OPEN ACCESS Int. J. Agr. Ext. 10 (01) 2022. 149-159 DOI: 10.33687/ijae.010.01.4010

Check for updates

Available Online at EScience Press
International Journal of Agricultural Extension
ISSN: 2311-6110 (Online), 2311-8547 (Print)
https://esciencepress.net/journals/IJAE

SOCIO-ECONOMIC, FARM, AND INFORMATION VARIABLES INFLUENCING FARMER'S DECISION TO ADOPT A SUSTAINABLE WAY OF COTTON PRODUCTION

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ARTICLE INFO

Article History
Received: August 12, 2021
Revised: January 07, 2022
Accepted: January 22, 2022

Keywords
Sustainable
Better cotton
Conventional system
Environmental degradation
Adoption

ABSTRACT

Conventional cotton production in Pakistan is viewed as no more productive due to the increasing costs of production and environmental degradation. The better cotton initiative (BCI) is one of the eminent sustainable ways of producing cotton in Pakistan. Although, the majority of cotton growers are still associated with conventional farming. This study examined the socio-economic factors affecting the participation of farmers in a better cotton initiative program. A survey of cotton growers, using multistage random sampling technique, was conducted in three cotton-growing districts of Punjab from three different agro-ecological zones. Primary as well as secondary (where necessary) data were taken from a sample of a total of 399 farmers (BCI as well as non-BCI) and WWF-P respectively for analysis. IBM SPSS statistics 20 was used for statistical and econometric estimations. Results indicate that farmers' education, farming experience, the area under cotton, contact with BCI staff, contact with BCI registered farmers, perceptions about the higher cost of production, more price than conventional cotton production have a significant positive effect on the adoption of 'Better cotton' (BC) production. Land ownership and age of respondents were statistically non-significant with adoption. Poor health status also has a significant positive relationship with the adoption of BC farming. The study findings imply that adoption of BC can be accelerated by increasing farmers education, training, and communication with the BCI team, and, most significantly, by pricing BC produce fairly.

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INTRODUCTION

Cotton is the most important cash crop, and its production mostly comes from low-wage parts of the developing nations as about 2/3 of the world's cotton is produced in four countries (China, USA, India and Pakistan) (Matloob *et al.*, 2020). But continuing issues of economy, society and environment made cotton production unsustainable (Schueneman, 2014). Like, cotton production requires more pesticides than almost any crop; it is calculated that cotton cultivation accounts for 25% of global insecticide use and 10% of pesticide use (Ahmad and Hasanuzzaman, 2020). Similarly, estimations of the 'Environmental Justice Foundation' witness that out of total irrigation for global cotton production 15% to 35% of withdrawals are thought as unsustainable (Schueneman, 2014).

Since its creation, Pakistan has been one of the biggest producers and influential exporters of cotton worldwide, and its economy is chiefly dependent on cotton (production, ginning, and textile) (Abbas, 2020). When compared to China, the United States, India, and Vietnam, Pakistan enjoyed a significant comparative advantage in the cotton sector (Khalid *et al.*, 2021). To increase the export volume of cotton for foreign exchange earnings, Pakistan should focus on quality, infrastructure, cost reduction, new technology, investment in the agricultural sector, and marketing in the global market (Maqbool and Mahmood, 2020; Razzaq *et al.*, 2021). Increasing awareness regarding the depletion of natural resources and their possible consequences are driving consumer choices and consumption patterns towards sustainability (Hassan *et al.*, 2018; Ahmed *et al.*, 2020).

Tackling the sustainability-related implications of production in this ambiguous and complex production network is a difficult task. Nonetheless, various sustainability standard systems have developed over the last three decades (Ferrigno, 2016) and currently, numerous global initiatives are available for increasing the production of sustainable cotton in the world. 'Organic cotton' and 'fair-trade cotton' are the well-known sustainable cotton production alternatives to reduce the negative effects of production (and boost small growers' livelihoods). But the predictions about the market of organic cotton say that it will stay relatively small (Addis *et al.*, 2021), mainly due to lower productivity. In the case of 'fair-trade cotton', there is no network for introducing and promoting it in Pakistan. An initiative named Better Cotton Initiative (BCI) entered the market in 2009 (PAN UK Solidaridad and WWF, 2017) aiming directly at the mainstream market. As result, the quantity of sustainably produced cotton has increased substantially. In 2008-9, it accounted for less than 1% of worldwide production; by 2015-16, it had increased to 13%, however around 1/5th of that 13% is considered more sustainable (PAN UK Solidaridad and WWF, 2017; Ferrigno, 2016). The BCI had registered 2.4 million cotton growers who produced over 6.2 million metric tonnes (accounting for 23% of global cotton supply) of Better Cotton by the end of the 2019-20 growing season (BCI, 2018).

The standards of sustainability for cotton production are relatively new and has influenced the relevant market for a few years (Voora *et al.*, 2020). But the 'Better cotton initiative' is the most appropriate platform for cotton production in Pakistan which directly focuses on the sustainability of the cotton industry and indirectly confronts rural poverty (ICAC, 2011). Unfortunately, the adoption of Better Cotton production is not up to the mark in Pakistan though its acceptance is dramatically mounting worldwide. In previous research, there is insufficient information about the core factors that influence the adoption of better cotton in Pakistan. This study was designed to provide rational insight into the factors affecting the adoption of better cotton production by farmers based on the theory of planned behaviour which is used by many studies like (Savari and Gharechaee, 2020), (Lin and Roberts, 2020) and (Bagheri *et al.*, 2021).

Theoretical framework

Theory of Planned Behavior (TPB) is a well-known conceptual model that uses psychological factors such as attitudes and norms to explain individual intentions to do a specific activity (Despotović *et al.*, 2019). Therefore, TPB was used for developing the theoretical framework of this research which is shown in Figure 1.

Conferring to the stated theoretical framework of this study, the behaviour of a farmer (cotton grower) is directed by three types of contemplations: his/her attitude towards sustainable farming (which is further dependent on three components as shown in Figure 1), control factor, and social factor (restricting or inspiring factors).

Farmer's attitude towards sustainable (BC) farming

First, knowledge (top left in Figure 1) about BC cotton production, then awareness about environmental changes and needed adaptations to cope with environmental risks (middle of top three items in Figure 1) and finally personal characteristics of the farmers (shown on the top right of Figure 1) are chief the factors which can influence a farmer's belief and underwrite for development of attitude (indicated by hexagonal item in the middle of Figure 1) towards sustainable (BC) farming.

Social factor (Social pressure)

The influence of the officer working with BCI, implementing organization or extension worker plays a key role in the formation of normative beliefs for the social factor. The "contact with BCI staff" and "contact with BCI farmer" was used as parameters for social factor.

Control factor

There are opinions that some factors can supplement or deter the performance of a farmer's behaviour. The context of these opinions undertakes that a farmer has no control over behaviour but 'marketing aspects and 'cost aspects' play a vital role in the development of control beliefs. So "perceptions about the higher cost of production" and "more price than conventional cotton" were used as parameters for the control factor.

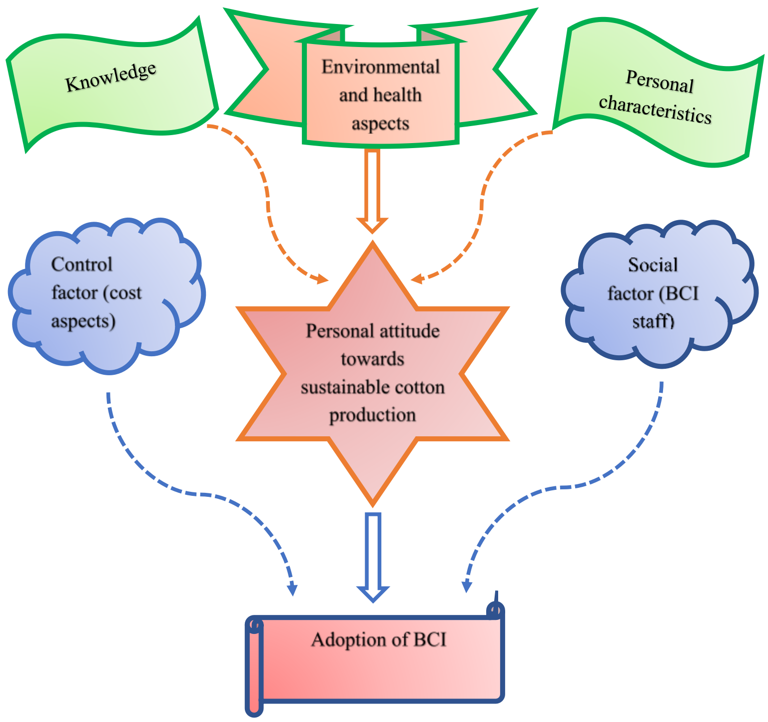

Figure 1. The theoretical framework of factors influencing cotton farmers' sustainable farming attitude and behaviour.

METHODOLOGY

Study Region

This study was conducted in Punjab, the biggest province of Pakistan where cotton is produced on most of its arable land. Punjab is divided into 14 agroecological zones (PARC, 1980) consisting of various districts and this division is based on inventories of land resources. There are also some core areas of cotton production, and some areas are termed non-core areas. This study was conducted in three districts of Punjab, two of them belong to core cotton-producing areas and one belongs to the non-core areas.

Sample size

For a comprehensive farm survey, a representative sample size of the total population under study was determined using the formula developed by Yamane (1967). The sample size based on this formula is widely used by researchers (Hussain and Thapa, 2012; Qasim *et al.*, 2011; Ullah and Perret, 2014). It depends on the population size and the level of precision.

$$n = \frac{N}{(1 + Ne^2)}$$

Where, n = Sample size, N = Total number of Rural households in the study area, e = Precision level which is set at 5 or 10% in different social studies but here sample size was calculated using 5% to get more accuracy.

$$\boldsymbol{n} = \frac{293024}{(1+293024(0.05)^2)} = 399$$

Because each tehsil has a different population, the sample size chosen was proportional to the size of each tehsil's population. The proportionate distribution of sampled data among distinct strata is feasible with the proportional allocation (Rajpar and Barrett, 2019). Using the following formula, the sample size at the tehsil level was calculated:

$$n_i = n.\frac{N_i}{N} \quad \text{for i=1,2,3}$$

Where;

$$n_1 = 399\frac{138432}{293024} = 188$$

$$n_1 = 399\frac{63769}{293024} = 86$$

$$n_1 = 399\frac{90823}{293024} = 123$$

$\boldsymbol{n_i}$: Sample size for ith stratum (in this case, the tehsil); n: Sample size for the entire population (399 in this case); $\boldsymbol{N_i}$ denotes the total number of rural households (farmers) in the ith stratum; N denotes the total number of rural households in all three strata. Statistical Package for Social Sciences (SPSS) software was used to analyse the data.

Sampling technique and framework

The survey was carried out employing a multistage sampling technique, which was employed in several related studies. In the first stage, two districts from core cotton growing areas of Punjab namely Bahawalpur (from agroecological zone I) and Rajanpur (agroecological zone III) were selected. One district, Bhakkar (agroecological zone IX) was chosen from a non-core area of cotton. Bahawalpur is the most suitable area for cotton in terms of climate (max 40 °C and min 26°C), soil (loam, medium clay, sandy loam), and water (500-800mm) (Ahmad et al., 2019). Rajanpur is an economically most suitable district with maximum returns of 13,487 Rs/hectare (Ahmad et al., 2019). Bhakkar is chosen as the third district for a survey to see variations in the adoption of better cotton as compared to core areas. In the 2nd stage, one tehsil from each district; Ahmadpur East, Rajanpur (tehsil) and Bhakkar (tehsil) were chosen randomly. Six villages were chosen through a simple random sampling technique from each selected tehsil at the 3rd stage. At the fourth stage, 188, 87 and 124 farming households were chosen at random from all selected villages in Ahmadpur east, Rajanpur, and Bhakkar respectively, total of 399 farmers (both BCI and non-BCI) for the entire study region.

Table 1. Sampling framework.

Argo-ecological zones of Punjab	Districts	Tehsils	Villages	Rural households
zone I	Bahawalpur	1 (Ahmadpur east) N= 1,078,683, NHH= 166,376, RN = 902,706, RHH= 138,432	6	188
zone III	Rajanpur	1 (Rajanpur) N= 706,868, NHH= 92,801 RN= 494,262, RHH= 63,769	6	87
zone IX	Bhakkar	1 (Bhakkar) N= 685,059, NHH= 108,432, RN= 572,041, RHH= 90,823	6	124
Total	n= 293024/ [1+293024(0.05)2] = 399		18	399

*N=total population, NHH= total number of households, RN=total rural population, RHH=rural households

Source: Pakistan Bureau of Statistics, 2018

Data collection

A semi-structured questionnaire was first constructed and then refined by consulting with experts from the extension department (because the extension department has been involved in facilitating the BCI) and the BCI staff of WWF-Pakistan. A pilot survey was done by approaching 15 farmers and many gaps were filled by drawing practical information from farmers. During the cotton season of 2020 (May to December), a complete survey of farm households was conducted. BCI farmers in the selected tehsils were chosen randomly from the lists of 'BCI participant farmers' provided by WWF-Pakistan and for approaching non-BCI farmers a great help was taken from the agriculture officers at extension departments of selected tehsils. Data were collected through face to face interviews.

Binary Logistic Regression (BLR) Model.

To identify the factors affecting farmers' participation in BCI in the study area a logistic regression model is used because logit, probit and Tobit models are the prevalent econometric methods employed for the identification of determinants that govern the given dependent variable (dummy). Logit and probit models are like each other (being binary response variable models), but mostly, the Logit model is chosen as opposed to the other possibly due to its easier interpretation as well as its competence to accentuate patterns in the given data that otherwise could be covert (Khan *et al.*, 2021; Mukherjee *et al.*, 2013; Namara *et al.*, 2007). Therefore, for this study, the logistic regression model was employed to examine the key factors shaping farmers' participation in the 'Better cotton initiative'.

Model specification

The usual BLR technique was implemented to estimate the pragmatic model. The general form of laudable logit model is epitomized as follows:

$$L_i = ln\left(\frac{P_i}{1-P_i}\right) = \beta_\circ + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} \text{ ,}$$

Where L is the log of the odds of cotton farmers' adoption of BCI which is called the logit and Pi is the probability (conditional) of a farmer participating in BCI. X_{1i} to X_{ki} symbolize the stimulus; β_0 represents the intercept of the model; β_1 to β_k symbolize the coefficients of the independent variables. Considering the BLR model, the probability of a 'household to adopt BCI' or not are two possible outcomes in this study. The dependent variable, in this case, is a dummy variable that will take the value of 1 if a cotton farmer has adopted BCI and will take the value of 0 if the cotton farmer has not adopted BCI. In the case of 'Y' (dichotomous response variable) and an 'X' (vector of explanatory variables), the probabilities (of an event occurring) can be written as follows:

$$P_i = Prob(Y_i = 1) = \frac{1}{1 + e^{-(\beta_\circ + \beta_1 X_1 + \cdots + \beta_k X_k}}$$
$$= \frac{e^{(\beta_\circ + \beta_1 X_1 + \cdots + \beta_k X_k}}{1 + e^{-(\beta_\circ + \beta_1 X_1 + \cdots + \beta_k X_k}} \quad \ldots\ldots\ldots..(1)$$

Similarly;

$$P_i = Prob\ (Y_i = 0) = 1 - prob\ (Y_i = 1)$$
$$= \frac{1}{1 + e^{-(\beta_\circ + \beta_1 X_1 + \cdots + \beta_k X_k}} \quad \ldots\ldots.\ldots(2)$$

where P_i is the likelihood for a farmer to adopt BCI and $(1-P_i)$ is the possibility of not adopting BCI. The Pi/(1−Pi is just the odds ratio in favour of joining in BCI and the odds of a particular event to occur are demarcated as the fraction of the probability of occurring to the probability of not occurring. Now dividing the equation (1) by (2) we get:

$$\frac{Prob(Y_i = 1)}{Prob(Y_i = 0)} = \frac{P_i}{1 - P_i} = e^{(\beta_\circ + \beta_1 X_1 + \cdots + \beta_k X_k}$$

Now we will obtain the log of odds ratio by taking the natural log of the above equation.

$$L_i = ln\left(\frac{P_i}{1-P_i}\right) = \beta_\circ + \beta_1 X_{1i} + \beta_2 X_{2i} + \cdots + \beta_k X_{ki} \text{ ,}$$

Where $\beta_1, \beta_2, \ldots, \beta_k$ show the partial slope variables which depict the change in L for a unit change in the stimulus variables ($X_{k1}, X_{k2}, \ldots, X_k$). In other words, it tells how the log of odds in favour of growers' participation in BCI changes with the unit change in a specific predictor. The choice of the predictors used in this model was based on the relevant literature and the precise situations in the study area.

For estimating the parameters of this model, the maximum likelihood estimation method was used in SPSS (Gujarati *et al.*, 2012). In this study, we have tried to investigate the factors involved at the farm level in the adoption of BCI as a sustainable cotton production strategy as compared to the conventional farming system. The specific logit model for this study is given as,

$$Y_i = \beta_\circ + \beta_1 AGE + \beta_2 EDU + \beta_3 FE + \beta_4 DHS + \beta_5 TLA + \beta_6 LAC + \beta_7 DCBCIS + \beta_8 DCBCIF + \beta_9 DPCP + \beta_{10} DMP + \varepsilon,$$

Y_i = probability of adoption of BCI, 1 if adoption 0 otherwise

AGE=age (years)

EDU=education (no. of years of schooling)

FE=Farming experience (no. of years)

DHS= Health status (1= good health, 0= poor health)

TLA=total land area (acres)

LAC=land area under cotton (acres)

DCBCIS= contact with BCI staff

DCBCIF= contact with BCI farmer

DPCP=perception about the cost of production

DMP=More output price than conventional cotton

Table 2. Variables in the study and their description.

Variables	Description
Dependent variable Y_i	Adoption =1, non-adoption=0
Independent variables	
(A) Socio-economic variables	
AGE	Age of respondent (no. of years)
EDU	Education of respondents (years of schooling)
FE	Farming experience (years)
DHS	Health status (1= good health, 0= poor health)
TLA	Total land area (no. of acres)
LAC	Land area under cotton (no. of acres)
(B) Social factor	
CBCIS	Contact with BCI staff (Yes=1, No=0)
CBCIF	Contact with BCI farmer (Yes=1, No=0)
(C) Control factor	
PCP	high cost of production (Yes=1, No=0)
MP	More output price than conventional cotton (Yes=1, No=0)

RESULTS AND DISCUSSION

Socio-economic and farm indicators

Age, education, farming experience, a total area owned, the area under cotton, family size, number of adults and children were taken as socio-economic variables for both types of farmers in the study area and the following Table 3 displays the averages and standard deviations of these socio-economic indicators. The average age of BCI and non-BCI farmers was calculated as 43.37 and 43.50 years respectively which showed that the average age of both types of farmers was close to each other. Education of respondents varies across both groups as average education of BCI farmers was calculated as 8.55 years of schooling while for non-BCI farmers average education was 5.89 years of schooling which shows that most educated farmers belonged to BCI, possibly due to more understanding power the educated farmers joined BCI more than that of conventional (non-BCI) farmers. The average farming experience of BCI farmers and non-BCI farmers was 20.90 and 18.15 years respectively. More farming experience of BCI farmers showed that it had a substantial contribution to understanding the techniques told by BCI staff, therefore helping farmers to join BCI. The average of 'total area owned' for farming is more for conventional farmers (6.47 acres) than BCI farmers (5.50 acres) but an average of the area under cotton crop is more for BCI farmers (5.02 acres) than that of other farmers (3.79 acres).

These results indicate that big cotton farmers tend to adopt BCI practices more than small farmers. The values of the average total land area owned and average land under cotton was very close to each other because most of the BCI farmers were growing only cotton crop in Kharif season along with some grasses and vegetables for family consumption. Average family size, average no. of adults and average no. of children for BCI farmers were 6.54, 2.72 and 3.87 respectively while for non-BCI farmers average family size, average no. of adults and average no. of children were calculated as 9.54, 4.26 and 5.25 respectively.

Summary of Binary response variables

The dependent variable in this study was binary with 1 as adoption of BCI and 0 as non-adoption of BCI. The results showed that 50.37% of farmers had adopted the BCI and 49.62% were not registered with this program. The frequency and percentage of farmer's contact with BCI staff showed that 52.88% of farmers had contact (i.e., attend the meetings) with BCI staff while 47.12% did not attend the meetings and had no contact with the officers of BCI.

The contact of a farmer with the registered BCI farmer was also taken as a dummy variable to influence the adoption of a better cotton initiative. The results showed that 54.14% of farmers had contact with nearby BCI farmers and 34.58% did not have any contact with registered BCI farmers. Perceptions about the cost of production also play a vital role in the adoption of new technology (which can curtail the cost of production). The dummy variable results regarding perception about the higher cost of production showed that 72.68 farmers had perceptions of higher costs and 27.32 percent of farmers said that they were incurring usual costs of production. Being good quality produce better cotton is deemed to have more price than conventionally grown cotton. The response of farmers showed that 74.44% of farmers were receiving higher prices while only 27.32% were not receiving more prices. Regarding the health status of farmers, 76.44% of farmers were healthy, and 23.56% were reported unhealthy.

Table 3. Socioeconomic and farm indicators of the study area.

Indicators	BCI (N=201)		Non-BCI (N=198)	
	Average	Standard Deviation	Average	Standard Deviation
Age (Years)	43.37	7.61	43.50	11.52
Education (Years of Schooling)	8.55	4.12	5.89	2.09
Farming experience (Years)	20.90	6.54	18.15	5.42
Area owned (acres)	5.50	2.66	6.47	2.20
Area under cotton (acres)	5.02	3.01	3.79	1.75
Family Size (No.)	6.54	2.42	9.54	1.72
Adults (No.)	2.72	1.12	4.26	2.88
Children (No.)	3.87	2.13	5.25	1.31

Source: Calculations from author’s data collected through a survey of farmers

Table 3. Binary response variables.

Variables	f	%	f	%
Y	201	50.37	198	49.62
Health status (D) Good=1, Bad=0	305	76.44	94	23.56
Contact with BCI staff (D) Yes=1, No=0	211	52.88	188	47.12
Contact with BCI farmer (D) Yes=1, No=0	261	54.14	138	34.58
Perceived high cost of production (D) Yes=1, No=0	290	72.68	109	27.32
More price than conventional cotton (D) Yes=1, No=0	297	74.44	102	25.56

Source: Calculations from author’s data collected through a survey of farmers

Reasons for the satisfaction of BCI farmers with the ‘Better cotton initiative’

The BCI farmers were asked some questions regarding their satisfaction after registration with the better cotton initiative. About 35% of farmers stated that they were satisfied with the guidelines and training related to a reduction in the use of inputs and this is the main reason for adoption. Above 22% of the total BCI, farmers said that the BCI has helped them in efficient allocation of resources, more than 10% reported productivity improvement occurred, up to 15% reported that their income has improved, 10% said that their health issues are decreased and their health has improved after joining BCI, about 7% of the BCI farmers said that their income and food security is improved after joining this program, and about 8% said that this initiative is beneficial for the environment. These results are according to the previous studies conducted by (Kumar, 2016) in India and Zulfiqar and Thapa (2017) in Pakistan. It can be deduced from these results that the BCI program is a good platform for farmers to get social, economic and environmental benefits from BCI without incurring any cost on training or guidelines given by this initiative.

Rationales for non-adoption of ‘Better cotton initiative’ by conventional farmers

As better cotton production is much better than that of non-BCI or conventional cotton production in terms of resource use efficiency, higher productivity, the safety of biodiversity and net revenue, despite that conventional cotton production is common in Pakistan. Hence, reasons for not adopting the BCI program were asked by the traditional cotton growers (Figure 3). Most of (44.2%) the non-BCI farmers lack information about the BCI program (criteria of registration, technological know-how, sources of pesticide and organic fertilizers, registered and certified varieties, implementation skills at farm etc.). Many of the conventional cotton growers (24.1 %) told that they expect no financial benefit by registering with the BCI program, about 15.6% said that they feel it difficult to adopt the practices recommended by BCI staff. Only 9.5% of the non-BCI farmers said that they do not have any interest to learn as they had a lot of experience and there is no need to be guided by any person. Minority (6.5%) of non-BCI farmers said that they did not have the required skills to implement the adaptation practices given by the BCI program.

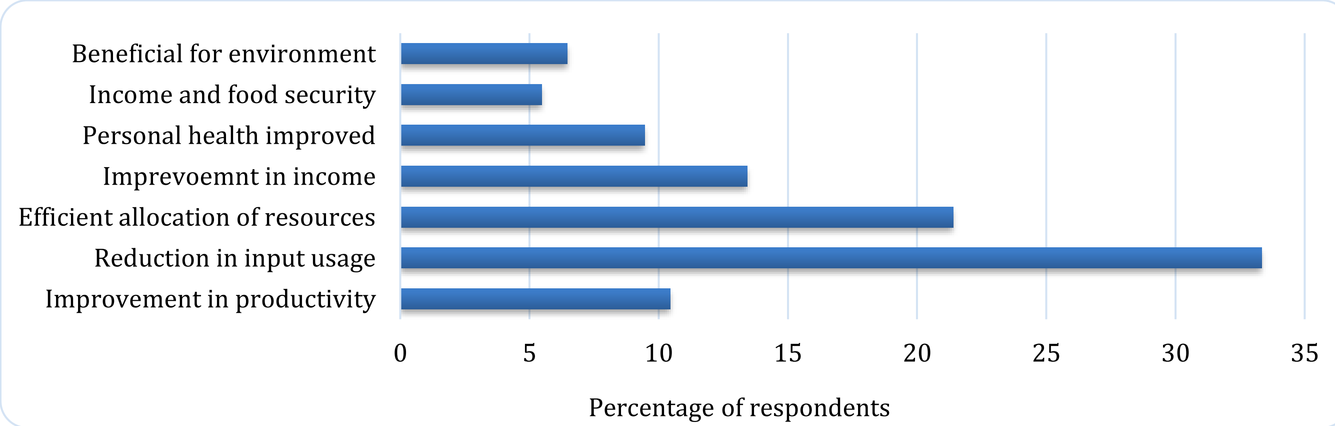

Figure 2. Satisfaction level of BCI farmers with the BCI program.
Source: Calculations from author's data collected through a survey of farmers

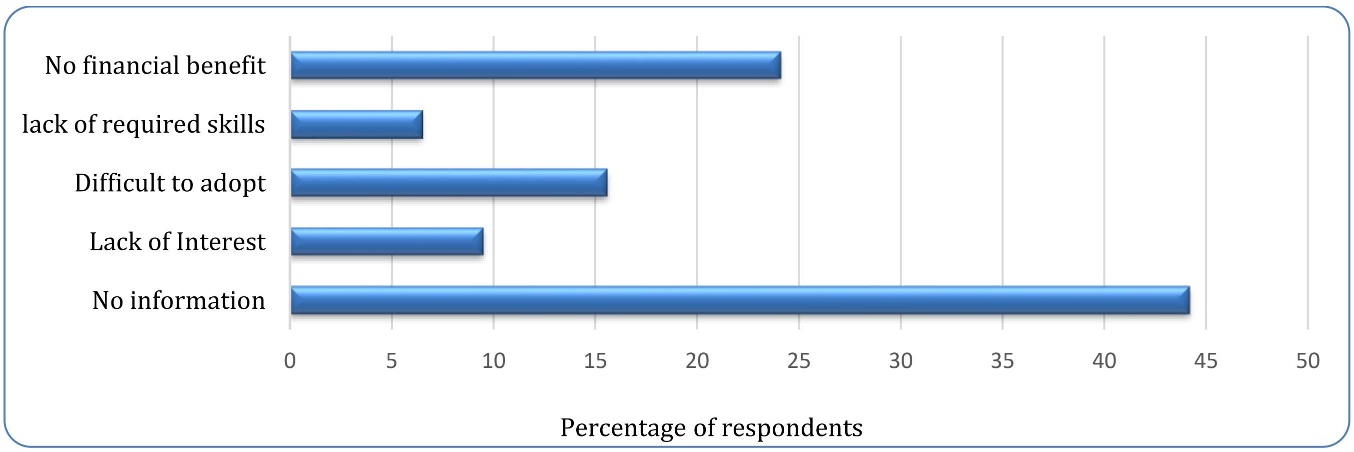

Figure 3. Why conventional farmers did not opt for the BCI program.
Source: Calculations from author's data collected through a survey of farmers.

Factors affecting the adoption of BCI

Logit model was estimated to find out the factors impacting the adoption of better cotton. The results are presented in Table 4, which shows that farmers' education, farming experience, contact with BCI staff and BCI farmers, area under cotton, perception about the extra cost of production, poor health status and more output price for better cotton significantly decrease the likelihood of adoption of better cotton. On the other hand, the age of the farmer and farm size increases the probability of choosing better cotton but were non-significant. Interpreting empirically, each logit estimate of the model is a partial slope coefficient which measures the change in logit because of a unit change in the value of a given regressor. Thus, the coefficients of variables; education (3.220), farming experience (0.076), contact with BCI staff (2.12) and more price than non-BCI cotton (1.469) imply that if these variables increase by one unit, the estimated logit increases by 3.22, 0.076, 2.12 and 1.469 units respectively in favour of opting for the better cotton, and all these variables are significant at 1% level of significance. The coefficients of the area under cotton (0.479) and contact with BCI farmers (0.119) indicate that with one unit increase in these variables the estimated logit in favour of the adoption of BCI increases by 0.479 and 0.119 units respectively with a significance level of 5%. The coefficients of health status and high cost of production variables with values of 0.093 and 2.70 showed that one unit increase in these variables increases the estimated logit of adopting BCI by 0.093 and 2.70 respectively at a 10% level of significance. The coefficients of age (-0.034) and family members (-0.128) implies that if the farmer's age and family members increase by one unit, the estimated logit decreases by about 0.034 and 0.128 units respectively in favour of opting for the better cotton, other things remaining the same. The coefficient of the total land area is negative which exhibits negative relation between the adoption of BCI and total land ownership, but it is non-significant. The antilog of a slope coefficient yields an odds ratio [Exp(B)] that provides a more meaningful interpretation. Thus, taking the antilog of the farmers' contact with BCI staff coefficient of 2.12, we get 8.33, which implies that the farmers in contact with BCI staff are more than 8 times as likely to adopt better cotton as compared to other farmers, ceteris paribus. Similarly, the odds ratio of education (25.028), perceived high cost of production (14.87) and more output price than non-BCI cotton (4.344) infer that educated farmers, who perceived high production costs and who expect more price of better cotton are 25 times, more than 14 times and more than 4 times more likely to adopt better cotton respectively. Odds ratios of variables like health status, contact with BCI farmers, area under cotton and farming experience also entail those farmers with poor health status, more contact with BCI farmers and having more cotton area were more likely to adopt better cotton initiative.

Table 4. Factors affecting adoption of BCI: Results of the logit model.

Variables	B	Exp(B)	S.E.
(Constant)	-2.807**	0.060	1.355
Age	-0.034ns	0.966	0.032
Education	3.220***	25.028	0.055
Farming experience	0.076***	1.078	0.031
Family Members	-0.128*	0.879	0.121
Total Land	-0.481ns	0.618	0.199
Area under cotton	0.479**	1.614	0.205
Contact with BCI staff (D)	2.12***	8.33	0.094
Contact with BCI farmers	0.119**	1.126	0.107
Perceived high cost	2.70*	14.87	0.075
Health status	0.093*	1.097	0.0023
More price	1.469***	4.344	1.007

Source: Note: ***p<0.01, **p<0.05, *p<0.10, ns = non-significant respectively

CONCLUSION AND RECOMMENDATIONS

This study indicates that educated farmers with farming experience, who have sufficient area under cotton production and have contact with BCI staff and BCI registered farmers have more tendency to adopt a sustainable way of cotton production (better cotton initiative), so farmers should be educated and their contact with BCI training staff must be enhanced for more adoption of sustainable cotton production systems. Farmers with perceptions about higher production costs are also inclined to adopt cost-effective ways of farming, it infers those farmers should be trained to perceive any higher costs they are incurring so that they can move to better cotton production. More price than conventional cotton production has a significant positive effect on the adoption of 'Better cotton' (BC) production so this price gap should be widened for attracting more farmers to join sustainable cotton production. The focus should be on young farmers who have more tendency than aged ones as the current study revealed.

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