ABSTRACT
This study was conducted to determine the extent of underemployment in agricultural sector of district Mardan during 2007. Underemployment is a situation wherein the number of hours worked of an employed person is not enough compared to what he is willing and able to engage in. It is an intriguing and complex issue. Due to subdivision of land holdings and mechanization of agriculture, the problem of underemployment in the agricultural sector is worsening over time. In the rural areas, the pace of industrialization is very slow and creation of off-farm employment opportunities is minimal. Hence, underemployment is a source of unrest and threat to sustainable livelihood. The study is based on data collected through structured questionnaire from one hundred sampled farmers. Respondents were categorized into six groups on the basis of size of land holdings. In the study area, agriculture is the major source of employment. The average size of land holdings was 2.73 hectares ranging from 0.20 to 11.94. About 49% of farmers had their land holdings below 2 hectares. On an average, 2.40 adult units of family labour were engaged in agricultural activities ranging from 1.47 to 3.50. The study revealed that average level of underemployment was 23.95%. The major determinants of underemployment were farm size, size of family labour, size of livestock herd, level of off-farm employment, level of education and distance of the village from the main road. Econometric analysis revealed that coefficients of the farm size, size of livestock herd, level of off-farm employment and level of education were negatively correlated and significant while coefficients of size of family labour and distance of the village from main road were positively correlated. There was significant difference in the level of underemployment among various size of farms. Small farmers find it difficult to eke out their livelihood solely from agriculture. They are switching to other sources of income. About 27% of sampled farmers were engaged in off-farm employments. The analysis shows that coefficients of farm size, size of livestock herd and village distance from main road were negatively correlated while coefficients of household size, level of education and age of sampled respondents were positively correlated with the level of off-farm employment. Size of land holdings decreases as a result of subdivision due to law of inheritance. In addition to this, technological change continues to exert a significant long run influence on farm sector employment and it is likely that, this long-term trend will continue. As a result, underemployment in the agricultural sector is likely to increase in future. Off-farm employment has the potential to absorb excess labour from agricultural sector. In rural areas, livestock provides a secondary income for households. There is need to develop livestock sector through various measures. It is recommended to look towards processing activities and value added products in the field of agriculture. It is also recommended to open skill development centers in rural areas to impart training and skills in various needed profession.

Key words: Agriculture, Employment, Underemployment, Off-Farm Employment.

INTRODUCTION
The problem in the labour market of Pakistan is not only that of open unemployment, but there is also significant underemployment. Underemployment was first considered by the second International Conference of Labour Statisticians (ICLS) in 1925. The eleventh ICLS adopted the first international statistical definition of underemployment in 1957. Time-related underemployment according to International Labour Organization refers to “insufficient hours of work in relation to an alternative employment situation that a person is willing and available to engage in” (ILO, 1998). Labour Force Survey of Pakistan (2006) shows that a significant number of those who were employed during the survey period were classified as having been underemployed. Underemployment was defined in the survey as persons who worked for less than 35 hours a week for an economic reason and they were available for additional work while underemployment rate is estimated as a ratio of the employed who worked less than 35 hours a week to the total labour force. In Pakistan, around 5.8 million or 14.0% of the total employed were working less than 35 hours a week (GoP, 2004). Based on available information, the proportion of underemployment has increased from 13.4 to 15.53% during 2002-05 (GoP, 2005). Agricultural sector and rural area are reservoirs of disguised and underemployed labor force. Underemployment in rural area was greater than urban area.

Underemployment in the agricultural sector, like other developing countries, is a common phenomenon in Pakistan. Cultivated land per person was 0.14 hectares during 2004-05 in the country. Population is increasing over time whereas there is rare increase in the cultivated land. Cultivated area of Pakistan was 20.30 million hectares in 1981 and it was increased to 22.51 million hectares in 2005. Population of Pakistan was 85.09 millions in 1981
and it was increased to 152.53 millions in 2005. During the past 25 years, cultivable land has increased by 27% compared to 98 percent increase in population, resulting in reduced individual land holdings in Pakistan (GoP, 2006). However, it may be pointed out at this juncture that each year, a sizeable portion of fertile and cultivated land, in the vicinity of cities, towns and villages is going out of cultivation and some marginal lands are brought under cultivation. According to 1998 Population and Housing Census of Pakistan, there were 19.30 million housing units in the country as compared with 12.60 million enumerated in 1980, showing an increase of 53.20% (GoP, 1998).

Farming in Pakistan is characterized by small and fragmented holdings. Due to operation of Islamic law of inheritance, each piece of cultivated land is being broken into small and scattered parcels generation after generation. In Pakistan, 86% of land holdings were below subsistence level (12.5 acres) during 2000. This figure was 94% in NWFP during the same period. Over the last 25 years division and sub division of land holdings has reduced farm size. Many of small farmers do not have enough land to fully utilize their labour hours. The number of small farms of less than 2 hectares increased from 34% of the total in 1980 to 58% in 2000. The share of both, the medium and the large farms in the total numbers of farms also decreased during the same period (GoP, 2000).

Mechanical agricultural technology is further reducing employment for both farm family members and hired farm workers. The use of agricultural machinery is increasing day by day in Pakistan like other agricultural countries of the world. Farm area exclusively using bullock power has generally declined over time. All over Pakistan, tractor is the dominant mode of traction power. It has gradually reduced the bullock’s power. Literally all the wheat crop is now threshed with mechanical threshers and similar progress was recorded in the use of rice husking machines. There were 157310 tractors operating on farms in Pakistan in 1984. This figure was increased to 401663 in 2004 (GoP, 2004). Several studies showed that tractor displaces labour. Khan and Karim (1991) have concluded that complete agricultural mechanization in Pakistan would displace two-third of the labour force. Besides tractors, there has been phenomenon of increase in other agricultural machineries (Reddy, 1995).

Increased agricultural mechanization and rapid population growth led to surplus labour, which could not be absorbed by agriculture so that the only possibility left for the unemployed for securing income is to join a non-agricultural occupation. Off-farm employment serves to absorb underemployed farm household labourers. The rapid growth of the rural population leading to the growing population pressure on land have underlined the increased importance of the rural non-farm activity as an alternative and a supplementary source of the rural employment and income. The relationship between agriculture and the rural non-agricultural activities is an intimate one. Agriculture is related to the rural non-agricultural activities directly through its forward and backward production linkages and indirectly through the consumption demands of the farm households.

Many studies have highlighted the importance of the rural non-farm activities in agricultural sector [see for example, Hazell and Haggblade (1993); Adams and He (1995); Lanjouw and Lanjouw (1995); Bakht (1996); Sen (1996); Lanjouw (1999); Lanjouw and Shariff (2002); Davis (2003)]. Many farm families seek non-farm jobs to supplement their incomes. However, their low level of education and skill often limit their ability to compete for higher wages, non-farm jobs. Islam (1997) reported that the share of the non-farm sector in rural employments in developing countries varies from 20% to 50%. Malik (2005) concluded that majority of poor households derive their non-farm incomes from construction sector. Construction and services sectors are the two largest employers of rural non-farm labour force. However, construction sector absorbs unskilled and/or low-skilled labour. Services sector, on the other hand, appeared as the most important source of non-farm income for the better off households. In addition, wholesale and retail trade and transport and communication also contribute significantly in the non-farm income of households belonging to higher income groups. Adams (1994) based on data from Pakistan, concluded that the poor mainly depended on unskilled labor and self-employment as major income sources.

Underemployment in the agricultural sector has been identified since long by development economists. It is an intriguing and complex issue. Due to subdivision of land holdings and mechanization of agriculture, the problem of underemployment in the agricultural sector is worsening over time. In the rural areas, the pace of industrialization is very slow and creation of off-farm employment opportunities is minimal. Hence underemployment is a source of unrest and threat to sustainable livelihood. According the knowledge of authors, in Pakistan, over the past two decades, hardly any study has tried to estimate the
level of underemployment in the agricultural sector. This study will help policy makers to delineate a rational policy for eradication of underemployment, alleviate of poverty, provision of sustainable livelihood and amelioration of rural societies. Results of the study will also be fruitful for NGO’s and other organizations working on the uplift of rural areas. It will pave the way for efficient utilization of human resources. As it is a pioneer study, it will set the stage for further research on the issue.

MATERIALS AND METHODS
This study was conducted in an irrigated area of district Mardan. Three villages were the universe of the study. The data was collected through a pre-structured questionnaire from January to June 2006 through several visits. One hundred respondents were interviewed for the study. Multistage stratified random sampling technique was used to collect the data. Villages were sampled from a distance of less than 1 kilometer, 1-4 kilometers and over 4 kilometers from main road. From each village, respondents were categorized into six groups—less than 1 hectare, 1 to less than 2 hectares, 2 to less than 3 hectares, 3 to less than 4 hectares, 4 to less than 5 hectares and 5 hectares and above. The sampling proportion in each village was obtained by the following formula (Chaudhry and Kamal, 1997).

\[
N_k = n \left( \frac{N_k}{N} \right)
\]

Where:
- \(N_k\) is the proportion of the sample in the \(k\)th village,
- \(n\) is the size of the sample,
- \(N_k\) is the total farmers of the \(k\)th village and
- \(N\) is the total farmers in three villages.

Measurement of Working Time
Measuring the level and trends in the hours worked is therefore important to calculate the level of underemployment. The level of engagement of family labour is linked with the farm size. The average number of hours worked per week by an adult unit was computed as the sum of:
- i. The average number of hours spent per week on various crops activities,
- ii. The average number of hours spent per week on livestock activities,
- iii. The average number of hours worked per week for wages in agricultural activities on other farms,
- iv. The average number of hours spent per week on off-farm activities in rural areas, and
- v. The average number of hours spent per week on off-farm activities in urban areas including government services.

Measurement of Underemployment
The notion of underemployment that this study is seeking to investigate is known as time-related underemployment in the terminology of International Labour Organization (ILO) that was adopted at the Sixteenth International Conference of Labour Statisticians (ICLS) (ILO, 1998). This criterion was also followed by Labour Force Survey of Pakistan (GoP, 2006). According to the ILO definition, time-related underemployment comprises of all persons in employment who satisfy the following three conditions during the reference period:
- i. Willing to work for more hours in addition to their current job(s) or willing to replace current job(s) with another job(s) that increases work hours or a combination of both options;
- ii. Available to work for additional hours and
- iii. Work less hours than specified for working by a national authority.

There are two main types of measures of underemployment. The first one is headcount measures, which means number of persons underemployed. The second is volume measures i.e. number of hours of underemployment. Headcount measures provide information about the pervasiveness of underemployment showing number of labour force affected while volume measures provide information about the extent of excess supply of labour force i.e. how many hours of supplied labour are not utilized. Estimation of volume measures is possible using the survey data as data on both actual and preferred working hours of all those in employment whether full-time or part-time was collected. Underemployment measures are more informative if expressed in terms of relative measures, which is the approach that was adopted in this study. The volume measure was estimated by using the following formula (Wilkins, 2004).

\[
V = \frac{\sum_{i=1}^{n} U_i}{\sum_{i=1}^{n} S_i}
\]

Where:
- \(V\) is the volume measure of underemployment
- \(U_i\) is the number of hours of underutilization of individual \(i\)
- \(S_i\) is the preferred number of hours of work of individual \(i\).

Econometric Model
In the light of literature reviewed and preliminary discussion with farmers of the area, major determinants of underemployment are farm size, size
of family labour, size of livestock herd, level of off-farm employment, level of education and distance of village from main road. Major determinants of off-farm employment are farm size, household size, size of livestock herd, level of education, distance of village from main road and age of the respondent. Key factors affecting underemployment and off-farm employment in agricultural sector were analyzed by using two-equations recursive model. The system is as under:

\[ U_i = \alpha_0 + \alpha_1 FS_i + \alpha_2 FL_i + \alpha_3 SL_i + \alpha_4 OE_i + \alpha_4 ED_i + \alpha_5 DR_i + u_i \]  

(3)

\[ OE_i = \beta_0 + \beta_1 FS_i + \beta_2 FL_i + \beta_3 SL_i + \beta_4 OE_i + \beta_5 ED_i + \beta_6 DR_i + \beta_6 Ag_i + v_i \]  

(4)

Where;

\( \alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5 \) and \( \beta_6 \) are parameters

\[ U_i = \text{Level of underemployment of individual } i \]

\[ OE_i = \text{Level of off-farm employment of individual } i. \]

\[ FS_i = \text{Farm size operated of individual } i \text{ (number of hectares operated).} \]

\[ FL_i = \text{Size of family labour of individual } i \]

\[ HS_i = \text{Household Size of individual } i \text{ (number of family members including children).} \]

\[ SL_i = \text{Size of livestock herd of individual } i \text{ (number of livestock held).} \]

\[ DR_i = \text{Distance of village from main road of individual } i \text{ (in kilometers).} \]

\[ Ed_i = \text{Level of education of individual } i \text{ (number of years of schooling).} \]

\[ Ag_i = \text{Age of the respondent } i \text{ (number of years).} \]

\( u_i \) and \( v_i \) are vectors of random errors.

To compare the level of underemployment of six groups, dummy variables multiple regression model was used in which dummy repressors taking the value of 1 if the observation belongs to a particular group and 0 if it does not belong to that group. The dummy variables multiple regression model is as under:

\[ U_i = \beta_{0i} + \beta_{1i} D_{1i} + \beta_{2i} D_{2i} + \beta_{3i} D_{3i} + \beta_{4i} D_{4i} + \beta_{5i} D_{5i} + \beta_{6i} D_{6i} + u_i \]  

(5)

Where;

\( \beta_{0i}, \beta_{1i}, \beta_{2i}, \beta_{3i}, \beta_{4i} \) and \( \beta_{6i} \) are parameters

\[ U_i = \text{Average level of underemployment of respondent } i \]

\( D_{1i} = 1 \) if respondent is in group 1, 0 otherwise.

\( D_{2i} = 1 \) if respondent is in group 2, 0 otherwise.

\( D_{3i} = 1 \) if respondent is in group 3, 0 otherwise.

\( D_{4i} = 1 \) if respondent is in group 4, 0 otherwise.

\( D_{5i} = 1 \) if respondent is in group 5, 0 otherwise.

\( D_{6i} = 1 \) if respondent is in group 6, 0 otherwise.

\( u_i = \text{Error term} \)

**RESULTS AND DISCUSSION**

The problem of underemployment in agriculture is due to surplus labour. Farm size decreases over time due to division of land holdings. Many of small farmers do not have enough land to fully employ their labour hours. This leads to underemployment in agriculture. Measuring the level and trends in the hours worked is important to calculate the level of underemployment. The level of engagement of agricultural labour is linked with the farm size. Three types of agricultural labour system are prevailing in the study area.

**Family Labour**

To investigate the level of employment and underemployment, understanding of engagement of family labour is important. There is positive relationship between farm size and average working hours spent per adult unit per farm. Table 1 depicts engagement and time spent of family labour according to farm size. The size of family labour per farm increases with farm size. In the study area, the average size of family labour per farm was 2.4 units. It ranged from 1.47 to 3.50 units. As time spent per week on farm is concerned, the average working hours spent per week were 18.42 ranging from 7.69 to 36.47. Relationship between farm size and average working hours spent per family labourer per week is shown in Figure 1.

**Casual Hired Labour**

It means labour employed occasionally on daily wages basis for specific agricultural work (Arif, 2004). Small farms generally perform all the farming operations themselves. Medium and large farms hire casual labour at peak agricultural period like harvesting and threshing of crops, picking of vegetables/fruits and sometimes for land preparation, sowing of crops and hoeing/weeding. There is positive relationship between farm size and average casual hired labour hours per farm. Payment to casual hired labour was made in kind or cash or in both. Average casual hired labour hours per farm per week increases with farm size. In the study area, the average casual hired labour hours per farm per week were 9.55 ranging from 3.09 to 31.95.

**Permanent Hired Labour**

It means person who works on the farm on a full-time basis and is employed for longer periods. Permanent hired labour gets wages in cash or kind on a fixed period basis, i.e. monthly, quarterly, yearly, etc. (Arif, 2004). Some families having large land holdings employ permanent farm labour. They perform various farm and domestic activities. There is positive relationship between farm size and permanent hired labour hours. The average permanent hired labour hours per farm per year increases with farm size. Permanent hired labour was paid either on a monthly or yearly basis. In the study area, the average
permanent hired labour hours per farm per year were 27.00. It ranged from 0 to 225.02 hours per year.

**Time Spent on Livestock**

In the study area, due to small size of land holdings farmers keep livestock to supplement their family income. Major livestock activities include fodder cutting, fodder chaffing, feeding, watering, grazing, washing, milking and marketing. Several studies reported about working hours spent on various livestock activities [see for example, Akhtar (1994); Ahmad (2001); Luni (2002); Kalsoom (2005)]. In district Mardan, average time spent per family labourer per week on livestock was 4.96 hours ranging from 2.94 to 6.79.

**Off-Farm Employment**

With the passage of time farm size is shrinking due to subdivision of land holdings. Small farmers find it difficult to make both ends meet exclusively from agriculture. Hence they are also looking for other sources of livelihood. Some farmers are getting out of agriculture and some small farmers are switching to off-farm employment in addition to agriculture. They are finding other jobs to optimize their labour use and to sustain their livelihood. Commonly found off-farm employment activities are government employment, business activities and daily paid jobs. The occupational pattern shows that daily paid labourers were 70.37% followed by businessmen (29.63%) and there were no permanent employees. There is negative correlation between farm size and off-farm employment. In district Mardan, average off-farm employment was 27% ranging from 8.33 to 36.84%. Figure 2 shows negative relationship between farm size and off-farm employment.

**Employment Level**

Employment level of sampled respondents in the study area includes employment at the farm and off the farm. It increases with farm size. Employment level according to farm size is given in Table I. In district Mardan, average working hours spent per family labourer on the farm were 23.38 per week ranging from 14.48 to 39.41 and average off-farm working hours were 4.72 per week varied from 0.76 to 7.53. Average working hours spent per family labourer on the farm and off-farm were 28.10 per week ranging from 22.01 to 40.17.

**Underemployment Level**

Underemployment is defined in the labour force survey of Pakistan as “if a person is working less than 35 hours a week for an economic reason and is available for additional work” (GoP, 2006). Underemployment is likely to increase in future due to subdivision of land holdings and increase in population. In district Mardan, average level of underemployment was 23.95% ranging from 3.07 to 37.13%. Figure 3 shows negative relationship between farm size and level of underemployment.

**Econometric Results**

To analyze the effect of independent variables on dependent variable, to examine the relative share of independent variables in the dependent variable and to make predictions, econometric models are used. The empirical model specified in equations 3 and 4 represents a two-equations recursive model. In equation 3, Underemployment \( U_i \) depends on farm size \( FS_i \), size of family labour \( FL_i \), size of livestock herd \( SL_i \), off-farm employment \( OE_i \), level of education \( Ed_i \) and village distance from main road \( DR_i \). In equation 4, Off-farm employment \( OE_i \) depends on farm size \( FS_i \), household size \( HS_i \), size of livestock herd \( SL_i \), level of education \( Ed_i \), village distance from main road \( DR_i \) and age of respondent \( Ag_i \). The results of the recursive model are presented in Tables II and III.

Table II shows estimates of underemployment. The \( R^2 \) value of 0.5999 can be regarded as quite a good fit in view of the cross-sectional data involved in this data. It implies that 59.99% variation in the level of underemployment is explained by the independent variables included in the model. The influence of the independent variables on the level of underemployment is explained as follows.

**Farm Size (FS)**

The results of the study indicated that coefficient of farm size was negative and statistically significant at 1% probability level. These results indicate that one-hectare increase in farm size could decrease the level of underemployment by about 6.12%.

**Size of Family Labour (FL)**

The results of the study indicate that size of family labour had positive coefficient and statistically significant at 1% probability level. The positive coefficient implies that due to increase in size of family labour by one unit could increase the level of underemployment by about 5.72%.

**Size of Livestock Herd (SL)**

The coefficient of size of livestock herd was negative and statistically significant at 5% probability level. It implies that one unit increase in size of livestock herd could decrease the level of underemployment by about 0.79%.
Off-farm Employment (OE)
The coefficient of off-farm employment was negative and statistically significant at 1% probability level. The negative coefficient implies that when time spent on off-farm employment increases by 1%, the level of underemployment decreases by about 0.43%.

Education (Ed)
The coefficient of education was also negative and statistically significant at 1% probability level. The results indicated that one-year increase in schooling year could decrease the level of underemployment by 1.38%. This result is consistent with the findings of Siphambe (2003).

Distance of Village from Main Road (DR)
The coefficient of village distance from main road was positive and statistically significant at 1% probability level. The results indicated that one-kilometer increase in village distance from main road could enhance the level of underemployment by about 2.53%.

Table III shows estimates of off-farm employment. The $R^2$ value was 0.5771. It implies that 57.71% variations in the level of off-farm employment are explained by the independent variables included in the model. The influence of the independent variables on the level of off-farm employment is explained as follows.

Farm Size (FS)
The results of the study indicated that coefficient of farm size was negative and statistically significant at 1% probability level. These results indicated that one-hectare increase in farm size could decrease the level of off-farm employment by about 3.29%. Kuhnen (1989) in Pakistan, Mecharla (2002) in India also observed negative correlation between farm size and off-farm employment.

Household Size (HS)
The results of the study indicated that household size had positive coefficient and statistically significant at 1% probability level. The positive coefficient implies that increase in household size by one unit could increase the level of off-farm employment by about 3.20%. Earlier Mecharla (2002) also found that there is negative correlation between household size and off-farm employment.

Size of Livestock Herd (SL)
The coefficient of size of livestock herd was negative and statistically non-significant. It implies that one unit increase in size of livestock herd could decrease the level of off-farm employment by about 0.26%.

The reason for non-significant of size of livestock herd was that mostly female members of the family were engaged in livestock activities.

Education (Ed)
The coefficient of education was positive and statistically significant at 1% probability level. The results indicated that one-year increase in schooling year could enhance the level of off-farm employment by about 2.32%. The research studies of Mecharla (2002), Siphambe (2003), Kimhi and Rapaport (2004), Bojnec and Dries (2005), and Zahid (2006) concluded that education has a positive effect on off-farm employment.

Distance of Village from Main Road (DR)
The coefficient of village distance from main road was negative and statistically significant at 1% probability level. The results indicated that one-kilometer increase in village distance from main road decreases the level of off-farm employment by about 1.97%. Zahid (2006) also found that farm location has negative impact on off-farm employment.

Age of the Respondent (Ag)
The coefficient of off-farm employment was positive and statistically significant at 5% probability level. The positive coefficient implies that one-year increase in age of the respondent could increase the level of off-farm employment by 0.19%. Earlier Mecharla (2002), Siphambe (2003), Kimhi and Rapaport (2004), and Zahid (2006) also showed positive correlation between off-farm employment and age of the farmer.

To compare the level of underemployment of six groups, dummy variables multiple regression model was used. Dummy variables multiple regression model estimates are given in Table IV. C is the benchmark category and shows average level of underemployment. All comparisons of different groups are made in relation to this category. Average underemployment level in the benchmark is 23.95%. Compared with this, the average level of underemployment of those who are in-group 1 is higher by 13.18%, for an actual average underemployment of 37.13% (= 23.95+13.18). By contrast, for those who are in-group 2 is higher by 5.61%, for an actual average underemployment of 29.56% (= 23.95+5.61), for those who are in-group 3 is lower by 0.32%, for an actual average underemployment of 23.63% (= 23.95-0.32). Similarly, for those who are in-group 4 is lower by 3.65%, for an actual average underemployment of 20.30% (= 23.95-3.65), for those who are in-group 5 is lower by 16.63%, for an actual average
underemployment of 7.32% \( (= 23.95-16.63) \) and finally for those who are in-group 6 is lower by 20.88%, for an actual average underemployment of 3.07% \( (= 23.95-20.88) \). Differential intercept and slope coefficients of \( D_1, D_4, D_6 \) are statistically significant at 1% and \( D_2 \) is significant at 10% while those of \( D_3 \) and \( D_4 \) are insignificant. As p-value of F-statistic is quite low, so there is significant difference among underemployment level of six groups.

CONCLUSION AND RECOMMENDATIONS

This study has examined the nature and causes of underemployment in agricultural sector of district Mardan. Agriculture is the major source of employment in the study area. The average level of underemployment was 23.95%. It ranged from 3.07 to 37.13%. The main cause of underemployment is small farm size. Other causes are size of family labour, size of livestock herd, level of off-farm employment, level of education and distance of the village from the main road. Some of the rural households in the study area find it difficult to meet their livelihood solely from agriculture. They are switching to other sources of income. About 27% of sampled farmers were engaged in off-farm employment. Negative correlation was found between farm size and level of off-farm employment. Other factors affecting off-farm employment were household size, size of livestock herd, level of education, village distance from main road and age of sampled respondents. Farm size is likely to shrink in future due to law of inheritance and as a result underemployment will further increase. It may be difficult for marginal farmers (very small farms) to stay in agriculture. Large scale underemployment will further add to the population living below poverty line. Needless to mention here that poverty is relatively higher in the rural area of NWFP as compared with other parts of Pakistan. Poverty further sparks social problems, which Pakistan is already confronting. Policy makers need to be alert to address this issue.

On the basis of the research study, following recommendations are made:

i. Agricultural labour in rural area of district Mardan has exceeded the capacity of agriculture to provide livelihood opportunities. Off-farm employment sector has the potential to absorb excess labour from the agricultural sector. There is need to generate off-farm employment opportunities through public and private partnership. New skills are needed for off-farm jobs. So, it is suggested that training programmes may be devised to meet the requirements of off-farm activities.

ii. Underemployment is negatively correlated with farm size. Farm size decreases overtime due to law of inheritance. Government should make policies to stop marginalization, so that the division of agricultural land should be up to a certain limit. This limit should be consistent with the sustainable livelihood of farm families.

iii. Livestock is an important source of self-employment. It often provides a secondary income for households. However, in the study area, size of livestock herd was small. So there is need to develop this sector. Steps like provision of improved breeds livestock, high yielding fodder varieties and intensification of preventive and curative measures to control the animal diseases are suggested to develop livestock sector.

iv. Agro-processing industries in the study area was quite limited. It is high time for policy makers to look towards processing activities and value added products in the field of agriculture. This would provide villagers with both employment and a market for their produce.

v. Most of small farmers are cash constrained. Micro financing has had served an important tool of poverty alleviation and self-employment. It needs to be intensified in the rural areas to needy people.

vi. We have manpower and we have talent. It is recommended to establish skill development centers in rural areas to impart training and skills in the needed professions like bee keeping, welding, electrification works and handicraft activities.
Fig. 1  Relationship between farm size and time spent by family labour

Fig. 2  Relationship between farm size and off-farm employment
Fig. 3  Relationship between farm size and underemployment

Table I  Employment level according to farm size

<table>
<thead>
<tr>
<th>Farm Size (In ha)</th>
<th>WHF</th>
<th>OFWH</th>
<th>TWH</th>
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<tbody>
<tr>
<td>&lt;1</td>
<td>14.48</td>
<td>7.53</td>
<td>22.01</td>
</tr>
<tr>
<td>1 to &lt; 2</td>
<td>18.99</td>
<td>5.67</td>
<td>24.66</td>
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<td>2 to &lt; 3</td>
<td>21.69</td>
<td>5.07</td>
<td>26.76</td>
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<td>26.47</td>
<td>3.03</td>
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<tr>
<td>4 to &lt; 5</td>
<td>34.69</td>
<td>2.46</td>
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</tr>
<tr>
<td>All Farms</td>
<td>23.38</td>
<td>4.72</td>
<td>28.10</td>
</tr>
</tbody>
</table>

Source: Field Survey
Notes: WHF = Working hours at the farm
OFWH = Off-farm working hours
TWH = Total working hours

Table II  Estimates of underemployment

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>St. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>33.836*</td>
<td>2.990</td>
<td>11.32</td>
<td>0.000</td>
</tr>
<tr>
<td>FS</td>
<td>-6.1166*</td>
<td>0.7573</td>
<td>-8.077</td>
<td>0.000</td>
</tr>
<tr>
<td>FL</td>
<td>5.7182*</td>
<td>1.257</td>
<td>4.548</td>
<td>0.000</td>
</tr>
<tr>
<td>SL</td>
<td>-0.78908**</td>
<td>0.3350</td>
<td>-2.356</td>
<td>0.019</td>
</tr>
<tr>
<td>OE</td>
<td>-0.43360*</td>
<td>0.05050</td>
<td>-8.586</td>
<td>0.000</td>
</tr>
<tr>
<td>Ed</td>
<td>-1.3839*</td>
<td>0.2304</td>
<td>-6.008</td>
<td>0.000</td>
</tr>
<tr>
<td>DR</td>
<td>2.5274*</td>
<td>0.6934</td>
<td>3.645</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Durbin-Watson = 1.7474, R² = 0.5999, R²-Adjusted = 0.5917, F-statistic = 73.212
**Significant (p < 0.05), *highly significant (p < 0.01), F (prob.) = 0.000

Notes:  
FS = Farm size operated (in hectares)
FL = Size of family labour
SL = Size of livestock herd (number of livestock held)
OE = Level of off-farm employment
Ed = Level of education (number of years of schooling)
DR = Distance of village from main road (in kilometers)

### Table III

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>St. Error</th>
<th>t-statistics</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-22.257*</td>
<td>4.930</td>
<td>-4.514</td>
<td>0.000</td>
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<tr>
<td>FS</td>
<td>-3.2907*</td>
<td>0.4122</td>
<td>-7.983</td>
<td>0.000</td>
</tr>
<tr>
<td>HS</td>
<td>3.2019*</td>
<td>0.4191</td>
<td>7.639</td>
<td>0.000</td>
</tr>
<tr>
<td>SL</td>
<td>-0.25888</td>
<td>0.3085</td>
<td>-0.8391</td>
<td>0.402</td>
</tr>
<tr>
<td>Ed</td>
<td>2.3168*</td>
<td>0.2747</td>
<td>8.434</td>
<td>0.000</td>
</tr>
<tr>
<td>DR</td>
<td>-1.9696*</td>
<td>0.5918</td>
<td>-3.328</td>
<td>0.001</td>
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<tr>
<td>Ag</td>
<td>0.18992**</td>
<td>0.07950</td>
<td>2.389</td>
<td>0.018</td>
</tr>
</tbody>
</table>

Durbin-Watson = 1.61, \( R^2 = 0.5771 \), \( R^2\)-Adjusted = 0.5684, F-statistic = 66.637
NS = Non-Significant, **Significant (p < 0.05), * highly significant (p < 0.01), F (prob.) = 0.000

Notes: FS = Farm size operated (in hectares)
HS = Household size (number of family members)
SL = Size of livestock herd (number of livestock held)
Ed = Level of education (number of years of schooling)
DR = Distance of village from main road (in kilometers)
Ag = Age of respondent (number of years of schooling)

### Table IV

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Std. Error</th>
<th>t-statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>23.95***</td>
<td>1.423</td>
<td>16.832</td>
<td>.000</td>
</tr>
<tr>
<td>D1</td>
<td>13.18***</td>
<td>3.374</td>
<td>3.906</td>
<td>.000</td>
</tr>
<tr>
<td>D2</td>
<td>5.61*</td>
<td>2.821</td>
<td>1.990</td>
<td>.070</td>
</tr>
<tr>
<td>D3</td>
<td>-0.32NS</td>
<td>2.96</td>
<td>-0.108</td>
<td>.841</td>
</tr>
<tr>
<td>D4</td>
<td>-3.65NS</td>
<td>4.173</td>
<td>-0.875</td>
<td>.332</td>
</tr>
<tr>
<td>D5</td>
<td>-16.63***</td>
<td>4.531</td>
<td>-3.670</td>
<td>.003</td>
</tr>
<tr>
<td>D6</td>
<td>-20.88***</td>
<td>4.413</td>
<td>-4.731</td>
<td>.000</td>
</tr>
</tbody>
</table>

NS=Non-significant, *significant (p<0.10), significant (p<0.05), *** highly significant (p<0.01),
\( R^2 = 0.099 \), Adjusted \( R^2 = 0.089 \), F-statistic =11.561
Prob (F-statistic) = 0.000

Notes: C=average level of underemployment (%),
\( D_1 \) = 1 if respondent is in-group 1, 0 otherwise.
\( D_2 \) = 1 if respondent is in-group 2, 0 otherwise.
\( D_3 \) = 1 if respondent is in-group 3, 0 otherwise.
\( D_4 \) = 1 if respondent is in-group 4, 0 otherwise.
\( D_5 \) = 1 if respondent is in-group 5, 0 otherwise.
\( D_6 \) = 1 if respondent is in-group 6, 0 otherwise.
REFERENCES


