Research Article

Farmers' Behavior to Participate in Public Sector Agricultural Extension Services: Comparative Analysis of Pakistan and China

Muhammad Yaseen[1]*, Xu Shiwei[2], Yu Wen[2], Ejaz Ashraf[1], Muhammad Luqman[1], Muhammad Ameen[3] and Sadia Hassan[4]

[1]Department of Agricultural Extension, College of Agriculture, University of Sargodha, Sargodha, Pakistan; [2]Agricultural Information Institute of CAAS, Beijing, China; [3]Nanjing Agricultural University, Nanjing, China; [4]Department of Plant Pathology, College of Agriculture, University of Sargodha, Sargodha, Pakistan.

Abstract | The contemporary study was designed to investigate farmer's participation behavior concerning public sector agricultural extension services, by comparing the situations of two countries, Pakistan and China. The logistic regression model was used to study the influence of age, education, labor, farm area and villages on the household head's participation in agricultural extension services/ activities organized by public sector department. For this purpose, a random sample of 160 households from four districts of Punjab province of Pakistan was selected, and another random sample of 122 households selected from the six villages of Huailai County of Hebei Province in China. Data were collected using the interview method with the help of validated and expert reviewed interview schedule. The results revealed that the household head's average age is 47 years in Pakistan and 53 years in China. The old aged household head's participation in extension services in Pakistan is less (36%) than China (43%). Similarly, household head's education is 9 years schooling in Pakistan accounting less participation (25%) in agricultural extension services while 7 years schooling in China with higher participation (57%) in agricultural extension services. Governments of the Pakistan and China should launch massive adult literacy programs to increase the educational level of the farming community together with the involvement of youth in agricultural farming and agro-based enterprises to achieve sustainable rural livelihood and improved living standards.

Received | July 29, 2019; **Accepted** | October 20, 2020; **Published** | November 20, 2020
***Correspondence** | Muhammad Yaseen, Department of Agri. Extension, College of Agriculture, University of Sargodha, Pakistan; **Email:** yaseen.baksh@uos.edu.pk
Citation | Yaseen, M., X. Shiwei, Y. Wen, E. Ashraf, M. Luqman, M. Ameen and S. Hassan. 2020. Farmers' behavior to participate in public sector agricultural extension services: Comparative analysis of Pakistan and China. *Sarhad Journal of Agriculture,* 36(4): 1180-1189.
DOI | http://dx.doi.org/10.17582/journal.sja/2020/36.4.1180.1189
Keywords | Agricultural extension, China, Farmer behavior, Logistic model, Pakistan, Participation

Introduction

At the time, when extension was introduced in developing countries, extension services were assigned to the ministry of agriculture and became exclusive role of the government. With passage of time, various departments started their involvement in different activities of agriculture and rural development, and designed their own extension and advisory services. Due to this trend lot of confusions were generated among farmers and for extension services providers as well. Therefore, extension and advisory services in the developing world demand thoughtful considerations of policy makers to initiate reforms and modernize existing extension system. In this scenario it is the sole responsibility of development policy agents to launch new agricultural extension systems that ensure sustainable agricultural

development especially in developing and low-income countries (Qamar, 2005).

Extension and advisory services are capable to improve agriculture production by providing advanced agro-based technologies to farmers (Hliang *et al.*, 2004). Similarly, agriculture extension is distinctive opportunity for farmers to get advisory services relating to advanced agriculture mechanization, innovative plant production and protection services etc. (Govt. of the India, 2003) and helping farmers to reduce poverty, ensure food security and to mitigate climate change in agriculture (Butt *et al.*, 2011). The fundamental objective of extension is to deliver agricultural knowledge generated at research institutions to farmers who have to practice it in their farms (Hedjazi *et al.*, 2006). Therefore, extension providers should play their active and participative roles to disseminate and transfer advanced agricultural technologies (Jan *et al.*, 2008).

Agricultural extension promotes existence and advancement in agriculture system worldwide by providing efficient services to farmers with sound agricultural information and guidance (Kidd *et al.*, 2000). At present, agricultural extension is overwhelmingly developed and playing its victorious role in the mechanized farming system in advanced countries on the other hand, in developing world the extent of success fluctuate from country to country (Ministry of Agriculture, 2010). These advisory services are helpful to increase production at farm level. Advisory services always play a key role in transferring agricultural information regarding advanced technologies and management practices to farming community (Owens *et al.*, 2001). According to Brummett *et al.*, (2011) extension services support rural farmers to increase production and to sustain efficiency. Technological guidance for farmers to secure food and eradicate poverty require improvement in accessibility of quality inputs, which demonstrate the worth of farmers' adoption behavior and awareness regarding improved practices, for initiating policy formation towards strengthening farming system and mitigating climate change effects in agriculture (Glenk *et al.*, 2014). Agriculture is considered as a key engine for development as well as for boosting up the economy of the majority of developing countries. So keeping this scenario in view agriculture should be given top priority at the time of planning and policy formulation to overcome the burning issues of food insecurity, rapidly growing population, poverty, and climate change. Agricultural extension is the most effective tool for sustainable development in agriculture (Rivera *et al.*, 2001).

Extension services provided by the public sector has an imperative role in economic development of the farming community; developing countries are striving hard to modernize extension and advisory services. Like the Nigerian government devised a program "Community Farm Extension Services" to change behavior of youth in rural areas and mobilizing them to adopt agriculture as career (Ovwigho, 2009). Similarly, in Malawi agriculture extension sustained and promoted farmers to fulfill their agro-based needs and to make sure the availability of farm inputs (Chowa *et al.*, 2013). In the same line of actions, the Government of Jordan implemented innovative methodologies executed by field staff and developed their professional competencies to cope them for provision of better extension and advisory services (Al-Sharafat *et al.*, 2012). However, the government of Algeria focused the use of Information and Communication Technologies (ICTs) for the development of agriculture (Arous *et al.*, 2013). But, contrary to this, The World Bank recommended Pakistan government to take organizational reforms in existing agriculture extension and advisory services system. There is dire need to improve and devise agriculture extension policies (Rivera, 2006).

Agriculture extension services in Pakistan

From the inception to the year 1962, Pakistan had no department or unit to provide extension and advisory services for farming community. In this phase (1947 to 1962) the faculty members of Agriculture College Lyallpur (Faisalabad) were assigned additional duty to provide extension and advisory services to farmers accompanied by their academic research and teaching assignments at college. Meanwhile, during 1962, Agriculture University Lyallpur was founded and in the same time agriculture education unit was separated from research and agriculture extension wing. A separate wing for agriculture extension was initiated and its organizational mechanism was handed over to Secretary (agriculture) of every provincial government throughout Pakistan, and he was responsible to head various wings of agriculture department including agriculture extension (Jan, 2007).

Multiple agriculture extension and rural development

initiatives were taken by governments from 1947 to date throughout the country. First ever agriculture extension and rural development program Village Agricultural and Industrial Development Program (V-AID) was initiated in 1952 through out Pakistan and was terminated in 1962. Meanwhile, Basic Democracy System (BDS) started its working in 1959 and abolished in 1970. Soon after termination of BDS Rural Works Program (RWP) was initiated but due change in political government during 1972 this program was ended and same activities were carried out under the flagship of Peoples' Works Program (PWP). Integrated Rural Development Program (IRDP) was commenced in 1971 to amalgamate various research and extension activities, however IRDP was also abolished in 1977. Moreover, Barani Area Development Program (BADP) was initiated in 1975 with emphasis to improve rain-fed areas and to maintain sustainability in development. BADP was also abolished in 1977; this program remained working parallel to IRDP. All these rural development and agriculture extension programs were terminated due to some reasons. The important motives causing closure of these programs were less coordination amongst related departments, unavailability of professionally trained extension field staff, corruption at various organizational levels, shortage of financial resources, lack of farmers' and local leadership participation in activities of extension and rural development programs (Luqman *et al*., 2013). Training and Visit (T and V) program replaced conventional agriculture extension system during 1978. T and V program was also abolished in 1999 due to numerous flaws like duplication of message, favoritism while selecting contact farmer, fewer usage of advanced teaching methods to disseminate modern agriculture technologies to target clientele "farmer" (Abbas *et al*., 2009).

In Pakistan, different programs were introduced from 1952 to 1999 but these programs were closed down because of weak linkage among extension, farmer and research, unskilled staff, lack of budget and top-down approach (Abbas *et al*., 2009). The government should formulate a comprehensive policy on yearly basis to bring different subsections of agriculture sector under one umbrella and to build up a system for linking agricultural extension, research, education and private sector to facilitate farming community and provide advanced technology (Mengal *et al*., 2012). There is need to bring reforms in existing extension system by introducing effective farmer-extension-research linkages (Jan *et al*., 2013). Likewise, public-private sector has to involve farmers in extension and advisory services (Ali *et al*., 2011) to make rural farmers capable to utilize information and advanced technology for crop production and protection (Yaseen *et al*., 2014). Moreover, the public-private sector must co-operate in the provision of agricultural extension services to bring gradual change in farmers' behavior, which enables them to accept innovative technology for improvement in crop yields, secure food, and environmental sustainability (Ahmad *et al*., 2012).

Agricultural extension in China

Following the extension system of USA universities, some Chinese universities also replicated agriculture extension model during 2nd decade of 20th century. The government of China established national agricultural technology extension (ATE) system, comprising five levels; the foremost level was mutual help group and demonstration at County level, the 2nd level was County based Agricultural Technology Extension Center to introduce advanced agricultural practices for farmers, the 3rd level was to restore participatory extension system and encompass it all over country, the 4th level was to reform policies and implement polices to practice household responsibility contract program, the last and 5th level was shifting centralized planned economy to market based economy while, ATE services centers and national level extension centers (for soil and fertilizer, plant protection, and seed management) were developed by the Ministry of Agriculture, similarly, several agricultural specialized departments were established. Presently five leveled organized structure; National-level ATE institution, Provincial-level ATE institution, Prefecture-level ATE institution, County-level ATE institution and Township-level ATE institution are functioning (Qijie and Chuanhong, 2008).

During 1920s the Jinling University in China initiated extension division for cotton crop under the Department of Agriculture and Forestry with technical assistance of extension experts from USA, it was budding of agriculture extension system in the country. The overall objective of this effort was to mitigate American cotton in Chinese system and to transfer modern cotton practices among farmers. Afterward extension services center was launched in Anhui province's County Wujiaghe in 1924. In the

mean time, agriculture research station was started with first ever law for agriculture extension approved by central committee for agro-extension in 1929. Soon after inception of People Republic of China during 1950s ATE system was developed including farm demonstration at county managed jointly by the household groups, extension staff, and experts (Qijie and Chuanhong, 2008).

The green revolution became popular in Asian countries during the decades of 1960 and 1970; mean time the Chinese government developed ATE system. Four-stage county based agricultural research network was stretched throughout the country. The stages for this national level network are county based agricultural research station; community based agricultural science and technology centers, agriculture science and technology units and agriculture extension staff for agricultural production. The government of China kept in process for policy reforms in agriculture extension system. The major motives for these policy reforms were to merge various isolated responsibilities for production of agriculture technology, demonstration, analysis, capacity building, and other linked services for supply of agricultural inputs into one unit named agriculture extension system. To fulfill this commitment, the Ministry of Agriculture initiated National Level Agriculture Technology Extension stations in 1982. To strengthen these stations National Soils and Fertilizers stations were launched in 1986. These organizational reforms ensured groundwork for modernizing agriculture technology extension system to streamline extension services at village, county and township level. Until the end of 1992 the government established 1569 county-based ATE centers and almost 4500 township-based ATE units along with multiple households for agri. technology demonstrations (Qijie and Chuanhong, 2008).

While organizational reforms were in progress during 1983, the state allowed ATE field staff for provision of bonus allowance as reward for progress in production; this incentives policy resulted in excellent performance by the staff. However, during 1985 government again legalized ATE staff to offer some services to farmers on advisory fee basis. These efforts brought financial sustainability for ATE staff along with opened the opportunities to start entrepreneurships; these advanced practices are not in use in developing world. In 1991 government declared township-level ATE units as grassroots level agriculture extension manifestos to strengthen the mechanism. Similarly, in 1993 government enforced a law to promote and encompass agriculture advancements among farmers. Though in 1996 the government approved improvements in financial delivery for ATE services at all levels. In 1998, the state government of the China reformed rural monetary schemes representing basic accountability for individual household, to collaborate and support them for various extension and advisory services in the form of agriculture inputs, marketing mechanism for production, and delivery of services for improvements in agriculture. Yet, the Ministry of Agriculture originated the preparation and execution of agricultural extension and farm services delivery mechanism. The said mechanism comprises of five different modules like crop production, aquaculture, animal production and management, animal disease management, farm mechanization, and socio-economic management (Lohmar *et al*., 2009).

China is one of most emerging economies, where development in all sectors is growing speedily. Pakistan being a closest neighbor friend and deep diplomatic relations with China is acknowledged in the form of China Pakistan Economic Corridor (CPEC). Therefore, the present study was conducted to investigate comparative analysis of Pakistani and Chinese farmers' behavior with regard to public sector agricultural extension services. Agricultural extension system in China will be an example for Pakistan as well as for other Asian countries to replicate Chinese agricultural extension strategies towards sustainable development in agriculture. In this scenario, there is need to develop a mechanism which could improve and strengthen the linkages among the farming community, research institutions, and agricultural extension. In fact, the efficient farming is the aim pursued by agricultural extension.

Furthermore, the present study was designed to compare agricultural extension system of Pakistan with China in order to formulate extension policies for Pakistan to reorganize, reshape and reform existing extension system following the development strategies adopted by China to uplift skills and competencies of farming community for sustainable agriculture development and to ensure food security in Pakistan as well as for Asia and finally for global food security. Another motive of this study is to formulate policy suggestion for China Government

toward modernization of agricultural extension and advisory services throughout rural areas of China. Furthermore, this study will provide policy guidelines for developing world to formulate extension policies for development of farming community in economic, social and cultural aspects.

Materials and Methods

Data collection

Basically, present study is based on comparative analysis of farmers' participation behavior regarding public sector extension services between Pakistan and China. For this study, data have been collected with the help of expert reviewed and validated interview schedule and personal interviews were conducted in rural Pakistan and China. Four districts out of 36 districts of the Punjab province of Pakistan were selected randomly and a total sample of 160 farmers from 16 villages of four districts was selected again on a random basis and 122 households were randomly selected from six villages of Huailai County of Hebei Province in China. Lists of household heads involved in farming practices were prepared in consultation with agriculture department, government of Punjab, Pakistan and county extension wings, Hebei province, China. Data were collected from household heads through face-to-face interviews. Teams comprising of experts carried out the survey in Pakistan and China.

Model selection

Logistic regression was applied for data analysis, for this purpose household heads were selected from the rural community to investigate whether household heads take part in agricultural extension services or not and that was considered as a dichotomy problem. Value 1 is set for farmer's participation behavior and 0 otherwise. Particular formula for calculation is as follow:

$$Ep_i = F(Zi) = f(\alpha + \beta X_i + \mu) = \frac{1}{1+e^{Z_i}} = \frac{1}{1+e^{-(\alpha+\beta X_i)}} \quad \ldots(1)$$

Where Ep_i is probability of farmer's participation behavior in agricultural extension activities, f is the cumulative standard logistic distribution function (Wooldridge, 2009), β is the parameter to be estimated, and X_i is the interpretation variable vector. A logistic model can be generated from an underlying variable model (Kostakis, 2014). Let us assume that Z_i is the unobserved variable determined by:

$$Log\frac{Ep_i}{1-Ep_i} = Z_i = \alpha + \beta X_i + \mu \quad \ldots(2)$$

Assuming that μ is independent of X_i and is symmetrically distributed to 0, we can generate the response probability for Z_i (Wooldridge, 2009) as follows:

$$Ep_c = \alpha + \beta_1 age + \beta_2 edu + \beta_3 title + \beta_4 labor + \beta_5 area + \beta_6 village + \mu \quad \ldots(3a)$$
$$Ep_p = \alpha + \beta_1 age + \beta_2 edu + \beta_3 title + \beta_4 labor + \beta_5 area + \beta_6 village + \mu \quad \ldots(3b)$$

Ep_c and Ep_p are binary dependent variable that represents the household head's behavior regarding participation in extension services/ activities where Ep_c and Ep_p denotes the extension participation in China and Pakistan respectively. In order to identify the relative factors, which influence the farmer's behavior to accept agricultural extension activities, variables simply classified into two groups according to the age (the household head's age) which is the dummy variable that takes the value of 0 if the household head's age is less than 53 years for China and less than 47 years for Pakistan and 1 otherwise; edu is the dummy variable that takes the value of 0 if the household head has less than 7 years schooling in China and less than 9 years schooling education for Pakistan and 1 otherwise; labor is dummy variable that takes the value of 0 if the household has labor less than 2 persons in case of China and less than 4 persons in case of Pakistan and 1 otherwise; area is dummy variable that takes the value of 0 if the household has 0.8 hectare in China while in case of Pakistan less than 12 hectares and 1 otherwise.

Given below are some variables and their description which were used in the study:

Variable	Description
lnage	Logarithm of household head age
lnedu	Logarithm of education of household head
title	A dummy variable, 1=leader in a village, 0=other
lnalabor	The logarithm of household labor for agriculture
hlarea	Average area (acres for Pakistan and mu for China) for household labor in agriculture
village	Village of house hold head / farmer

Results and Discussion

Data description

The farmer's behavior regarding agricultural extension

services is related to their demographic characteristics and the surrounding environment. In this section, the farmer's age, education, labor, farming area, and villages were statistically analyzed and divided into bilateral groups in the Table 1, so as to compare the tendency of farmers' behavior concerning agricultural extension services and other factors (age, education, labor etc.).

Findings from Pakistan

The average age of household head is 47 years, the correspondent logarithm variable "lnage" is 3.80, and the group with older aged household heads participation in extension contributes 26%, while the other group's rate is 36%. The probability of old age group to take part in agricultural extension services is higher. The education level of household head is 9 years of schooling, the correspondent logarithm variable "lnedu" is 1.87, the group with above 9 years education level who participate in extension contribute 25% while others group contribute 14%. Farmers with high educational level have a higher probability to participate in agricultural extension services. The labor capacity for a household farm is 4 persons. The correspondent logarithm variable "ln labor" is 0.23, the group with more than 4 persons labor force participating in extension, contribute 17% while another group has 27% share. The area for a household is above 12 acres. The correspondent logarithm variable "lnalarea" is 2.00, the group with more than 12 acres area who take part in extension activities contribute ratio of 22% while the other group contributes 21%. Farmers group who have 12 acres area have a higher probability to participate in agricultural extension services. Overall participation of household heads from all villages in agricultural extension training is very disappointing with a ratio of only 21.9%. In case of participation from villages individually in extension activities, Chak 86NB is first with participation share of 65% while Chak 88NB is second with share of 40% and retra is third with participation ratio of 20%, Chah Nawan and chak 190NB are fourth with share of 15% each and Chak 113JB and Kot Qaisrani are fifth with equal participation share ratio of 10% each. While Khoh village, has no participation in agricultural extension activities.

Table 1: *Factors influencing farmers' participation behavior.*

Variable	Description	Pakistan					China			
		Mean	Group	Obs.	Prop.		Mean	Group	Obs.	Prop.
Lnage	Logarithm of household head age	3.80	>3.80	96	0.26		3.96	>3.96	68	0.50
			≤3.80	64	0.36			≤3.96	54	0.43
Lnedu	Logarithm of education of household head	1.87	>1.87	116	0.25		1.81	>1.81	74	0.57
			≤1.87	44	0.14			≤1.81	48	0.29
Title	Dummy variable, 1=leader in village, 0=other							0	107	0.43
								1	15	0.67
Lnalabor	Logarithm of household labor for agriculture	0.23	>0.23	87	0.17		0.64	>0.64	106	0.46
			≤0.23	73	0.27			≤0.64	16	0.44
Lnalarea	Average area for household labor in agriculture	2.00	>2.00	107	0.22		2.20	>2.20	59	0.44
			≤2.00	53	0.21			≤2.20	63	0.49
Village	ChahNawan			20	0.15	Anyingpu			20	0.50
	Chak113JB			20	0.10	Dongshuiquan			22	0.36
	Chak190RB			20	0.15	Paoercun			09	0.55
	Chak86NB			20	0.65	Shimenwan			11	0.36
	Chak88NB			20	0.40	Yanjiafang			30	0.37
	Khoh			20	0.00	Zhanjiaying			30	0.63
	Kot Qaisrani			20	0.10					
	Retra			20	0.20					

Obs.: Observations; Prop.: Proportion.

Findings from China

According to data presented in Table 1, the average age of household head is 53 years, the correspondent logarithm variable "lnage" is 3.96, and the group with older aged household heads has half participating rate, while the other group's rate is 43%. It is likely that the older group has a higher probability to participate in the agricultural extension services. The average education level for a household head is 7 years of schooling, the correspondent logarithm variable "lnedu" is 1.81, the group with above 7 years education level have 57% of extension participating rate while others group is about 29%. Farmers with higher education have a high probability to participate in agricultural extension services. The labor for a household farm is above 2 person. The correspondent logarithm variable "lnlabor" is 0.64, the group with more than two persons labor force participating in extension has 46% ratio while another group has 44% share. The area for a household is 12 mu (1 mu=0.067 hectare). The correspondent logarithm variable "lnarea" is 2.20, the group with more than 12 mu area who participate in extension training share ratio of 44% while the other group's ratio is 49%. Similarly, the farmers' group having 12 mu land area have more probability to take part in agricultural extension services. Overall participation of household heads in agricultural extension training belonging to all villages contribute 45.9% while individually, household heads from Zhanjiaying village participating in agricultural extension contribute more than 63 % is first in term of participation in extension training and Paoercun, Anyingpu, Yanjiafang, Shimenwan and Dongshuiquan stand second, third, fourth, fifth, and sixth with participation rates of 55.6%, 50%, 36.7%, 36.4% and 31.8% respectively.

According to the results in Table 2, if one unit increases the age of a household head then the odds of participation of farmer in extension services/ activities will increase by factor of 7.74. Similarly, if the education level of a farmer is increased by one unit then the household head participation in extension activities will increase by factor of 1.61, similarly, if the average area for household labor in agriculture is increased by one unit then it will increase acceptance for household head's participation in extension by 3.87 factor. Household head title and Household head labor are statistically insignificant for participation in extension services/ activities. This model includes 8 villages i.e. Chah Nawan is a base village for comparison with other villages including Chak 113JB, Chak 190RB, Chak 86NB, Chak 88NB, Khoh, Kot Qaisrani and Retra. Household heads from villages Chah Nawan, and Chak 190RB have the same chance for participation in extension services/ activities containing 0.15 times each, similarly, household heads from villages Chak113JB and Kot Qaisrani have equal chances to participate in extension services with 0.10 times each. Household heads from Chak 88NB and Chak86 NB have more chances of participation in agricultural extension services/ activities with 0.40 and 0.65 times respectively. While the household heads of village Khoh have no chances to take part in agricultural extension services/ activities.

Table 2: *Logistic regression model's results for Pakistan.*

Variable	Co-efficient	Z-value	p>z	Odds ratio
lnage	7.048	2.25	0.025	7.744
lnedu	0.469	1.65	0.100	1.614
title				
lnhlabor				
larea_5	2.220	2.36	0.018	3.871
Chah Nawan				
Chak113JB				
Chak190RB				
Chak86NB				
Chak88NB				
Khoh				
Kot Qaisrani				
Retra				
_cons	0.0001458	-2.78	0.005	0.00004

Number of obs = 122; LR chi^2(5) = 12.80; Prob> chi^2 = 0.0253; Log likelihood = -77.752; Pseudo R^2 = 0.0761.

According to the results in Table 3, if the education level of a farmer is increased by one unit then the participation of household head in extension services increases by a factor of 1.6988, similarly, if the average area for household labor in agriculture is increased by one unit then it will increase participation of household head in extension services by factor of 0.9608. Household head age and household head labor are insignificant for participation in extension services/ activities. This model includes 6 villages i.e. Anyingpu is a base village for comparison with other villages including Dongshuiquan, Paoer, Shimenwan, Yanjiafang and Zhanjiaying. Paoer and Zhanjiaying have no significant difference with compare to base village. Household heads from villages Dongshuiquan,

Shimenwan and Yanjiafang have almost same chances for participation in extension services/ activities containing 0.37, 0.36 and 0.37 times respectively.

Table 3: *Logistic regression model's results for China.*

Variable	Co-efficient	Z-value	p>z	Odds ratio
lnage				
lnedu	0.530	1.99	0.046	1.699
title				
lnhlabor				
hlarea	-0.040	-1.78	0.075	0.961
Anyingpu	Base village			
Dongshuiquan	-0.992	-1.83	0.067	0.371
Paoercun				
Shimenwan	-1.016	-1.45	0.148	0.362
Yanjiafang	-0.993	-2.03	0.042	0.371
Zhanjiaying				
_cons	-0.209	-0.37	0.708	0.812

Number of obs= 122; LR $chi^2(5)$ = 12.80; Prob> chi^2 = 0.025; Log likelihood = -77.752; Pseudo R^2 = 0.076

Conclusions and Recommendations

The study results indicate that rural households in Pakistan have better labor opportunities to maximize production and minimize labor charges by using household labor as a source. But there is need to utilize these prospects in a better way by introducing some land reform policies with the consensus of political, social, economic and administrative leadership. Inclusive participation of different villages of Pakistan in agricultural extension services is too disappointing. Keeping this trend in view the government of Pakistan should launch massive campaigns regarding the participation of villages in agricultural extension activities. Moreover, results indicated that improving the educational level of farmers would raise the participation of farmers in agricultural extension services. Therefore, the government's educational initiatives for rural areas especially for adult farmers would be very useful to improve farmers' participation in agricultural extension activities to improve crop productivity.

While the Government of China should launch some plans to ensure 10 years (high school) education for farming community as well as also focus on the involvement of youth in farming practices to boost up rural livelihood for improved living standards. To achieve sustainable development household labor should be maximized to reduced labor and input cost and to get maximum production. Similarly, the government should launch some policies to redistribute farmland among farming community more focusing on youth to encourage their vital role for the development of agriculture towards food security. As presently average agricultural land area for a household is only 0.8 hectare, which is not sufficient. The government of China should also focus to raise household heads participation in agricultural extension activities, which is dire need of time to gain advanced knowledge for sustainable improvement in agriculture production. Overall participation of different villages in agricultural extension services is encouraging in China which is almost 50%, yet it appeals to maximize participation of every village in extension services which requires governments' attention to bridge the gap between rural communities and extension services.

On the basis of results of the study following recommendations are suggested for the government of China and Pakistan. So, both of the governments should strengthen agricultural extension to play an effective role for future perspectives; prioritize the areas like the supply of inputs, the role of media in information dissemination, community development and by involving private sector. Moreover, it is necessary to harmonize agricultural extension to facilitate farmers by providing education, improved and clear information, and by reducing the gap among farmers, agricultural extension and technology services and other related stakeholders. Extension agents are technical experts in the system so the government should introduce and implement innovative policies to develop and widen their competences to penetrate into national agricultural extension system. As the provision of educational opportunities for communities especially rural, being basic human rights is the sole responsibility of government. Therefore, the government of Pakistan and China should introduce massive adult education initiatives to improve the educational level of the farming community; this will definitely improve the participation of farmers in agricultural extension activities to improve agricultural productivity in both countries. Likewise invite youth towards agricultural farming and agro-based entrepreneurship by offering attractive packages to develop agriculture and rural economy on the sustainable basis. The government of China should pay attention to agricultural extension

reform system by replicating it throughout the country and accomplishing the most challenging task for the shift of top-down approach into the bottom-up approach. These reforms also require extensive effort to improve professional competencies of extension staff and to provide sufficient budget to carry out agricultural extension activities on the sustainable basis. In short, research and extension are mutually dependent authorities and there should be coordination among them to facilitate farming community and maximize their participation in extension activities on sustainable basis.

Novelty Statement

The current research deal with farmer's behavior towards participation in agricultural extension and advisory services both in Pakistan as well as in China. The manuscript is unique and will be helpful for development practitioners to formulate agricultural extension policy for Pakistan toward modernization of agricultural extension for development of farming community in economic, social and cultural aspects.

Author's Contribution

Muhammad Yaseen: Conceived the major idea of research as principal author and prepared initial draft of manuscript.
Xu Shiwei: Supervised whole research and finalized the manuscript.
Yu Wen: Data analysis and helped in preparing research instrument.
Ejaz Ashraf: Helped in data Analysis
Muhammad Luqman: Reviewed the literature and prepared research instrument
Muhammad Ameen: Helped in data collection from Pakistan
Sadia Hassan: Helped in data collection from China

Conflict of interest
The authors have declared no conflict of interest.

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