



## Constraints faced by young farmers in adopting ICT tools in Agriculture: a case study of district Sargodha

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### Abstract

In the modern ages, application of ICTs has not been negated by anyone due to its promising role as information source and in digitalizing of agricultural business. This study was focused on determination of constraints being faced by the young farmers (rural youth) in Sargodha. Descriptive study was administered by the interview schedule, having open ended and close ended questions. Multistage probability (simple random) sampling method was used for the selection of study respondents. Data were collected from 225 randomly selected young farmers who used to do farming for their livelihoods. For reaching on an authentic decision, recorded data were analyzed using SPSS. Data showed that majority of the respondents were adult and mature farmers, having small size of landholding. Monthly family income of majority of respondents was medium. Different kinds of information sources were being prominently used by the respondents. Lack of awareness, language barrier, stereotype behavior and content irrelevancy are some of the major social constraints highlighted by the farmers. Among the economic constraints, poor ICTs infrastructure is the one to whom they blamed. Coming to technical constraints, their inability to use ICTs, internet coverage, authenticity of information and lacking in skill set were major constraints. Authors have recommended to establish sustainable ICTs network for productive channelizing of information to reach the target of “highest proportion of population mean rural youth”. For engaging young farmers in Agriculture using ICTs a policy framework comprises of four major segments is suggested.

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## Introduction

Pakistan is an agricultural based country and contributes about 18.5 % to national GDP. It is the single largest sector of economy that provides 38.5% employment to the country's total labour force (Government of Pakistan, 2019). Most of the rural population of country is living in rural areas and dependent on agriculture sector directly or indirectly. Technology transfer can be main source to uplift the life standard of rural people. Agricultural technology transfer is based on three components farming community, research institutes and agricultural extension. For the dissemination of new agricultural technology to its ultimate users i.e. farming community, the role of technology through agricultural extension is pivotal (Guillaume *et al.*, 2019). Information needs of farmers are largely divided into four main categories as explained well in the figure 1.

Flow of agricultural information between extension staff and farmers especially in developing countries and underdeveloped countries is not so strong and quick (Belay and Abebaw, 2004). Under traditional extension system, agricultural extension services are not effective enough to meet the ever growing food demands of fast growing population especially in the developing countries because of weak connection between extension staff and farmers (Aker and Isaac, 2010). This is the dire need of the current technical era to make efficient use of ICTs by the farmers in the field of agriculture like other fields for better agricultural production (Butt *et al.*, 2017).

Dissemination of information through computer-based economy is faster and easier than old traditional methods. Use of ICTs can increase the information flow of two-way communication that makes easier for farmer to approach researcher staff or researcher staff to the farmers (World Bank, 2011). Demands of ICTs in every field of life is increasing day by day. Agriculture is worldwide business so; the demand of new and improved applications of ICTs is increasing day after day (Zhang *et al.*, 2016). According to demands, ICTs are being updated to

solve the future problems of agriculture's especially communication and dissemination of latest technology. This type of technologies can help the developing and underdeveloped countries to compete and make themselves comparable with developed countries (Afolabi, 2012). ICTs have the capacity to solve the problems of farming community-marketing communication, needs of technology, marketing problems etc. Usage of computer in the process of crop production and crop marketing can make easier as well as quick enough (World Bank, 2011).

It can be very fruitful for the farming community and for their future generations as well. Extension staff especially field agents can use the advance technology to improve the learning process of farming community (Zahedi and Zahedi, 2012). ICTs also have large potential to maximize farm productivity through use efficient application of land, water, fertilizer and other resources (Deloitte, 2012). Throughout the globe, the proportion of young farmers (age 15-24 years) is continuously increasing day by day. One of the biggest challenges to this rural youth is limited and insufficient access to information and knowledge (FAO, 2014). Now, young rural people are actively engaged in diverse nature of ICT tools including application of ICTs in modern agricultural practices (Aker, 2011). But the ground realities reveal that generally all the farmers and specifically, young farmers are facing a number of problems regarding ICTs application in agriculture (Shanthya and Elakkiya, 2017).

This has been reported that in Pakistan more than half of the total country's population comprises of youth having age upto 24 years (Pakistan Bureau of Statistics, 2015). Out of which majority are residing in rural areas and partially or completely involved in farming to earn income for their livelihoods (Hassan *et al.*, 2016). Like other parts of the developing and developed world, young farmers of Pakistan are heavily engaged in application of different ICT tools for quick access to farming related information and knowledge. The application of ICTs by the young farmers especially in the field of agriculture is still on

initial stage. Their level of ICTs application in agriculture is not upto the maximum level due to a number of multiple and interconnected factors. The main purpose of conducting this study was to explore the barriers and main hurdles being faced by young farmers in adopting ICTs for better agricultural practices so that farm profit can be maximized.

### Methodology

Methodology of material & methods of any research study include systematic data collection process and analysis of data in scientific manners. This includes description of research area, identification of study variables, sampling procedure, collecting data process, analyzing collected data and interpretation for the sake of concluding results and conclusion. Research is a process having always a “plan” that makes researcher able to find the solution of the problems identified in the study (Nachmias and Nachmias, 1996).

Study was carried out in Punjab province, Pakistan. Its population is about more than the half of total population of Pakistan. Its land is highly productive agricultural land as compared to the other three provinces. There are 36 small as well as large subdivisions (districts) of province Punjab (Government of the Punjab, 2019). Punjab province is very much famous due to its maximum share in the total agricultural production of the country. A wide variety of crops, fruits and vegetables are being grown in the province. Parentage share of major crops being grown in the province is well elaborated in the following figure 2:

Research design is a pre-planned structure of the study that focuses on results of the study, logics of the study and problems solving attitudes. Process of research design includes data collection, data analysis and interpretation.

A researcher can find relationship between different variables in this process. Current study has descriptive design, which is most common in the social researches. Collected data was used to describe

the different relationships among the variables.

Sampling is one of important steps of research process as it is not possible to cover whole population due to time and financial constraints. Sargodha district comprises of six tehsils as Sahiwal, Silanwali, Bhalwal, Kotmomin, Sargodha and Shah Pur. Three (03) tehsils were randomly selected as the targeted research area. From each selected tehsil, three (03) villages were selected using random sampling procedure. List of young farmers (having age upto 30 years) were prepared by conducting preliminary survey of the selected villages and staff of agriculture extension department of district Sargodha. At the last stage from the total nine (09) selected villages, 225 respondents were randomly selected using formula suggested by Yamane (1967) as given below:

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

$n$  = Sample size in each village,  $N$  = Total number of Farmers in each Village,  $e$  = Sampling error set at 15% Interview schedule was developed for sake of data collection research instrument through face-to-face interview method. Validity of the research instrument was checked by the panel of experts. Panel of experts recommended some changes in the instrument.

Instrument was revised after discussion of the experts based on given suggestions. Before actual data collection, research instrument was pre-tested by conducting interviews with 50 farmers of district Sargodha. These farmers were not included in the sample size of the research study. The data were coded and analyzed in the statistical package for social sciences (SPSS).

### Results and discussion

#### *Demographical characteristics of respondents*

Data regarding selected demographical characteristics of respondents like age, education, size of family land holding, years of farming experience of household head and total household income was collected and presented in Table 1 given below:

**Table 1.** Frequency distribution of respondents according to their demographic characters.

Socioeconomic characters	F	%
Age		
Upto 20 years	31	13.8
21 to 25 years	111	49.3
26 to 30 years	83	36.9
Education		
Upto Primary	38	28.0
Matriculation	91	36.0
Intermediate	73	26.0
Graduation or above	23	10.0
Size of family landholding		
Upto 10 acres	107	47.6
11-20 Acres	79	35.0
21-30 Acres	22	9.8
31 Acres or Above	17	7.6
Farming experience of household head		
Upto 7 Years	45	20
8-15 Years	71	32
16-20 Years	86	38
21 Years or above	23	10
Monthly family income		
Upto 15,000 rupees	34	15.0
15001 to 25,000 rupees	54	24.0
25001-35000 rupees	81	36.0
35001 rupees and above	56	25.0
Total	225	100.0

Among demographic factors, age is the prominent factor which determines the respondent's mindset, interest or passion for the farming occupation. The data regarding present age of the respondents shows that about half of them were fall in the range of 21-25

years age. This indicates that majority of respondents belong to young age group (upto 24years) as described by UNO. It is clear from the data that farmers having young age largely utilized ICT tools for better farming practices.

**Table 2.** Distribution of respondents according to their sources of agriculture information.

Information sources	Yes		No	
	Frequency	Percentage	Frequency	Percentage
Radio	205	91.1	20	8.9
Television	216	96.0	9	4.0
Internet	216	96.0	9	4.0
Mobile phone	216	96.0	9	4.0
News-paper	205	91.1	20	8.9
Agri. Help line	216	91.1	9	8.9
Written literature from public agencies	216	91.1	9	8.9
Written literature from private agencies	207	92.0	18	8.0
Extension worker	216	96.0	9	4.0
Private inputs dealers	207	92.0	18	8.0
Fellow farmer	207	92.0	18	8.0

It was recorded that majority of the respondents (36.0%) were having education upto 10 years of schooling (matriculation). This is very disappointing that only 10% of respondents possessed higher level of education (graduation or above). Similar findings were also quoted by Chaudhry *et al.*, (2017) while identifying self-perceived needs of rural youth in the Punjab, Pakistan. They concluded that majority of the

rural youth in the research area had education upto matriculation. This is very common that in rural areas university level education is not so prominent. Majority of the respondents perceived that “*there is no need to get university level education for those who engaged in farming*”. Generally this has been observed that farming in Pakistan is characterized by low educational status (Ahmad *et al.*, 2018).

**Table 3.** Distribution of young famers according to their application of ICTs in Agriculture.

Application of ICTs in Agriculture	Frequency	Percent
Yes	195	87.0
No	30	13.0
Total	225	100.0

Nearly about half of the respondents possessed small agricultural land holdings (upto 10 acres). Data regarding farming experience of household head of respondents' shows that majority (38.0%) ha farming experience from 16 to 20 years. This indicates that household heads of majority of the respondents engaged in farming practices since two decades. Farming was the major income source of all the respondents of the study. However, minor percentage of young farmers also used to earn income from different secondary income sources like labour,

business and some other off-farm activities. The data of monthly family income shows that the monthly family income of majority (36.0%) was in the range of 25000 to 35000 rupees. In connection with these findings Rashid and Islam (2016) concluded that socio-economic factors like age, size of land holdings, family income and years of farming experience has no role in influencing problems of farmers while using ICTs in agriculture. On the other hand respondent's educational status showed significant role in this regard.

**Table 4.** Distribution of respondents according to frequency of using ICT tools in agriculture.

ICTs	Frequency	Percent
Low	69	35.4
Medium	81	41.0
High	45	23.6
Total	195	100.0

The data placed in indicate that there are multiple information sources including mass communication, extension experts, fellow farmers and print media. In connection with these results Awan *et al.*, (2019) concluded that fellow farmers and radio are the major source of information for majority of the rural people in Pakistan. It means that the information sources are being commonly utilized now by the farming community in Sargodha. Among the most effective information sources were extension workers, magazines, agricultural helpline, television,

newspaper and mobile phone. Supporting to this Waqar *et al.*, (2018) stated that mobile phone is very commonly being utilized by the agricultural workers in Sargodha. In his concluding remarks, contrary to the findings of current study they stated that ICTs as a whole are not being utilized effectively by the citrus growers in district Sargodha. Similarly, present findings are also supported by results reported by Chaudhry *et al.*, (2017). They concluded that internet is the major source of information for rural youth in district Sargodha.

**Table 5.** Ranking of constraints faced by respondents in adopting ICTs in agriculture.

Constraints	Mean	S.D	Rank
Social constraint			
Irrelevant content	2.85	0.458	4
Stereotype behavior	2.96	0.197	1
Language barrier	2.82	0.500	5
Illiteracy	2.62	0.648	6
Lack of awareness	2.89	0.314	3
Lack of training	2.91	0.288	2
Economic constraint			
High cost of ICT	2.79	0.409	2
Poor ICT infrastructure	2.87	0.338	1
Limited access	2.64	0.674	3
Technical constraint			
Power issue	2.62	0.693	8
Low internet coverage	2.90	0.302	6
Limited availability of internet	2.98	0.200	2
Internet connectivity issue	2.91	0.321	5
Limited availability of computer	2.85	0.520	7
Inability to use ICT	3.00	0.000	1
Lack of skills	2.95	0.219	3
Limited authenticity of agricultural information	2.94	0.239	4
Limited knowledge	2.95	0.219	3

Table 03 depicts that what is the opinion of respondents about the application of ICTs in the farming business. It is clear from the descriptive results that exactly 87% of the respondents recorded the response that they are commonly applying ICT for agricultural practices. Only 13% of respondents negated the ICT use in agriculture sector. Rate of ICT application in the district could have support from the Riaz *et al.*, (2017), he concluded that these kind of information sources could prove viable for the farming systems.

#### *Percentage use of different ICTs in agriculture by young farmers*

Young farmers adopt a wide range of ICTs in agriculture like radio, television, mobile phone, agriculture helpline, internet etc. The percentage use of these ICT tools for getting updated information related to agriculture by the young farmers is presented in figure 2. The data presented in figure 3 shows that an overwhelming majority (85.80%) of respondents (young farmers) used mobile phone as ICT tool in agriculture. Other ICT tools were radio,

television, agriculture helpline, computer with internet and without internet as reported by 8.4%, 65.3%, 33.3%, 34.7% and 18.7% of respondents, respectively. In connection with present findings, Abbas *et al.*, (2003) concluded that application of any ICT tool in agriculture is largely associated with age of farmers. In most of the cases, young age farmers tend to use mobile phone for agricultural related information at faster rate as compared to old age farmers. During qualitative interviews it was noted that young farmers mostly preferred to get updated agricultural information from mobile phone and internet. These qualitative findings also get support from results reported by Raza *et al.*, (2019).

They concluded that among different ICT tools, farmers preferred to use mobile phone due to its user friendly nature. In spite of their readiness to use mobile phone for getting access to agricultural related information, most of the farmers reported that they were facing multiple nature of problems and obstacles while using cell phone in agriculture. The same was also reported by Chhachhar and Hassan (2013).



**Fig. 1.** Classification of information needs of farmers.

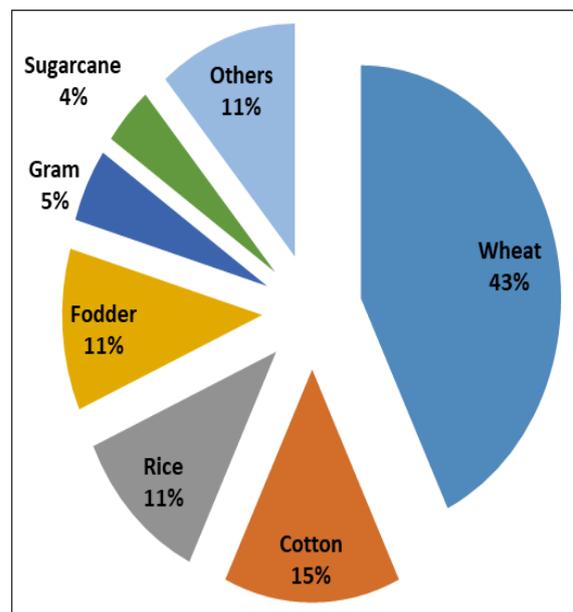
#### *Frequency of using ICT tools in agriculture*

Frequency of using ICT tools in the agriculture sector was asked in from respondents in interviews to know the usage ratio of ICT tools in agriculture businesses. After having clear cut idea about the usage of ICT in agriculture by the respondents, the question asked was about usage frequency of ICTs by them. The response was recorded on a Likert type scale of 03 (Low=1, Medium=02 and High=03). Maximum participants showed their inclination from “medium use of ICTs” to the “high use of ICTs”. It means that at individual level diversion of farming community in Sargodha has diverted its approach towards modern means of information. Lin *et al.*, (2007) stated that readiness of individuals has influential role in adoption of technology transferring tools.

#### *Constraints in the adoption of ICT tools in agriculture*

Above table 10 shows all constraints in dissemination of ICTs in agriculture sector. There are three categories of constraints, first is social constraints. Respondents ranked the constraints by number like example 1, 2, 3, etc. farmers ranked stereotype behavior as a first constraint with mean value 2.96

and 0.197 standard deviation.



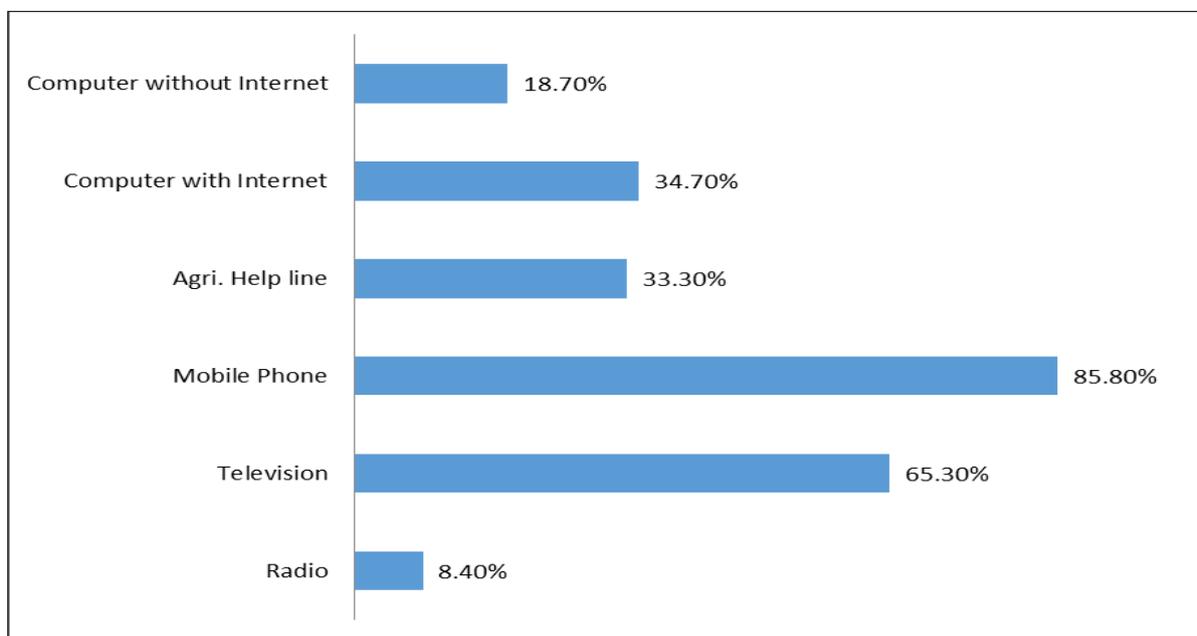
**Fig. 2.** Percentage share of major crops being grown in the Punjab.

It means according to the collected data stereotype behavior from social constraints was biggest hurdle in dissemination of computer based technology in agriculture. Lack of training and lack of awareness was also important constraints in social constraints package with mean value 2.91 & 2.89 respectively.

Similar types of constraints and problems were also reported by Chhachhar and Hassan (2013) and Hosseini *et al.*, (2009).

Second category of constraints is economic constraints with three factors poor ICT infrastructure, high cost of ICT and limited access ranked 1, 2 and 3 with mean values 2.87, 2.79 & 2.64 respectively. According to the response of farmers, poor ICTs infrastructure was the main constraint of lack of computer based technology in agriculture sector. Above two kinds of constraints (social & financial) in adopting ICTs in agriculture for efficient and effective rural development process was also reported by

Kemal and Yan (2015), authors also asserted that duality approach in technological intervention has been failing from providing the solution to the poverty. Third constraint section was about technical constraints. Totally nine categories of technical constraints were asked in the interview schedule. Majority of farmers with mean value 3.00 respond that they are unable to use ICTs because of less education and less training facilities for training among farmers for the application of ICTs in agriculture sector. Singh *et al.*, (2018) also reported technical constraints that editing in the already available extension literature is serious kind of challenge in ICTs adoption.



**Fig. 3.** Percentage application of different ICTs in agriculture.

The second biggest constraint known by farmers was limited availability of internet in rural areas of the targeted areas of study. First problem was about awareness and training of using ICTs applications in agricultural businesses.

According to the collected data, other important constraints with high mean value 2.95 were ranked at third position in the list of technical constraints. Farmers ranked the limited availability of computer and power issues with least number in the list of technical constraints with limited mean value 2.85 & 2.62 respectively. Similar nature of constraints was

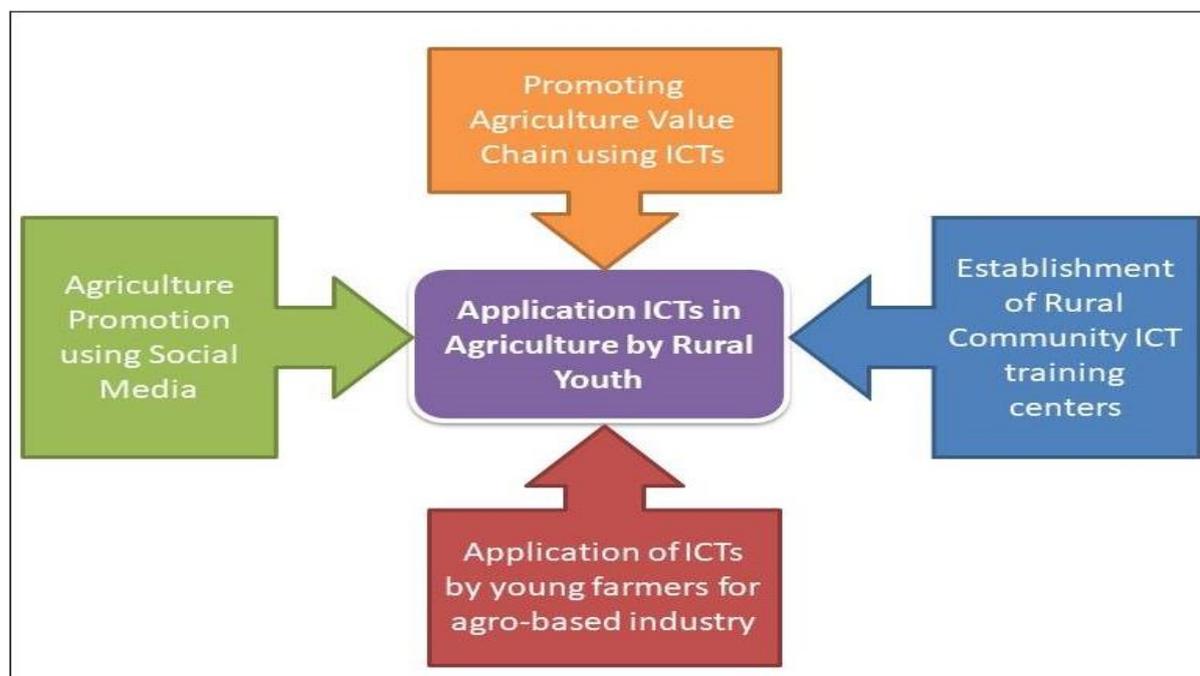
also explored by Shanthya and Elakkiya (2017) and Awan *et al.*, (2019).

#### *Key findings & recommendations*

The study showed that about half of the respondents had age in the range of 21-25 years with education upto matriculation (10 years of schooling). Small agricultural land holding is very much prominent in the research area. Majority of the respondent's household head is engaged in farming since twenty years back. Respondent's main source of income was farming however, few respondents used to earn income from non-farm income sources. Monthly

family income was reported to rupees 35000/-. Young farmers used a variety of agriculture information sources. An overwhelming majority of young farmers used to apply ICTs in the field of agriculture. Major ICT tools which are being used by the respondents to get updated access to agricultural

information were radio, television, computer with/without internet, cell phone and agricultural help line. Frequency of application of ICTs in agriculture by the young farmers was found to be medium.



**Fig. 4.** Sketch of policy framework for engaging young farmers in Agriculture using ICTs.

A wide range of social, economic and technical constraints are being faced by the young farmers. For engaging young farmers for the application of ICTs in agriculture, there is dire need to remove these constraints. For this purpose following policy framework is hereby suggested as presented in Figure 4.

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