The Journal of Animal & Plant Sciences, 27(6): 2017, Page: 1993-2002
ISSN: 1018-7081

DETERMINANTS AND CHOICES OF OFF-FARM WORK AMONG RICE FARMERS IN A DEVELOPING COUNTRY

M. Rizwan[1], Z. Deyi[1], A. Nazir[1], R. Osati[1,] L. Traore[1] and G. R. Sargani[1]

[1]College of Economics and Management, Huazhong Agricultural University, Wuhan, 430070, Hubei Province, P.R. China
Corresponding Author's email: zdy@mail.hzau.edu.cn

ABSTRACT

The present study analyses the relative importance of off-farm activities and factors influencing off-farm activities among rice farmers in Punjab, Pakistan. The data from 400 farmers were collected in detail, from which 262 farmers were characterized with off-farm activities. Results revealed that self-employment was the most important off-farm participating activity amongst the rice farmers in categorized off-farm work. While, public service was the second important off-farm activity of the farmers. The results of multinomial probit regression indicated that education has significant impact and stimulate for engagement in each four categories of off-farm employment. Presence of younger population in households and land renting opportunity stimulate migration in other cities and countries. Less farming area, dependency ratio and large family size are the driving factors for participation in off-farm labour activities. There should be off-farm promoting activities within the region to enhance rice growing households' income. Consequently, income will be helpful to mitigate the food security by investing in agricultural sector and also for improving the farmers' living standard and poverty reduction as well.

Keywords: off-farm activities; migration; loan scheme; rice farmers; Pakistan.

INTRODUCTION

Conventionally the farmers just used to rely on agriculture, and didn't need any side income. So the policies were just focused to farming sector only. Since several years there have been comprehensive indications that small farmers do not rely on agriculture only. But, have coupled within a range of off-farm income activities (Barrett *et al.,* 2001). However, Haggblade *et al.,* (2010) divulged that in developing countries about 35 to 50 percent of the total income of rural households is shared by agricultural sources. There is an expectation that share of off-farm income will surge in the coming years. In general the countries with rising population and having inadequate agricultural resources are intimidation for agriculture sector (Haggblade *et al.,* 2007).

In Pakistan there is a wide gap in incomes of rural and urban households' and the factors to reduce this gap are undetermined. Yet, agriculture is the major sector for Pakistan economy and its share for GDP is 21 percent and accommodates 43 percent of the total work force. Growth in agricultural has increased due to expansion of area. However, the share of agriculture sector in national GDP and workforce has a declining trend from 45% in 1960-61 to 21% in 2010-11 with passage of the time (GOP, 2011). Furthermore, decreasing trend in GDP is larger than workforce, which indicates existence of surplus labour resulting toward slow production. This trend coincides with Lewis's (1954) theory of economic development. On the other hand, industrial sector share in Pakistan's GDP has increased to 20 percent in 2012 from 13 percent in 1985 and *Ceteris Paribas* for employment (GOP, 2013).

Furthermore, majority populations of the country live in the rural areas and mainly derive their livelihood from agriculture and related activities. Farm income is one of the foremost issues especially for small farmers. Off-farm income, nowadays, is becoming a foremost part of livelihood strategies for rural households in Pakistan. With the passage of time, income generation has increased in the country with the contribution manufacturing sector. Though, industrial development and capability of this sector, for accommodating the labour surplus in agricultural sector is inadequate.

However, choice driving factors for off-farm activities vary. For instance, Zhao (2002) revealed that social network from rural to urban migration is quite essential. However the policies in Pakistan are aimed for poverty reduction and rural development but not much importance has been given to the off-farm sector. In this article we try to determine the flaws and responsible factors for expansion of off-farm sector.

It is an importunate phenomenon of off-farm work by farm households around the world. Off-farm employments are providing a significant source of income to preponderance farm households in both developed and developing countries. The dependency of farm families on the income from off-farm work is

increasing steadily over the years. Previous studies have found that 20 to 75 percent of the households' income is from off-farm activities (Benjamin, 1992; Adams, 2001; De Brauw *et al.,* 2002; Xiaobing *et al.,* 2007; De Brauw and Rozelle, 2008; Yu and Zhao, 2009a). For instance, in Ghana 74 percent of the households were engaged in nonfarm activities (Jolliffe, 2004). The involvement of U.S. farm households in off-farm work was approximately 65 percent and the comparable substantiation has also been found in Taiwan, almost 75 percent of the farm households have accounted off-farm incomes (Fernandez *et al.,* 2007).

Moreover, Income from off-farm source than agriculture sources has shared approximately 35 to 50 percent of households' total income in developing countries (Haggblade *et al.,* 2010). In Latin American countries, share off-farm income was 40 percent on average (Davis *et al.,* 2002). Likewise, in Sub-Saharan Africa off-farm income shared was from 30 to 42 percent of total household income (Davis *et al.,* 2014). Households' partaking in off-farm work may vary depending on their level of wealth (Reardon *et al.,* 1998). Woldehanna, (2000) revealed that 35 percent Dutch farmers were involved in off-farm works. While, in Ethiopia, 57.3 percent in 2008 and 73.5 percent in 2013 of farm household contributed in off-farm activities (Beyene, 2008; Bedemo *et al.,* 2013).

Traditionally farmers have endeavored to uphold their assortment for income activities in which off-farm activities had a fundamental role (Barrett *et al.,* 2001). Although, the main reasons of farmers' association with off-farm activities are greater returns and less risk of investment in non-agriculture sector (Kilic *et al.,* 2009). Off-farm activities have positive effect in agricultural production. Though, if the off-farm income is invested on farm it would give more benefit the farmer to cultivate timely (De Janvry *et al.,* 2005). Giles, (2002) revealed that farmers in China used their off-farm work income in agriculture sector to reduce the risk shocks in agriculture production.

Furthermore, Stampini and Davis (2009) divulged that non-farm employment has influenced the use of variable inputs in rural Vietnam due to off-farm income invested on seeds, fertilizer, agricultural services and hired labour. Off-farm activities, still, have become a key part of farmer's overall income in developed and developing countries. Agriculture sector is pretty risky, because farm production depended on many factors which are out of control the farmers. In spite, there is no assurance of favorable returns from farming. Many farmers have adapted numerous source of income to ensure their farm income (De Janvry and Sadoulet, 2001; Haggblade *et al.,* 2007). Many reasons are observed for, off-farm activities, phenomenon, which may cause to reduce farm income and willingness to protect farm productivity against different risks (Reardon, 1997; Ellis, 1998).

Generating income through off-farm work, is a way of farmers' self-insuring strategy to strengthen the households overall income (Alasia *et al.,* 2009). Household must give attention to income diversification as a strategy to minimize the farming income risks (Reardon *et al.,* 1992). It plays a vital role to stabilize the income and reduce income inequality among rural households. A range of studies exposed that off-farm activities have enormous part to enhance the growth of rural economy and reducing the poverty level (Weijland, 1999; Lanjouw, 2001). Likewise, Oluwatayo (2009), revealed that off-farm income has positive effect on the likelihood of diversification index. In another study Stampiniand Davis (2009) found that off-farm income variation and its effect on living standard of households. Furthermore, Awoniyi and Salman (2011) using logistic regression model identified the factors effecting the farmers' decisions for taking part in off-farm activities. Also, the households which were not involved in off-farm activities were living below the poverty line.

It has been seen, non-farm activities, to perform progressively significant part in sustainable development and to reduce the poverty as well, especially in the developing countries (FAO, 2005). Diversity in employment supports to increase income by scattering risk across different activities (Gordon and Craig 2001). Farm households have possibilities to invest in agriculture sector for more advanced technologies. Consequently, households can gain high profit and will be able to transform from traditional to modern agriculture. Off-farm activities getting attention as it contributes a vital role for the small farmers' income, especially in developing countries. For instance, income gained from off-farm work contributed more than three times annual for the paddy farmers in Malaysian (Taylor, 1987). Likewise, Shand (1986) revealed in his study that off-farm activities have significant effect for the Malaysian farmers. Off-farm employment was also found as an anti-poverty strategy in Mada (Corner, 1981). Shand (1986) revealed in his study conducted in KADA region among paddy farmers that employment of household labour was existed and that surplus labour could be fascinated by creating more employment through strengthening off and on the farm.

Furthermore, different studies revealed that there are various socio-economic factors which are responsible for the taking part in off-farm activities (Radam and AbdLatif 1995; Zhao, 1999; Du, 2000; Zhao, 2002; Zhu, 2002; Awoniyi and Salman, 2011; Willmore *et al.,* 2012; Ping *et al.,* 2016). For instance, age, education level, capital are the factors for decision to take part in off-farm activities (Radam and AbdLatif, 1995). Likewise, Awoniyi and Salman (2011) divulged that income diversification in rural households revealed similar results

in Nigeria. In addition, due to low income from agriculture sector, households were engaged in off-farm employment (Kahan, 2013; Iqbal and Ahmed, 2015). Moreover, to allocate the leisure time farmers choose the off-farm activities (Matshe and Young, 2004). Beyene, (2008) indicated that low production and less income form agriculture sector, also education were the factors influencing for taking part in off-farm activities in Ethiopian households.

In the present study, it is hypothesized that large family size, less cultivation land, better education and more dependency ratio are the factors which determine the participation off-farm activities. Figure1 depicts the concept of off-farm participation activities among rice farmers. It is anticipated that due to low income and unstable yield and leisure, time push, the rice growers participate in off-farm activities. Nevertheless, there are other socio-economic factors which affect the rice farmers for participation in off-farm activities and are conceptualized in the given diagram. Numerous studies have indicated that social networks, gaps in income, land limitations and composition of households are the driving factors for participation in off-farm employments (Zhao, 1999; Du, 2000; Zhao, 2002; Zhu, 2002).

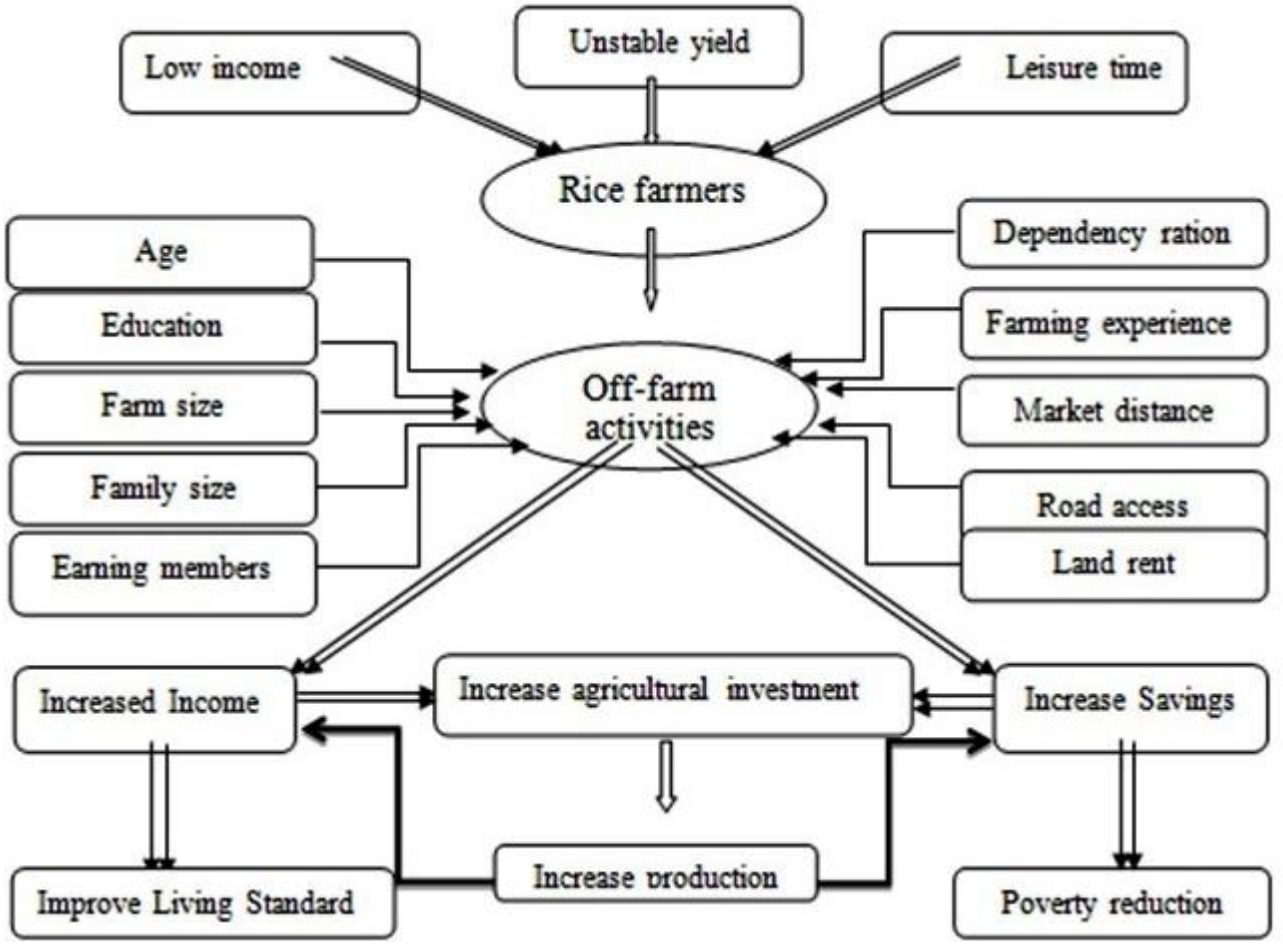

Figure1. Conceptual frame work for rice growing farmers regarding off-farm activities

MATERIALS AND METHODS

Data Collection: For analyzing the participating decision in off-farm activities among rice growing farmers. A comprehensive survey was conducted in three districts[1] of Punjab, Pakistan in 2015-16. These districts were selected on the basis of major rice producing districts in Pakistan. The data was collected from 400 farmers in detail from which 262 farmers were characterized having off-farm activities. Further were categorized as 85 from Sialkot, 90 from Gujranwala and 87 respondents were from Hafizabad districts.

Furthermore, Off-farm activities were classified into four types namely, off-farm labour, off-farm self-employment, off-farm public services and off-farm migration & others. Off-farm labour consists of different types of mechanics, labour on daily wages on farm,

[1]Sialkot, Gujranwala and Hafizabad districts

transport operations, construction labour. Self-employment ensnares shop keepers, commission agents and fertilizers or pesticide business, any type of trader. Public services comprise all types of employment in public and private sector institutions, teachers, lawyers, doctors. And migration & others consists migration temporary inside or out of Pakistan and pensioners etc.

Model specification: For investigating the effect of participation factors in off-farm activities, which has a theoretical background origin with decision making theory. In accordance to the theory when the strength of the inducements goes beyond the individuals reaction then an action happens (Hill and Kau, 1973). Further, for determining the factors driving the participation for four off-farm employment categories in this article a multinomial probit model was applied. Theoretically, probit model is more alluring than logit model and it was used for off-farm activities in previous researches for instance (Xia and Simmons, 2004; Akaakohol and Aye, 2014). Benefit of this model is that it is free from the logit model property that is 'independence of inappropriate substitutes'. The development in the computer software, troublesome of probit model, made the possible to apply it for the present study data. The model is specified as (Xiaoping *et al.,* 2007), although the variables are not same.

$$Y = b_0 + b_1X_1 + \ldots\ldots\ldots\ldots + b_{10}X_{10} + e$$

Where,

Y = is polychotomous variable demonstrating off-farm activity type participation;

b_o, b_1, b_2, b_3, ----------, b_{10} = (row vectors of) coefficients to be estimated;

X_1 = (column vector of) respondent's age;

X_2 = (column vector of) education;

X_3 = (column vector of) farm size;

X_4 = (column vector of) farming experience;

X_5 = (column vector of) distance from city;

X_6 = (column vector of) earning members;

X_7 = (column vector of) access to road;

X_8 = (column vector of) dependency ratio;

X_9 = (column vector of) family size;

X_{10} = (column vector of) land renting;

e = error term

The polychotomous variable is an independent variable which is equal to 0 if a member of households does not participate in off-farm activity. Off-farm labour represents to 1, 2 for self-employment, 3 for public services, and 4 denotes to migration & others. Descriptive statistics can be seen in table 1 of the variables used in the regression model.

Expected signs of variables on categorized off-farm activates: Table 1 shows the expected signs of the variables used for the each equation in this model. Age is the first variable in the table list and shows that younger people are more like to migrate. Farming area sign shows that less agriculture area push to do off-farm work for all categorized. Expected sign for farming experience shows that more experienced farmer are taking part in self-employment, public services and labour work due to well-structured farms. Next variable shows that less distance from the main city is a push factor for labour and self-employment while positive and negative sign for both services and migration. Less earning members and large family size are also push factors for off-farm work. More accessibility to road may have positive and negative impact on all categorized off-farm activities. More dependency ratio and having more opportunities to give land on rent have positive impact and push factor for taking part in off-farm work of all categorized.

Table 1. Variables used in the model and their expected signs.

Variables	Expected signs			
	Labor	Self-employment	Public services	Migration & others
Age	+	+	+	-
Education	+/-	+/-	+	+/-
Total farming area	-	+/-	-	-
Farming experience	+	+/-	+/-	-
Location from city	-	-	+/-	+/-
Earning members	-	+/-	-	-
Family size	+	+	+/-	+
Access to road	+/-	+/-	+	+/-
Dependency ratio	+	+	+	+
Land renting	+/-	+/-	+	+

RESULTS AND DISCUSSION

Description of variables: The results indicate that average age of farmers in study area is 44 years and had 8 years of formal education. The average farming area is 12 acre and farmers had 19 years farming experience. Farm location from the main market / city on average is found 9 kilometers. Moreover, the mean value for number of earning members in a family and family size is 2.14 and 7.35, respectively. Majority farmers from target area have access to road from their village and the average value of dependency ratio is 2.78 of total members of household in a family among rice farmers in the study area (Table 2).

Table 2. Statistics Outline of variables used for regression

Variables	Variable definitions	Mean	SD	Min	Max
Age	No. of years	44.02	7.96	23.00	71.00
Education	No. of schooling years	8.29	3.19	0.00	16.00
Total farming area	Farming area in acres	12.23	8.31	1.00	32.00
Farming experience	No. of farming years	19	7.82	5.00	47.00
Location from city	Distance in kilometers	9.33	4.13	2.00	23.00
Earning members	No. of earning family members	2.14	0.69	2.00	4.00
Family size	No. of family members	7.35	1.07	3.00	10.00
Access to road	Dummy variable, 1=access, 0=otherwise	0.93	0.21	0.00	1.00
Dependency ratio	No. of family members depend on earners	2.78	1.32	1.01	6.00
Land renting	Dummy variable, 1=renting, 0=otherwise	0.08	o.24	0.00	1.00

Participation in Off-farm employment of households:

Major types of off-farm employments are differentiated as, off-farm labour, self-employment, public services and migration (temporary) & others in table 3. Off-farm labour comprises of daily labour, different types of mechanics, transport operations, labour hired for agriculture sector, construction labour. Self-employment including all types of business such as shop keeping, grain market business, traders, agents, fertilizer and pesticide business. Public services comprise employment of all types such as teachers, lawyers, doctors, bank employees etc. Migration & others consists all kind of temporary migration inside Pakistan or outside, pensioners etc.

Normally 65 percent from the respondents at least one person was involved in off-farm activity. The off farm participation is categorized in four types of off-farm employments and summarized in table 3. Households' participation in off-farm labour was 17 percent in total in three districts, and district Gujranwala was highest with 20 percent followed by Hafizabad with 19.3 percent and Sialkot 12.4 percent. Around 22.8 percent households' members of all three districts were involved in self-employment which is very important off-farm activity. Sialkot district was the highest with 27.6 percent participate in self-employment and Hafizabad district was the lowest with 15.6 percent. Public services off-farm activity was also second important off-farm activity with 18.3 percent participation from households in all three districts. Among three districts, households of Gujranwala was highest participating with 20.8 percent, it was 20 percent and 14.5 percent in Hafizabad and Sialkot districts respectively. Only 7.5 percent of the household involved with migration and others off-farm activity. Hafizabad district was stood first among three districts with 9.6percent involvement.

Table 3. Share (%age) of Households' participation in different farm & off-farm activities.

Categories of activities	Sialkot	Gujranwala	Hafizabad	Overall activities
Farming Only	41.4	25.0	35.6	34.5
Off-farm labour	12.4	20.0	19.3	17.0
Self-employment	27.6	25.0	15.6	22.8
Public services	14.5	20.8	20.0	18.3
Migration & others	4.1	9.2	9.6	7.5
Overall activities	**100**	**100**	**100**	**100**

Households' average annual income obtained from different sources: Table4revealshouseholds' comprehensive average income obtained from different sources annually. In first part, agriculture source which consist all types of crops and livestock income obtained in one year. The overall household income comprises of crop income, livestock income and income which is gained from non-farm source such as business, remittances, pensions (De Janvry and Sadoulet, 2001; Babatunde *et al.,* 2010). Results reveal that income obtained from off-farm sector is greater than agriculture sector except Gujranwala. Although, there is not much difference but has significant results for Sialkot and Hafizabad districts. It indicates a greater importance for participation in off-farm activities of rice farmers in all research areas. Furthermore, results reveals that income obtained from self-employment in Sialkot district was highest than the other two districts which shows more involvement of rice growing farmers family members in self-employment. Moreover, income obtained from services was highest in Hafizabad district. It indicates that respondents are more like to involve in public and private sector (table 3).

Even more interesting point is that, participation in off-farm labour is higher in Hafizabad district but income obtained is less than other districts. Results illustrate that wages of labour in Hafizabad is lower than other two districts. Moreover, income obtained from migration and other sources is also higher in Hafizabad district. These results are in line with (Xia and Simmons, 2004) but in contrast with (Xiaoping *et al.,* 2007). It means that more people from Hafizabad district like to migrate to support their families and also have more surplus labour in the same district.

Table 4. Households' average annual income obtained from different sources (in PKR).

Income Sources	Sialkot	Gujranwala	Hafizabad
Crops	249,317.07	358,374.85	286,435.1
Livestock	49,200.00	63,340.00	42,150.00
Sub-Total (agriculture)	*298,517.07*	*421,714.85*	*328,585.1*
Off-farm labour	80,256.00	95,476.00	80,341.00
Self-employment	128,652.33	92,602.58	79,621.71
Public services	113,205.00	101,914.00	120,306.00
Migration & others*	55,420.00	61,352.00	66,421.00
Sub-total (off-farm)	*305,533.33*	*351,344.58*	*346,689.71*
Grand Total	**60,4050.40**	**773,059.43**	**675,274.81**

*Income consists from pension, remittances and unearned ways.

Result and discussion on regression (multinomial probit) results for participation off-farm activities: Table 5 reveals the results obtained from multinomial probit regression. The regression equation for goodness of fit realizes satisfactory. All variables show significant results on all categories of off-farm activities except farming experience and members earning. Age has significant negative effect on self-employment and migration but no has any effect on labour and services off-farm activities. It portrays that young persons like to have self-employment and migration. These results are consistent of (Xiaoping *et al.,* 2007). Likewise, Apind *et al.,*(2015) and Yusuf *et al.,*(2016) reported that age had negative relationship

with off-farm work. Education has significant impact on all four off-farm activities. Table 4 reveals that education has significant positive impact on self-employment and services but has negative effect on labour and migration but has 2 times more for services than self-employment. These results narrate that more educated people do not like to work as labour and dislike to migrate. An empirical study by Reardon*et al.,* (2001), in Latin America, showed the same results. For labour, the results are in consist those of (Dary and Kuunibe, 2012; Rahman, 2013). While, in contrast with some earlier studies for self-employment and migration for instance, Xiaoping *et al.,*(2007) narrated positive effect of education on migration but no any effect on self-employment and wage labour. Nevertheless, De Brauw *et al.,* (2002) and Yu and Zhao (2009b) stated positive effect on wage labour in their studies. Some earlier literature also indicates that age has a positive association with off-farm work (see, Apind *et al.,* 2015; Eshetu and Mekonnen, 2016; Yusuf *et al.,* 2016).

For farming area interesting results have been found. Farming area has a positive effect on self-employment off-farm labour activity. Households having more farming area are involved in self-employment especially in business like rice mills and flour mills have hired labour on their farms. Rahman (2013) identified the similar outcomes in his study participation in off-farm activity in Bangladesh. However, Apind *et al.,* (2015) and Eshetu and Mekonnen (2016) indicated in their studies that farm size had negative effect on off-farm work. In contrast, less farming area have negative effect on labour off-farm activity, which indicate that farmers having less farming area are involved in labour activity. Moreover, Location from city has negative association with self-employment. The results narrate that households living very near to the city are involving self-employment. Furthermore, family size has positive effect on off-labour, services and migration but not impact on self-employment. These results show that households with large family size have involved in the mentioned off-farm activities. These findings are in line with (Iqbal and Ahmed, 2015).

In addition, dependency of ration has positive effect on off-farm labour and self-employment. These results reveal that households have more dependent person involved in labour work and self-employment activities. Previous studies revealed that there is no any effect on self-employment and migration to dependency ratio (Zhao, 1999). While, Xiaoping *et al.,* (2007) stated that it is easier to migrate for those who have grandparents of their children at their homes. Additionally, land renting has also positive impact on services and migration. In the research area, results show that having opportunity for land renting to the households, push for involvement in services and migration activities. For migration, results are associated with (Xiaoping *et al.,* 2007).

Table 5.MultinomialProbit regression results for participation in distinguished of off-farm employments.

Independent variables	Dependent Variable = Participation in Off-farm employments							
	Off-farm labor		Off-farm self-employment		Off-farm public services		Off-farm migration & others	
	Coeff.	Z score	Coeff.	Z score	Coeff.	Z score	Coeff.	Z score
Age	- 0.02	0.44	- 0.07**	1.38	0.37	1.89	-0.071*	1.87
Education	- 0.87*	0.92	0.37**	1.69	0.78***	4.91	-0.32*	4.53
Total farming area	-0.07*	0.32	0.063**	1.34	-0.43	0.76	-0.069	2.00
Farming experience	1.09	3.23	0.24	1.07	0.33	0.89	0.05	0.61
Location from city	-0.79	0.99	-0.059**	0.21	0.27	0.66	-0.06	0.32
Earning members	-0.65	0.88	0.027	0.076	0.97	2.65	-0.19	3.23
Family size	0.81**	1.03	0.051	0.19	0.04**	1.34	0.07*	0.71
Access to road	-0.93	1.44	0.16**	0.77	-1.78	0.89	0.23	2.01
Dependency ratio	0.62**	0.93	1.032**	0.91	1.03	2.33	0.69	4.21
Land renting	-0.02	0.45	0.149	0.85	0.37**	0.98	0.26*	0.97
Constant	2.09***	3.91	4.89***	0.75	3.93***	3.47	3.96*	4.76
Wald Chi^2	341.7							
Log-likelihood	811.2							

*Denotes statistically significant at 10% level. **Denotes statistically significant at 5% level.
***Denotes statistically significant at 1% level.

Conclusion: The present study was conducted to analyze participation of rice growing households in off-farm activities in Punjab province of Pakistan. These off-farm activities were categorized in four different types namely off-farm labour, off-farm self-employment, public services and migration &others. The results indicate that

self-employment is the most common off-farm activity among rice farmers while off-farm service is second important activity. But farmers are giving very less importance to migration. The interesting thing for migration is found that migration is more out of country than within the country. Maybe it is because less sources of income and lower economy in the studied country than those countries where the households are migrated. The empirical analysis reveals that young persons like to have self-employment and migration. Education has significant influence on all four categorize of off-farm activities. It consolidates that more educated people do not like to work as labour and dislike to migrate and prefer self-employment or public service. Furthermore, households having more farming area also involved in activities like off-farm activities. Also, households with large family size are involved in activities like services and migration. The households having more persons are involved in labour work and self-employment activities. Where there were opportunities for land renting, the households were more passionate for involvement in services and migration activities. Nevertheless, farmers had more leisure time due to well mechanized farming and had opportunity to increase their income by engaging in off-farm activities. It is suggested that, if government and other relative authorities will provide off-farm activities to the rice farmers within the region. They can get better outcomes and reduce poverty and increase productivity in rice and other crops as well as households' living standard. It is also suggests that loan scheme should be introduced without any interest for the rice growers especially for the small farmers to increase the production. This study encourages for future research to investigate the efficiency between households having with and without off-farm activities.

Acknowledgements: This research is financed by project "The Policy Impacts of Introducing Green Electricity Quota Trading System on the Sustainable Electricity Development in China" (Project No. 13YJA790163). I would like to express my deepest thanks to my supervisor Zhou Deyi for his valuable and expert guidance, keen interest and sympathetic attitude.

REFERENCES

Adams, R.H. (2001). Nonfarm income, inequality, and poverty in rural Egypt and Jordan, World Bank Publications.p.1-41.

Akaakohol, M.A. and G. C. Aye (2014). Diversification and farm household welfare in Makurdi, Benue State, Nigeria. Development Studies Research. An Open Access J., 1(1), 168–175.

Alasia, A., A. Weersink, R. D. Bollman and J. Cranfield (2009). Off-farm labour decision of Canadian farm operators: Urbanization effects and rural labour market linkages. J. Rural Stud. 25(1): 12-24.

Apind, B. O., J. K. Lagat, H. K. Bett and J. K. Kirui (2015). Determinants of small-holder farmers' extent of market participation: Case of rice marketing in Ahero irrigation scheme, Kenya. J. Eco. Sust. Dev, 6(2): 154–160.

Awoniyi, A.O. and K. K. Salman (2011). Non-farm Income Diversification and Welfare Status of Rural Households in South West Zone of Nigeria. International Food Policy Research Institute. 1–3.

Babatunde, R. O., F. I. Olagunju, S. B. Fakayode and A. O. Adejobi (2010). Determinants of participation in off-farm employment among small-holder farming households in Kwara State, Nigeria. Production Agriculture and Technology, 6(2): 1–14.

Barrett, C. B., T. Reardon and P. Webb (2001). Nonfarm income diversification and household livelihood strategies in rural Africa: concepts, dynamics, and policy implications. Food policy, 26(4), 315–331.

Bedemo, A., K. Getnet and B. Kassa (2013). Determinants of labor market participation choice of farm households in rural Ethiopia: multinomial logit analysis. J. Eco. Sus. Dev. 4(1):133–141.

Benjamin, D. (1992). Household composition, labor markets, and labor demand: testing for separation in agricultural household models. Econometrica: 287–322.

Beyene, A. D. (2008). Determinants of off-farm participation decision of farm households in Ethiopia. Agrekon, 47(1): 140–161.

De Brauw, A., J. Huang, S. Rozelle, L. Zhang and Y. Zhang (2002). The evolution of China's rural labor markets during the reforms. J. Comp. Econ., 30(2): 329–353.

De Brauw, A. and S. Rozelle (2008). Migration and household investment in rural China. China Econ. Rev. 19(2): 320–335.

Corner, L. (1981). Linkages reciprocity and remittances: the impact of rural outmigration on Malaysian rice villages.http://www.popline.org/node/421584 accessed on 2016-12.05.

Dary, S.K. and N. Kuunibe (2012). Participation in Rural Non-Farm Economic Activities in Ghana". Amer. Inter. J. Cont. Res. 2(8): 154–161.

Davis, B., T. Reardon, K. Stamoulis and P. Winters (2002). Promoting farm/non-farm linkages in developing countries. Promoting Farm/Non-farm Linkages for Rural Development: Case Studies from Africa and Latin America, Rome FAO: 110.

Davis, B., S. Di Giuseppe and A. Zezza (2014). Income diversification patterns in rural sub-Saharan Africa: reassessing the evidence. World Bank Policy Research Working Paper, (7108).

Du, Y., (2000). Impact of shadow price of labor on labor hourly supply. China Rural Survey (5): 36–42.

Ellis, F. (1998). Household strategies and rural livelihood diversification. J. Dev. Stud. 35(1): 1–38.

Eshetu, F. and E. Mekonnen (2016). Determinants of off farm income diversification and its effect on rural household poverty in Gamo Gofa Zone, Southern Ethiopia. J. Dev. Econ. Agri. Eco. 8(10): 215–227.

FAO: Food and Agriculture Oragnization (2005). Rural income generating activities: A cross country comparison. Rome FAO.

Fernandez-Cornejo, J., A. K. Mishra, R. F. Nehring, C. Hendricks, M. Southern and A. Gregory (2007). Off-farm income, technology adoption, and farm economic performance. Economic Research Report - Economic Research Service, USDA, (36): 53. Available at: <Go to ISI>://CABI:20073230903.

Giles, J. (2002). Off-farm labor markets and household risk-coping behaviour in rural China.". *V (2002)*: 52–94.

Government of Pakistan.(2011). Agricultural statistics of Pakistan 2010–11. Ministry of Food andAgriculture (economic Wing), Finance Division, Government of Pakistan,Islamabad. Islam. Pakistan.

Government of Pakistan(2013). Agricultural statistics of Pakistan 2012–13. Ministry of Food andAgriculture (economic Wing), Finance Division, Government of Pakistan,Islamabad. Islam. Pakistan.

Gordon, A. and C. Craig (2001). Rural non-farm activities and poverty alleviation in sub-Saharan Africa, NRInstitute Policy (14). available at http://gala.gre.ac.uk/11126/1/Doc-0183.pdf. Accessed on 2016-11-05.

Haggblade, S., P. Hazell and T. Reardon (2010). The rural non-farm economy: Prospects for growth and poverty reduction. World Dev. 38(10): 1429–1441.

Haggblade, S., P. B. R. Hazell and T. Reardon (2007). Transforming the rural nonfarm economy: Opportunities and threats in the developing world, Intl Food Policy Res Inst. (58).

Hill, L. and P. Kau (1973). Application of multivariate probit to a threshold model of grain dryer purchasing decisions. Am. J. Agr. Econ. 55(1): 19–27.

Iqbal, M. A., Ping, Q., Ahmed, U. I., and Nazir, A. (2015). Determinants of Off-farm Activity Participation among Cotton Farmers in Punjab , Pakistan. Int. J. Manag. A. Eco. 2(7): 707–718.

De Janvry, A. and E. Sadoulet (2001). Income strategies among rural households in Mexico: The role of off-farm activities. World dev. 29(3): 467–480.

De Janvry, A., E. Sadoulet and N. Zhu (2005). The role of non-farm incomes in reducing rural poverty and inequality in China. Department of Agricultural & Resource Economics, UCB.

Jolliffe, D. (2004). The impact of education in rural Ghana: examining household labor allocation and returns on and off the farm. J. Dev. Econ. 73(1): 287–314.

Kahan, D., (2013). MANAGING RISK in farming, Rome FAO: p.11.

Kilic, T., C. Carletto, J. Miluka and S. Savastano (2009). Rural nonfarm income and its impact on agriculture: evidence from Albania. Agr. Econ. 40(2): 139–160.

Lanjouw, P. (2001). The rural non-agricultural sector and poverty in El Salvador. World Dev. 29(3): 527–529.

Matshe, I. and T. Young (2004). Off-farm labour allocation decisions in small-scale rural households in Zimbabwe. Agr. Econ. 30(3): 175–186.

Oluwatayo, I.B. (2009). Poverty and income diversification among households in rural Nigeria: A gender analysis of livelihood patterns. In The 2nd Instituto de EstudosSociais e Económicos (IESE) Conference on 'Dynamics of Poverty and Patterns of Economic Accumulation in Mozambique: 22–23.

Ping, Q., M. A. Iqbal, M. Abid, U. I. Ahmed, A. Nazir and A. Z. K. A Rehman (2016). Adoption of off-farm diversification income sources in managing agricultural risks among cotton farmers in Punjab Pakistan. J. Appl. Environ. Biol. Sci, 6(8): 47–53.

Radam, A. and I. AbdLatif (1995). Off-Farm Labour Decisions By Farmers In Northwest Selangor Integrated Agricultural Development Project (Iadp) In Malaysia. Bangl. J.Agri.Econ. 18(2): 51–61.

Rahman, M. S. (2013). Socio-economic determinants of off-farm activity participation in Bangladesh. Russian J. Agricultural and Socio-Economic Sciences, 13(1): 1-7

Reardon, T., K. Stamoulis, A. Balisacan, M. E. Cruz, J. Berdegué and B. Banks (1998). Rural non-farm income in developing countries. The State of Food and Agri. : 283–356.

Reardon, T. (1997). Using evidence of household income diversification to inform study of the rural nonfarm labor market in Africa. World dev. 25(5): 735–747.

Reardon, T., J. Berdegué and G. Escobar (2001). Rural

nonfarm employment and incomes in Latin America: overview and policy implications. World dev. 29(3): 395–409.

Reardon, T., C. Delgado and P. Matlon (1992). Determinants and effects of income diversification amongst farm households in Burkina Faso. J. Dev. Stud. 28(2): 264–296.

Shand, R.T. (1986). Agricultural development, non-farm employment and rural income distribution: a case study in Kelantan, Malaysia. In Rural industrialization and non farm activities of Asian farmers. Proceedings. Korea Rural Economics Institute: 121–140.

Stampini, M. and B. Davis (2009). Does nonagricultural labor relax farmers' credit constraints? Evidence from longitudinal data for Vietnam. Agr. Econ.40(2): 177–188.

Taylor, J. E. (1987). Undocumented Mexico—US migration and the returns to households in rural Mexico. Am. J. Agr. Econ. 69(3): 626–638.

Weijland, H. (1999). Microenterprise clusters in rural Indonesia: Industrial seedbed and policy target. World Dev. 27(9): 1515–1530.

Willmore, L., G. Y. Cao and L. J.Xin (2012). Determinants of off-farm work and temporary migration in China. Popul. Environ. 33(2-3): 161–185.

Woldehanna, T. (2000). Economic Analysis and Policy Implications of Farm and Off-farm Employment: A case study in the Tigray region of Northern Ethiopia (Doctoral dissertation)

Xia, Q. and C. Simmons (2004). The determinants of labour-time allocation between farm and off-farm work in rural China: The case of Liaoning Province. J. Chinese Econ.Business Stud.2(2): 169–184.

Xiaobing, W., T. Herzfeld and T. Glauben, T. (2007). Labor allocation in transition: Evidence from Chinese rural households. China Econ. Rev. 18(3): 287–308.

Xiaoping, S., N. Heerink and Q. U. Futian (2007). Choices between different off-farm employment sub-categories: An empirical analysis for Jiangxi Province, China. China Econ. Rev. 18(4): 438–455.

Yu, X. and G. Zhao (2009a). Chinese agricultural development in 30 years: A literature review. Front. Econ.China, 4(4): 633–648.

Yusuf, T.M., O. L Ballogun and S. A. Tiamiyu (2016). Transforming Smallholder Farming in Nigeria through Off-Farm Employment. In 2016 AAAE Fifth International Conference, September 23-26, 2016, Addis Ababa, Ethiopia. African Association of Agricultural Economists (AAAE).

Zhao, Y., (2002). Causes and consequences of return migration: recent evidence from China. J. Comp. Econ. 30(2): 376–394.

Zhao, Y. (1999). Leaving the countryside: rural-to-urban migration decisions in China. Am. Econ. Rev. 89(2): 281–286.

Zhu, N. (2002). The impacts of income gaps on migration decisions in China. China econ. rev. 13(2): 213–230.