since independence, the country has made significant strides in agriculture, to meet the growing demands of our growing population. The Indian farming is mostly characterized with diversified agro-ecologies, water scarcity, unpredicted rains due to vagaries of monsoon and high cost of technological inputs. Based on the changing scenario of agriculture year by year, it requires promotion of proper management of natural resources like soil, water and micro environment, besides wellbeing of all stakeholders involved in the food production and consumption chain. This is primarily possible by technological empowerment of farmers. Technology is the base for increasing agricultural productivity and production. In spite of declining resources, technologies continue to play a major role in achieving sustainable production in agriculture and allied sectors. Agriculture in Bijnor district is still technology deficit as far as Indian agriculture is concerned. Yield per hectare of food grain, fruits and vegetables are far below national averages. Keeping this view in mind an attempt has been made in this paper to examine how farmers are facing problems in adopting agricultural technology. The study is based on 227 respondents selected randomly from five villages in district Bijnor.

Keywords: Socio-economic problems, agricultural technology, farmers.

The vast majority of the world's poor lives in rural areas and is engaged in agriculture, and therefore activities designed to address the vulnerability of these rural poor are often geared toward improving agricultural practices as a means of increasing productivity, efficiency and, ultimately, income (Parvan, 2013). Introduction of new agricultural technology seems to offer an opportunity to increase output and income substantially. Technology refers to how to cultivate a crop successfully. This success can be obtained by knowing how to apply fertilizer, control pests, and take care of plant for its healthy and good growing (Truong and Yamada, 2002). But the point that needs special attention is that till now the introduction of new agricultural technology has met with only partial success as measured by the observed rate of adoption. Indian agriculture is still in traditional character. It

is technological innovation and adoption that can change traditional agriculture into modern one (Ahmed, 2013). Weak agricultural technology has many negative impacts on the productivity. The term technology means “application of knowledge and tools accurately for achieving the envies goals and economic objectives”. In developing countries, farmers mostly use the old traditional ways of cultivation that’s why their productivity is low. That’s why if we will not follow and apply the new techniques of production and keep owning old and traditional ways of cultivation then our production process will remain slow. Technology also bears a close link with land because land is scarce and can’t be produce. This is the one of the reason of low agricultural output (Masood *et. al.*, 2012). For instance, it has been reported that most small scale farmers in the country are unable to afford basic production technologies such as fertilizers and other agrochemicals resulting in low crop yields due to poverty and limited access to credit (Ministry of Food and Agriculture, 2010). Transfer of technology plays a vital role in the process of agricultural development. Transformation necessitates that farmers should be convinced to accept and work for the change. They need to be prepared mentally and emotionally to accept the new agricultural technology with the continuous effort of the government and other extension agencies. Most of the farmers are well informed about the new development in agriculture and they are ready to adopt the new farming technology but are not in a position to adopt the improved technology at full scale due to certain constraints faced by them in day-to-day life (Ahmed, 2013).

REVIEW OF EARLIER STUDIES

Waman *et. al.*, (1998) found that the level of education, size of family, interest in modern farming and sources of information were the main factors, which significantly influenced behavior of the small farmers regarding new farm technology.

Soni *et. al.*, (2000) in district Sagar Madhya Pradesh stated that there was a positive association between the socio-economic characteristics of farmers and the extent of adoption of modern technologies. For this purpose 100 farmers were interviewed in 1995-96, which showed that lack of knowledge was major obstacles in adopting improved varieties of crops and plant protection. Moreover, high fertilizer’s cost was also one of the reasons for non-adoption of farm technology.

Truong (2008) suggests that some machines are too heavy, which creates mobility problems as it is difficult for farmers to transfer the machines from field to field. While traditional farmers are enjoying minimum costs with respect to conducting their farming routines, things are different for the technology adopters.

Abdullah and Samah (2013) elucidate that technology usage among farmers, and the benefits that can be gained from this technology and also explains the factors affecting technology usage. Finally they concluded that farmers’ perceptions and

levels of education, as well as extension-workers' knowledge, the management of the extension program, and the physical conditions of the area, are all factors that affect technology adoption among farmers.

OBJECTIVES AND STUDY AREA

Keeping in view the role of technology in agricultural development, an attempt has been made to examine the existing socio-economic factors responsible for adoption of agricultural technology in the study area. For the study, district Bijnor of Western Uttar Pradesh in North India has been selected. The district Bijnor lying at the foot of the Himalayas, enjoys a unique place among the districts of the Western Uttar Pradesh. It is located between 29°2' and 29°57' North latitude and 77°59' and 78°56' East longitude. It is surrounded on the East by the district – Udham Singh Nagar of Uttarakhand, on the West by the Muzaffarnagar on the North by Haridwar and Gharwal of Uttarakhand, on the North-West by the Shaharanpur, on the South-West by Meerut, on the South by the Moradabad and on the East-South by district Jyotibaphule Nagar. Bijnor district is the gateway of the hilly region of Uttarakhand. The Length of the district from North to South is 99.2 km and its breath from East to West is 98.6 km. The western boundary is formed throughout by the deep stream of the river Ganga. The district may be described topographically as plain tract with slight undulations caused by the valley of few rivers. The Main crops of the area are wheat, rice and sugarcane. Although district Bijnor is a prominent agricultural district but the number of industrial units both big and small are also considerable.

RESEARCH METHODOLOGY

The study is addressed to identify and examine the socio-economic factors in adopting agricultural technology in five villages i.e. Madhusudanpur Nand Jhalra, Shahmuzaffarpur Chamrawala, Jogipura, Taharpur Said, Jaswantpur Lukadari. For this purpose 227 farmers were randomly selected from these villages. Due to time constraints and financial problems, it was very difficult to collect information of all villages in the district. Therefore, the scope of the study was confined to five villages. In order to collect the primary data, the sample farmers were interviewed through face-to-face method. After completion of data and required information, the data were transferred into tally sheet. The percentages and averages were worked out for discussions and interpretations of the results.

RESULTS AND DISCUSSION

Age Composition

In the process of agricultural development, the age composition of population plays a very significant role as it helps in adoption of new ideas and practices

which in turn bring economic benefits and make them food secure and prosperous. Age is an important factor that influences the probability of adoption of new technologies because it is said to be a primary latent characteristic in adoption decisions (Akudugu *et. al.*, 2012). However, there is contention on the direction of the effect of age on adoption. The presumption is that at a comparatively younger age people are more receptive to new ideas and practices, whereas at an advanced stage people find it difficult to change from old-age practices, and they resist to adoption of innovation. With the growing age, risk bearing capacity of man gradually declines. With this view all 1153 members of the household in selected villages were arranged according to their age in ascending order and finally divided into four categories, as shown in the Table 1.

Table 1: Age Composition of the Household Members

S. No.	Age Group	Number of Members in Villages					Total
		Madhusudanpur Nand Jhalra	Shahmuzaffarpur Chamrawala	Jogipura	Taharpur Said	Jaswantpur Lukadari	
1.	Below 30 (Young)	167 (34.64)	28 (36.36)	63 (43.44)	96 (33.92)	39 (23.49)	393 (34.08)
2.	31-45 (Middle)	137 (28.42)	20 (25.97)	39 (26.89)	80 (28.26)	68 (40.96)	344 (29.83)
3.	46-60 (Upper Middle)	112 (23.23)	20 (25.97)	28 (19.31)	57 (20.14)	38 (22.89)	255 (22.11)
4.	Above 60 (Old)	66 (13.62)	9 (11.68)	15 (10.34)	50 (17.66)	21 (12.65)	161 (13.96)
Total		482 (100)	77 (100)	145 (100)	283 (100)	166 (100)	1153 (100)

The age composition of members of the household depicts that the members are belong to all the four age groups in the study area. However, the numbers in each age group varies from as low as 161 members amounting to 13.96% in case of old age group with age range above 60 years to as high as 393 members amounting 34.08% in case of young age group with age range below 30 years. The encouraging fact is that the young age and lower middle age (0-30 and 31-45 years) account for the highest number of members with 63.91%. However, on the downside it can be seen that upper middle age group with age range 45-60 years accounts for only 255 members amounting 22.11%.

Education

Illiteracy is the hazardous problem of India. Mostly in rural India, literacy rate is too painful. ‘Information is power’ but it is not possible without education. It

Table 2: Educational Status of the Members

S. No.	Level of Education	Number of Members in Villages					Total
		Madhusudanpur Nand Jhalra	Shahmuzaffarpur Chamrawala	Jogipura	Taharpur Said	Jaswantpur Lukadari	
1.	Illiterate	135 (28.00)	27 (35.06)	37 (25.51)	78 (27.56)	15 (9.03)	292 (25.32)
2.	Up to 5 class	83 (17.21)	15 (19.48)	30 (20.68)	80 (28.26)	47 (28.31)	255 (22.11)
3.	6-12 class	161 (33.40)	18 (23.37)	39 (26.89)	69 (24.38)	45 (27.10)	332 (28.79)
4.	Graduation	48 (9.95)	8 (10.38)	16 (11.03)	30 (10.60)	35 (21.08)	137 (11.88)
5.	Post- graduation	37 (7.67)	5 (6.49)	13 (8.96)	16 (5.65)	18 (10.84)	89 (7.71)
6.	Technical Education	18 (3.73)	4 (5.19)	10 (6.89)	10 (3.53)	6 (3.61)	48 (4.16)
Total		482 (100)	77 (100)	141 (100)	283 (100)	166 (100)	1153 (100)

means education is the prime requirement for development and systemizing the life for human being. The role of education in the development of agriculture hardly needs any emphasis. The role of education is immense in bringing about socio-economic transformation, which in turn affects the way in which a person utilizes his skills on agricultural land. Education is also able to erase the information gaps. Information gaps are the main communication barriers/hindrance which checks the flow of development. Education is thought to create a favorable mental attitude for the acceptance of new practices, especially information-intensive and management-intensive practices (Waller, 1998 and Caswell, 2001).

The Educational status of members of the household shown in Table 2 which shows a high percentage of members that is 28.79% are 6-12 to very highly educated, it is good sign as it indicates that education is gaining importance among the respondent. However, it is not a source of joy because there are still 25% members who are illiterate, while more than 4% members fall under the level of

technical education. Moreover, the educated members also vary in their category of education. A close look at the above table reveal that number of members in each category of education ranges from as low as, 48 members amounting to 4% in case of technical education category. While as high as 332 members amounting 28.79% in case of 6-12 category. Next position is accounted by illiterate category with 292 members amounting to 25 percent. It is very disappointing as a high percentage of members are still uneducated. There are 137 graduates and 89 post graduates in the study area which makes nearly 12 and 8% respectively.

LAND HOLDING

Land holding found to have a positive relationship with the probability of adoption of new agricultural technologies. In agricultural system size of land holdings determines the agricultural income of farmers. There is an intrinsic relationship between the size of land holding and socio-economic transformation. The sociological and anthropological studies provide enough evidence to prove the fact that the extent of land ownership is an important indicator of one's socio-economic status. The greater size of land holding is responsible for the adoption rate of new agricultural technology. Large farmers are more inclined to adopting new agriculture technologies than small farmers. Farmers of the small size of land holding hamper the optimum use of modern farming techniques, bio-chemical techniques, and animal force for tilling and managerial talent. The size of land holding of respondents is depicted in the table 3.

It is evident from the Table 3 that 227 respondents are categorize into three categories viz. small, medium and large comprised of 96, 77 and 54 respectively. The total area of all respondents is 415.60 hectares. 54 large size respondents having an area of 209.39 hectares of land amounting to 50.37%, while 77 medium size respondents are with 139.20 hectare of land amounting to 33.49%. A small part of the land is occupied by the small size respondents that are 67 hectares amounting to 16.13% to the total area of land holdings.

The decline in medium and small size of holdings is testimony of the fact that today farmers want to relish the greater commercial value of their land instead of spending time and money in cultivation of crops. Moreover, another factors come to light that is division of land among the family members, therefore leading to decline in small and medium size of holdings. The discussions above clearly economically vary sound to have large size of holding or due to subdivision of holding among various family members thereby reducing its size. Whatever the case may be its net impact can be noticed on the production and ultimately on the food security of the households.

Table 3: Size of Land Holding of the Respondents

S. No.	Holding range (ha.)	Area (ha.)					Total Area (ha.)	No. of Respondents					Total
		Madhusudanpur	Shamzafarpur	Jogipura	Taharpur Said	Jaswantpur		Madhusudanpur	Shamzafarpur	Jogipura	Taharpur Said	Jaswantpur	
1.	0-1 (Small)	21.44 (10.56)	5.84 (21.28)	5.36 (10.29)	22.48 (31.04)	11.92 (19.86)	67.04 (16.13)	31 (32.29)	8 (50.00)	8 (30.76)	31 (58.49)	18 (50.00)	96 (42.29)
2.	1-2 (Medium)	60.32 (29.61)	12.64 (46.06)	20.16 (38.70)	27.92 (38.56)	18.16 (30.26)	139.20 (33.49)	39 (40.62)	3 (18.75)	12 (46.15)	17 (32.07)	6 (16.66)	77 (33.92)
3.	2- above (Large)	121.92 (59.85)	8.96 (32.65)	26.56 (50.99)	22 (30.38)	29.92 (49.86)	209.36 (50.37)	26 (27.08)	5 (31.25)	6 (23.07)	5 (9.43)	12 (33.33)	54 (23.78)
Total		203.68 (100)	27.44 (100)	52.08 (100)	72.40 (100)	60.00 (100)	415.60 (100)	96 (100)	16 (100)	26 (100)	53 (100)	36 (100)	227 (100)

Table 4: Availability of Farm Implements

S. No.	Type of Implements	No. of Implements in Villages						Total
		Madhusudanpur Nand Jhalra	Shahmuzaffarpur Chamrawala	Jogipura	Taharpur Said	Jaswantpur Lukadari		
1.	Tractors	10 (3.32)	6 (6.81)	8 (6.95)	8 (9.19)	6 (6.38)	38 (5.54)	
2.	Pump sets	31 (10.29)	12 (13.63)	18 (15.65)	11 (12.64)	14 (14.89)	86 (12.55)	
3.	Harrows/cultivators	10 (3.32)	6 (6.81)	8 (6.95)	7 (8.04)	5 (5.31)	36 (5.25)	
4.	Sprayers	45 (14.95)	7 (7.95)	15 (13.04)	13 (14.94)	15 (15.95)	95 (13.86)	
5.	Bullock carts	75 (24.91)	15 (17.04)	21 (18.26)	12 (13.79)	21 (22.34)	144 (21.02)	
6.	Sowing machines	32 (10.63)	13 (14.77)	12 (10.43)	4 (4.59)	4 (4.25)	65 (9.48)	
7.	Threshers	12 (3.98)	8 (9.09)	9 (7.82)	6 (6.89)	5 (5.31)	40 (5.83)	
8.	Potato harvesters	8 (2.65)	7 (8.13)	11 (9.56)	-	-	29 (3.79)	
9.	Iron/wooden plough	78 (25.91)	14 (15.90)	13 (11.30)	26 (29.88)	24 (25.53)	155 (22.62)	
	Total	301(100)	93(100)	115(100)	87(100)	94(100)	685(100)	

FARM MECHANIZATION

Mechanization is one of the key factors in the rejuvenation of agriculture. Mechanization stands for the use of machinery in all farming operations, ranging from ploughing to the marketing of the produces. There is now a common belief that progressive agriculture is impossible without mechanization of agriculture. By mechanization of agriculture we mean the replacement of animal and human power by machinery. The improved tools and farm implements can change appreciably the cropping patterns, cropping intensity and crop combinations resulting into high agricultural returns. The use of machinery in agriculture has resulted in increased agricultural production and reduction of costs. As regard to these villages respondents are mechanized with the several types of tools and implements as given in the table 4. Table 4 shows the total numbers of tools/implements are 685 which are distributed on total 227 households of the study area. Among the tools/implements, iron/wooden plough has large number making of 155 amounting to 22.62 percent. Only 26 potato harvesters are there in the villages which are lowest among them. There are 38 tractors in the villages. Major work of farming is performed by tractors comprised of harrowing, cultivating, drafting, threshing, transporting, seed sowing and irrigation.

For the purpose of crop protection there are 95 sprayers which make 13.86% of total tools/implements. Rural and agricultural transportation like fodder carrying from field to home, sugarcane carrying from field to sugar mill and crushers, bricks from brick works and so on, is done by bullock carts which is a major transportation mean in the villages. These are 144 amounting 21% to the total tools/implements. Besides, above mentioned tools/implements, the respondents are equipped with 86 pump sets, 65 sowing machines, 40 threshers and 36 harrow/cultivators.

INCOME

Income is a key indicator of the socio-economic status of an individual. The living standard attained by an individual is to a large extent determined by his financial position. Majority of the farmers are small, they have not internal sources of their own to purchase the entire or any of the components of new agricultural technology. It is mainly responsible for their low income, which does not permit them to adopt more remunerative new agricultural technology. The categories of income level of the respondents are given in Table 5.

Table 5 reveals that the majority of the respondents fall under the income level category of ₹ 1000-3000 which accounted for 70 respondents amounting 30.83% followed by the category of ₹ 3000-5000 which makes 23.78% of the total. In case of below ₹ 1000 and above ₹ 10000 income level there are 44 and 15 respondent comes in these categories amounting, 19.38% and 6.60% to the total respectively.

Table 5: Monthly Income of the Respondents

S. No.	Income range (₹/month)	No. of Respondents					Total
		Madhusudanpur Nand Jhalra	Shahmuzaffarpur Chamrawala	Jogipura	Taharpur Said	Jaswantpur Lukadari	
1.	Below -1000	14 (14.58)	4 (25)	3 (11.53)	17 (32.07)	6 (16.66)	44 (19.38)
2.	1000-3000	29 (30.20)	3 (18.75)	10 (38.46)	18 (33.96)	10 (27.77)	70 (30.83)
3.	3000-5000	22 (22.91)	5 (31.25)	9 (34.61)	10 (18.86)	8 (22.22)	54 (23.78)
4.	5000-10000	25 (26.04)	3 (18.75)	3 (11.53)	6 (11.32)	7 (19.44)	44 (19.38)
5.	Above 10000	6 (6.25)	1 (6.25)	1 (3.84)	2 (3.77)	5 (13.88)	15 (6.60)
Total		96(100)	16 (100)	26 (100)	53 (100)	36 (100)	227 (100)

CONCLUSION

The rapid expansion of agricultural technology offers a unique opportunity to increase the economic benefits to farmers. The process of adoption of new agricultural technology in district Bijnor has been slow and interrupted mainly due to constraints like lack of capital, low price of agricultural produce, inadequate institutional credit, inadequate irrigation facility, high cost of fertilizers, high rental charges of implements and machines, uncertain whether condition, poor Government policies, poor farming conditions are responsible for the low output.

From the study it is concluded that young and middle age generation is actively participating in adopting agriculture technology as well as secondary activity. Education is the prime requirement for adopting of agriculture technology. Majority of the people are literate which results the interest to adopt agriculture technology. Small and medium land holdings were obstacle in adoption of agriculture technology. Farmers are not willing to take any risk to adopted agriculture technology or adopt new practice or experiment in their field. Majority of the farmers are equipped with the indigenous implements. Tractor is the most

expensive one in the farm machinery and thus it has a vital role in boosting the economic gains by carrying out different farm operations. Due to less income they could not afford to have their own tractors and other farm implements. Financial deficiency also hampers the adoption of new agricultural technology. Majority of the farmer have low income due to which they are unable to adopt new agriculture technology. A micro credit program should be of immense importance in boosting the adoption of new agricultural technology in the study area. Small agriculture training institutes should be opened in the study areas to train the farmers with the new farm technology. Farmers are unaware about efficient farming technique, proper use of fertilizer, good quality of seeds and pesticide. Thus we can say that due to unawareness our production is low. For the removal of this problem Government should launch programmes to the farmers and give them awareness about the professional and efficient techniques of production. Effective program planning is needed to embolden farmers in adopting technology into their farming routine.

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