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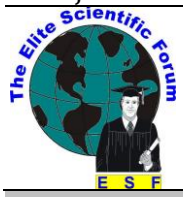

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RESEARCH ARTICLE

Socio-Economic Impediments in Usage of Modern Mechanized Technological Ideals in Agriculture Sector: A Case Study of District Lodhran, Punjab-Pakistan

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ABSTRACT

The process of adopting modern mechanized technological ideals encompasses certain aspects such as demographic characteristics, economic stability and societal acceptance regarding advanced methods of farming. The core objective of this research was to explore the role of socio-economic impediments in usage of modern mechanized technological ideals in agriculture sector of district Lodhran, Punjab-Pakistan. The present research was descriptive in nature and structured interview schedule was used to collect the data. A total of 200 small and large-scale farmers were selected through multi-stage sampling technique. Results revealed that 80% of the farmers do not adopt modern technological ideals due to economic instability, 35% of farmers reported that no person came into their area for guiding and training them regarding modern machinery and 62.5 % stated that there were cultural barriers behind not coming of trainers. This study concluded that farmers perceived modern mechanism more beneficial for their fields, but socio-economic impediments were playing vital role in hindering the adoption of modern mechanized ideals.

INTRODUCTION

In recent years, some official documents described that best food production in agriculture sector is relying on usage of new technological tools and techniques used in farming which are directly associated with economic conditions of farmers (Trilles et al., 2019). Farmers with distinct socio-economic status such as age, level of education, culture, religion, agriculture production methods, income, friends' pressure and societal values are affecting the farmers' decision-making process of adopting digital facilities in agriculture sector (Bergfjord, 2013; Ahsan, 2011). According to Siraj (2010) Pakistan is considered as one of those countries which are largely relying on their agriculture sector for economical development. Agriculture is the only sectors which is contributing approximately 19.8% in GDP of the country. Another study conducted by Amjad (2010) revealed that there were 6.6 million farmhouses in Pakistan and about 86% of those farmhouses are categorized into small farmers and approximately 14% are large farms; having direct approach to land and water resources. Pakistan has four provinces with varied population sizes. Among these four provinces, Punjab is the biggest one with respect to population and in its rural areas, the literacy ratio had been reported to be 58% among males and 37% among females (Anonymous, 2008). However, Punjab is considered the backbone of agriculture sector in Pakistan because majority of the contribution of agriculture sector in gross domestic product is from Punjab (Khan, 2010). Main agricultural production encompasses cotton, rice, sugarcane, milk, eggs and wheat as well (Shahbaz et al., 2013).

Although, state bank of Pakistan regularly arranging different capacity building programs and awareness seminars in order to analyze the supply and demands for capacity building of the farmers. These programs

are comprised of farmer's financial educational sessions that are basically designed to train farmers about agro-financial loans. The main objective behind these programs is socio-economic stability of the rural areas (Anonymous, 2018) but the agriculture sector is facing numerous challenges of yield gap between standard and potential. This issue seems to be more complex when the average production of different crops is compared with the production of other countries. This phenomenon acquires a complete strategic implementation for providing the information about technological equipment's through research and extension (Khan, 2010).

Long et al. (2016) illustrated that one of the main reasons behind these challenges is climate smart agriculture (CSA) which is very common and most prominent in agriculture sector due to climatic changes. The CSA encompasses sustainability to increase agricultural outputs, transformation to resist adverse effects of climatic changes and reduction in emission of greenhouse gases (Anonymous et al., 2013). Developing countries are more likely to face the undesired effects of abrupt climate changes. This is due to comparative importance of agriculture sector which directly affect the economic development of these countries (Haen, 2003). On the other hand, Pakistan is a multilingual country and this lingual diversity is impeding the farmers to get knowledge about agriculture advancement efforts with respect to their geographical settings. Additionally, lack of electricity consumption leads to low productivity especially in rural areas; however, load shedding approximately ten hours in a day is considered as routine which directly affects the agriculture production (Anonymous, 2015). Major issues in assessing modern mechanized technological ideals included limited access to energy, gender-based barriers in getting access to technology, low literacy rate, cost of advance machinery, centralized information. Adequate educational/training resources are required to train and motivate the farmers which are usually scarce at rural level. The other major contributing factors in this regard included gender, poor literacy rate and low socio-economic status of farmers (Jallo, 2016). A decline in production of major crops including wheat has been reported as compared to previous years (Anonymous, 2018) and it has been presumed to be associated with lack of adoption of mechanization. The information regarding the factors which hinder the adoption of modern technological tools is scarce. Keeping in view, this study was conducted to find out the bridging role of socio-economic status of the farmers and slow adoption process of modern mechanized technological ideals in agriculture farmers of district Lodhran, Punjab Pakistan.

MATERIALS AND METHODS

This study was descriptive in nature and survey method was used to collect the data. This research was conducted on farmers of district Lodhran, Punjab Pakistan. A multistage cluster sampling technique was employed to select the respondents as described previously (Ashraf et al., 2019). To select the sample size for the survey, geographical clusters were made at the first stage. The district Lodhran is consist of three Administrative tehsils (Dunyapur, Kahror Pakka and Lodhran) and 73 union councils as shown in Table 1.

Table: 1: List of Tehsils and Union Councils

Tehsil	No. of Union Councils
Dunyapur	22
Kahror Pakka	23
Lodhran	28
Total	73

District Wise Census Results Census (Anonymous, 2017).

After the first stage, 1 tehsil namely (Dunyapur) was selected randomly from 3 Tehsils of district Lodhran. Most of the population of this tehsil was associated with agriculture sector. At the second stage, after selecting tehsil three union council namely, Chak No. 360/WB, Jallah Arain and Qutab Pur were selected from 22 union councils of tehsil Dunyapur through simple random sampling technique. Furthermore, convenience sampling technique was used to select the respondents. There are two major reasons behind using this technique, firstly, researcher has limited time span, secondly, sample frame was not available.

Accordingly, a sample size of 200 was computed based upon the recommendation described previously (Comrey and Lee, 2013). A semi-structured interview schedule in native language was used to collect the data. Interview schedule was used because majority of target population was from rural areas and less educated as well, in order to get better responses. The interview schedule contained five portions including the demographic profile that was designed to measure the socioeconomic status (SES) of the respondents. The SES portion included questions about age, education, family size, family type, family income, ownership of land, farming and types of cultivated crops. Other four portions were consisted of specified information regarding wheat crop, cotton crop, vegetables and knowledge about agriculture. Data was analyzed by using SPSS version 23, and results were acquired through frequency and percentage by using this software.

RESULTS

The collected responses were carefully categorized and analyzed by using frequency and percentage distributions and are described in Table 2.

Table 2: Socio-economic characteristics of respondents

Variable	Categories	F	P
Age			
	31-40	56	28.0
	41-50	116	58.0
	50 and Above	28	14.0
Education			
	Uneducated	100	50.0
	Primary to middle	56	28.0
	Matric to intermediate	44	22.0
Family Size			
	2-4	2	1.0
	5-7	92	46.0
	8-10	83	41.5
	11-14	23	11.5
Family Type			
	Nuclear	69	34.5
	Joint	131	65.5
Monthly Income (Pak rupees)			
	1000-10000	83	41.5
	10001-20000	82	41.0
	20001-30000	18	9.0
	above 30000	17	8.5
Ownership of Land			
	1canals to 2canals	15	7.5
	2canals to 1 acre	36	18.0
	1acre to 5 acres	70	35.0
	6 acres to10 acres	9	4.5
	11acres to 20 acres	65	32.5
	21acre to 30 acres	3	1.5
	> 30 acres	2	1.0
Farming			
	Owner	120	60.0
	Tenant	33	16.5
	Both	31	15.5
	Any other	16	8.0
Type of cultivated crops			
	Cereal crops	38	19.0
	Vegetable	4	2
	Mixed cropping	158	79

Note: N=200, F= Frequencies, P= Percentage

The results in table 2 describe the distribution of the research participants in terms of their socio-economic background. With respect to age of the respondents, maximum of the respondents 116 (58%) reported their age between 41-50 years old while 56 (28%) and 28 (14%) reported their age between 31-40 and >50 years, respectively. With respect to educational status, majority of the respondents 100 (50%) were illiterate and 44 (22%) reported that they had done matric to intermediate education. The 3rd item ''family size of the respondents'' majority of the respondents 92 (46%) reported that their family size comprising 5-7 members and only 2 (1%) reported their family size as 2-4 members. In study area, 65.5% respondents had joint family system whereas remaining 34.5% respondents reported that they were living in nuclear family system. Only 8.5% respondents had > 30,000 (Pak Rupees) monthly income whereas majority (41.5%) had their monthly income ranging from 1000-10000 (Pak rupees). With respect to land ownership, the proportion of farmers which had land 1-5 acres was highest (35%) and only 5 (2.5%) respondents had more than 21acres land. Farming type was also recorded as an important factor and it was recorded that 60% respondents were cultivating their own land. It was also recorded that majority of the farmers (79%) were practicing mixed cropping of vegetables and cereal. On the other hand, 19% were sowing cereal crops only and 2% were sowing only vegetables.

Table 3 describes the responses of farmers about wheat crop. The analysis revealed that 103 (51.5%) farmers were using modern methods and remaining 97(48.5%) were using traditional methods for preparing their lands for cultivation of wheat crop. For land leveling, most of the respondents 105 (52.5%) were using traditional methods and remaining 95(47.5%) were using modern methods to level their lands for cultivation. Cultivation by scattering method was more in practice (87%) as compared to drill sowing. For irrigation of crops, 65.5% respondents were using canal water whereas (34.5%) were using the water of tube-wells in wheat fields. Inorganic means of protecting the wheat ccrop from pests was more popular (80.5%) as compared to organic means for protecting their fields from insects. A total of 60% farmers reported the use of modern tools of harvesting whereas remaining 40% were relying on manual harvesting by using manpower.

Majority of the farmers (65%) reported high cost of modern technologies/equipment as major hinderance in using their use.

Regarding sale of wheat crop, 49.5% farmers reported that they were selling their crops to the local people while 42% were selling their products to the local market and remaining 8.5% were selling their crops to the government agencies. Tractor was recorded as the most commonly used mode of transportation (60%) followed by crafts (27.5%) and yoke (12.5%).

Table 4 describes the distribution of the respondents in terms of cotton crops. Out of total, 75.5% farmers reported that they were cultivating cotton crops. A total of 60.5% farmers were using mix of manual and mechanical methods of land preparation whereas 32.5% and 7% were using mechanical and manual methods, respectively. Majority of the farmers (84%) were using synthetic fertilizers whereas 16% were using natural fertilizers (animal manure) to enhance the soil fertility in cotton fields. The land irrigation by Tube-well water was dominated (60.5%) in the region as compared to canal irrigation (39.5%). The inorganic pesticides were common (84%) for controlling pests/insects of cotton crop as compared to other organic and biological

Table 3: Information regarding wheat crop cultivation

Variable	Categories	F	P
Land preparation for cultivation			
	Modern methods	103	51.5
	Traditional method	97	48.5
Leveling of land			
	By traditional method	105	52.5
	Modern Methods	95	47.5
Method of cultivation			
	Drill Sowing	26	13.0
	Scattering	174	87.0
Means of supplying water			
	Canal Irrigation	131	65.5
	Tube-well	69	34.5
Protecting wheat from Pests/Insect			
	Inorganic means	161	80.5
	Organic means	39	19.5
Technologies for harvesting			
	Manual harvesting	80	40
	Modern	120	60
Technology for extracting wheat grain			
	Thresher	110	55
	Harvester	90	45
Major problem faced by farmers in using modern technologies			
	More costly	130	65.0
	Unavailability	36	18.0
	Lack of awareness	34	17.0
Sell your wheat crop			
	Local people	99	49.5
	Local market	84	42.0
	Government	17	8.5
Mode of transporting to use			
	By crafts	55	27.5
	By yoke	25	12.5
	By tractor	120	60

Note: N=200, F= Frequencies, P= Percentage.

Table 4: Information regarding cotton crop cultivation

Variable	Categories	F	P
Grow Cotton Crop			
	Yes	151	75.5
	No	49	24.5
Preparation of land for cotton crop			
	Manual method	14	7.0
	Mechanical	65	32.5
	Both	121	60.5
Method of sowing cotton crop			
	Drill	110	55
	Manually	90	45
Use of Fertilizer			
	Synthetic fertilizer	168	84
	Natural fertilizer	32	16
Means of supplying Watering			
	Canal Irrigation	79	39.5
	Tube-well	121	60.5
Method for controlling Pests/Insect			
	Inorganic means	190	95
	Organic means	10	5
Application of pesticides in 1 month			
	1 to 2 times	49	24.5
	3 to 4 times	151	75.5
Spraying method			
	By machinery	140	70
	By hand tank	60	30
Method for extracting cotton flower			
	By Manual	200	100

Note: N=200, F= Frequencies, P=Percentage.

control methods which accounted 5% only. Data regarding the application of pesticides in cotton fields depicted that 75.5% farmers were applying pesticides at the frequency of 3-4 times per months whereas 24.5% were applying pesticides 1-2 times per month to control the pests. Spraying of pesticides by automated machinery was more common (70%) whereas 30% were using hand tanks for spraying the pesticides. It was recorded that all the respondents from study area were harvesting the cotton manually by using manpower. Table 5 presents data regarding cultivation of vegetables. Out of total, 87.5% farmers were sowing vegetables either for commercial (76.5%) or domestic use (23.5%). For protection of vegetables from predators, maximum of the farmers 67.5% were using chemicals while 20% were protecting their vegetables through scare crow and remaining 12.5% were using hedging for protecting their fields from birds.

The data regarding agricultural problem and knowledge is presented in Table 6. Out of total, 35% respondents reported that no one came to train them regarding the use of modern machinery whereas 65% answered that experts from different organizations came to them for giving them knowledge and imparted training regarding the use of modern technological ideals. The respondents also reported the social (62.5%) and cultural (37.5%) problems including cultural rigidity/resistance of people in adopting modern means as responsible factors behind the reason that persons did not approach them for training.

A total of 64.5% respondents informed that they were watching technology programs on television; whereas remaining 34.5% respondents showed no interest in watching such programs on television. The lack of interest of professionals from national and multinational

Table 5: Information regarding vegetables field

Variable	Categories	F	P
Grow vegetables			
	Yes	175	87.5
	No	25	12.5
Purpose to grow			
	Commercial Level	153	76.5
	Domestic use	47	23.5
Means for protecting the vegetables			
	By scare crow	40	20
	Hedging	25	12.5
	Chemical	135	67.5

Note: N=200, F=Frequencies, P=Percentage.

Table 6: Information regarding Agricultural Problem and Knowledge

Variable	Categories	F	P
Person come to train you?			
	Yes	130	65
	No	70	35
Reason behind not coming?			
	Social problems	75	37.5
	Cultural problems	125	62.5
Watch agriculture technology program on Television?			
	Yes	129	64.5
	No	69	34.5
National or multinational companies came for advertisement?			
	Yes	29	14.5
	No	171	85.5
Do you believe in their Product?			
	To great extent	95	47.5
	To some extent	51	25.5
	Not at all	54	27
Factor which decease the adoption of technology			
	Economic problem	160	80.0
	To small land	28	14.0
	Cultural problem	12	6.0
Technology is helpful for Agriculture Development			
	To some extent	26	13
	To great extent	173	86.5
	Not at all	3	1.5
Think that the latest Technology brings only positive change			
	Yes	187	93.5
	No	13	6.5
Technology contribution to get better production			
	To some extent	92	46
	To great extent	98	49
	Not at all	10	5.0

Note: N=200, F= Frequencies, P= Percentage.

company in visiting the farmers was recorded as an important factor behind the lack of awareness of farmers regarding modern agricultural technologies. In this context, 85% respondents claimed that they had not been approached by professionals from national and multinational companies for advertisement of modern technologies; however, 14.5% respondents answered that experts from national and multinational companies visited their area for advertisement. During the survey, 47.5% farmers reported that they believed in using modern technological tools whereas remaining 52.5% had no or partial believe in such products. The important factors which created hinderance in adoption of modern technology included economic problems, small land and cultural issues. Lack of economic resources was found to be most important factor in this regard as reported by 80% respondents of study area. Small land size was recorded as 2nd important factor in adopting advance technology due to poor cost benefit ratio. Majority of the respondents (86.5%) reported their agreement with the fact that agriculture development rely on advance technology while 13% responded that they agreed to some extent with this fact. Out of total, 93% farmers believed in positive correlation between latest technologies and positive change whereas remaining 6.5% showed their disagreement in this regard. The 49% respondents had concept that modern technology contributes more than traditional knowledge to get better production. On the other hand, 51% showed little or no believe on this concept.

DISCUSSION

Modern mechanized ideals play pivotal role in agriculture but still majority of the farmers across the country are not adopting the modern technology in farming. In rural areas, famers have very less knowledge about the functions and benefits of these modern mechanized ideals and that is the more prominent issue of low yield. Farmers who are holding small land sizes have low economic stability. On the other hand, farmers holding large land sizes have less awareness and knowledge about the modern machinery. In a nutshell, in both cases they are unable to adopt modern means for better production in their farms. The results of present study indicated that socio-economic factors are highly influencing the adoption process of modern technologies which are consistent with the findings of Emami et al. (2018) and Bagheri et al. (2008) who explored that sustainability of agriculture sectors relied on socio-economic status, demographic characteristics of the area and societal acceptance which were highly affecting the mechanism of farming in agriculture sector in Iran. Moreover, farmer's decision in purchasing advance ideals is dependent

upon human capital and informational sources of the farmers. On the other hand, the results of present research indicated that famers are preparing their lands for cultivation of wheat, cotton and vegetable production in a modern manner and they use artificial fertilizers from protecting their fields from insects which are also consistent with the results of a research conducted in China by Zheng et al. (2010) who described that cultivation patterns were more likely to play a considerable role in improving environmental and practical rotations and thus advocating the use of modern technological tools for best production. Similarly, Lee et al. (2010) stated the use of advanced technologies as beneficial practice for minimizing crop losses especially in vegetable fields that could be affected climate changes such as high and low temperature. Findings of this study also showed that famers are not adopting the modern ideals because no one came to their area for giving them awareness about the modern means of production that was the major reason they were still confused to adopt modern technology, theses findings are in line with those described by Allahyari (2008) who demonstrated that discussions and seminars regarding the knowledge and instructions about the use of modern tools might play an important role in adopting modern tools in agriculture sector. Awan et al. (2019) use of information and communication technology can play an important role in uplifting the small-scale agricultural farmers in Pakistan. Furthermore, a recent study conducted in Kenya by Chimoita et al. (2019) also revealed that there was a significant influence of socio-economic background on adopting new technological tools in agriculture sector. Similarly, Bayissa (2015) demonstrated distance of markets from farmers' lands and insufficient economic resources as major contributing factors in lack of adoption of modern technologies in agriculture farming. Based upon findings of this study, it was concluded that farmers perceived modern technological ideals more trustworthy and time saving but they had low income and more importantly they were facing societal and cultural barriers in adopting modern machinery. Additionally, they were ready to adopt the modern means, but they did not know about the functions and actual benefits of modern tools. Lastly, lack of training about modern ideals was also found as a major factor in this regard. In conclusion, socio-economic impediments are playing vital role in adopting modern mechanized ideals in Lodhran, Pakistan. under the circumstances, it is suggested that farmers should adopt modern mechanized tools in farming and government should provide them more opportunities to the farmers for cultivation of crops on modern lines. The electronic media like television programs on modern agriculture may enhance the interest of farmers in adopting modern technologies. Future research must be conducted on the role of digital media in creating the awareness about the use, benefits and commercialization of modern technologies.

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Authors' contributions

All authors contributed equally to this work. All authors read and approved this manuscript before publication.

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