GEOGRAPHICAL PATTERNS OF FINACIAL WELL-BEING OF COAL MINE WORKERS IN DANDOT, DISTRICT CHAKWAL

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ABSTRACT

Mining is primary as well as hazardous profession of human existence. Mining activity is playing important role in increasing GDP and foreign exchange in Pakistan; moreover, it is also affecting the industrial growth, economic generation and job creation for the community located nearby. Understanding the links between resource dependence and financial wellbeing has long been subject of interest amongst economic geographers. This research is an endeavor to study the role of resource industries in shaping Pakistan's economic and social geography. This study is about the coal mining area of Dandot, District Chakwal, where 60% population of the area associated with coal mining. The study focuses on impacts of coal mining activity of this region on perceived financial wellbeing of coal mine workers of indigenous area. To study and assess the patterns of financial wellbeing of coal mine workers in Dandot, some financial capital indicators were identified such as economic growth and job creation opportunities. Cross-sectional design was used to collect data based on particularly selected indicators through survey questionnaires. Multi-stage probability sampling was used to collect data from 325 respondents working in six coal mines of Dandot. Frequencies, correlation and regression analyses were done to measure financial wellbeing in coal mine workers. Study concludes that mining tasks causes raise the degree of financial wellbeing of the coal mineworkers. Mining performs an essential role to make perceived economic development, high among mine personnel. The coal mines and associated activities were generating mostly jobs for the functioning population of the analysis area.

KEYWORDS: Mining activity, financial wellbeing, indicators, income growth, job creation, coal mine workers.

INTRODUCTION

The economic growth of various nations is determined by the number of methods to use their natural resources. Among these natural resources, mining is one of a vital source of economic growth of the country. Especially, coal mining is a major economic source for the regions awarded with coal reserves. Mineral reserves can prove to be an essential source of successful economic development of the country (Bogdetsky, Ibraev, & Abdyrakhmanova, 2005; Mensah, 2011). Similar to other professions, mining provides numerous opportunities in markets and also boost up development activities in the region. It not only creates occupation opportunities for the individuals, but also provides income to the country's

exchequer and foreign income to the mineral producing country. The role of the mining industry in the financial progress and sustainable development in the economics of any country is always questionable and debated. Keeping in view the success of mineral based industrial states such as Australia, America and Canada, the mining industry is definitely advertised by mainstream economists for developing countries to attain sustained financial expansion (Davis & Tilton, 2005). A dark brown or blackish sedimentary rock which is highly ignitable, composed of hydrocarbons and carbons is called Coal. It is a non-renewable resource as it requires hundreds of years for its composition (World Coal Assossiation, 2017).

Coal mining also helps a big range of employment, although this quantity is declining, mainly due to raised levels of efficiency per employee associated with rises in mining technology and the use of new mining techniques. In 2008, the amount of employees in U.S. coal mines numbered to 86,859 (U.S Division of Energy, 2017). Mining specialists think that India and China both countries count a lot on their extraction field for their financial expansion. The domestically mined coal generally uses to get 60 to 80 percent of energy need, providing inexpensive fuel to generate electricity and involve in other industrial progress. Alternatively, local coal boosts the large scale manufacturing units for providing other jobs (Mining and Developmet, 2002).

Top 10 hard coal producing countries are China, U.S.A, India, Australia, Indonesia, Russia, South Africa, Germany, Poland, and Kazakhstan. (World Coal Association, 2017).
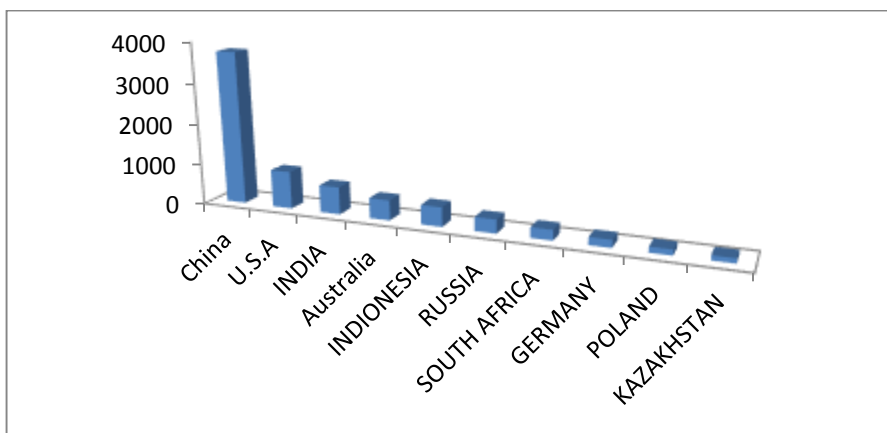
Figure 1: Top Ten Coal Producers Countries -2016 in Million Tons (Mt)
Source: World Coal Association, 2017

Mining can be vital industry in Pakistan. Pakistan has reserves of numerous mineral deposits including coal. There are huge sources of coal in every four

of Pakistan's provinces and in Azad Jammu & Kashmir. Approximately according to rough estimates, the full total coal sources of Pakistan will be more than 185billion tones. Total Coal produced by Pakistan is 3140 thousands of tons for the entire year (2013-14), where total coal produced by the Punjab is 684 thousands of tons with 21.8% of share of Punjab in total output (Punjab Development Statistics, 2015).

The primary coal areas of the Punjab are in Makarwal and in the Salt-Range. It is believed that there are total 235 million tons coal reserves are present in the Punjab, while 33millions tons coal can be extracted. The coal-field of Salt-Range includes the area of 260 sq. kilometers ranges the area of Khushab, Chakwal and Khewra in Jhelum District of Punjab. The full total coal creation of Area Chakwal is 3632 hundred metric tons (Punjab Development Statistics, 2015).

Table 1: GDP Sectorial Growth Rate for Mining and Quarrying, Pakistan

2009-10	2010-11	2011-12	2012-13	2013-14
2.8%	4.4%	5.2%	3.8%	4.4%

Source: Bureau of Statistics, Punjab (2015)

The present case study of the Dandot, district Chakwal is carried out to determine the intensity of financial impacts of coal mining industry of Dandot. The specific objectives of the study are: 1) To determine the working conditions and concentration of coal mines working in Dandot (District Chakwal), 2) To identify and assess financial wellbeing indicators which are significantly influenced by mining activity in Dandot (District Chakwal), 3) To measure the association of financial indicators and mining activity in Dandot (District Chakwal), 4) To examine local community perception on how mining activity impacts on financial wellbeing of Dandot (District Chakwal).

LITERATURE REVIEW

Numerous studies have been conducted on quarrying minerals and its belongings as well as its influences to financial improvement, prosperity and welfare of countries gifted by mineral resources. This section throws light at the association between mining growth and economic progress of an area as well as its impact on the other financial attributes.

Mining is the elimination of mineral deposits from the earth's surface in the interest of human (Down & Stock, 1977). Mining is the reduction of mineral reserves from the crust of earth in favor of mankind (Acheampong, 2004).

Indicators of Financial Capital: Bismarck and Darkoh in their research on the topic of *Socio-Economic and Ecological Impacts of Mining in the mining town of Botswana stated* that the mining industry in Botswana is the spine of the

country's income (Darkoh & Bismarck, 2001). The financial capital includes two basic concepts of generating income and providing job opportunities for locals.

Economic Growth: The share of mining to the economic growth of a country is enormous. Mining has a crucial underpinning for human progress through rise in capital (Acheampong, 2004). Well-known mining nations such as the USA, South Africa, Australia, Chile and Canada rule the worldwide field of mining. These states have become influential in the field of mining and extraction techniques and expertise (Mbendi Information services, 2004). In Jordan, also the major revenue generator is mining sector. In 1953 and 1956, Jordanian industrial sector was relayed chiefly on mining, quarrying, and supporting manufacturing industries. The mining industry has 3.3% share in GDP alone, but with manufacturing items, its part becomes 9% of GDP (Natural Resources Authority, 2014).

Job creation: Mine promoters generally point to the positive impacts of mining, like job creation and follow-up businesses. It is a self-denying thought that only 41% of the revenue generate from economic activities in South Africa, chief of which is coal mining, remains in the area (River Health Program, 2001).

Mining industry of America employs about 1 million workforce. The Gold Mining industry of South Africa is also creating jobs for about 56% among total mine workers (Mbendi, 2002). It has proved by the literature that the remoteness of resource town harms the economic conditions due to less employment chances, more economic dependency, limited choice of occupations and services (Freudenburg, 1992; Randall & Ironside, 1996). In the starts of the mining projects, local people try to fill up the lower accomplished jobs and offer basic services to the mine, particularly if it is in a far-flung area. As the society grown-up, it is generally in local people to offer jobs such as automobile repair; instruments repair shop, welding, metalwork, plumbing, and electrical services. When mining sector became privatized in 2003 in Jordan most people lost their jobs in south mining area and as the result of this, the living standard of local people has gone down and raised the rate of poverty in the area (Rawashdeh, Campbell, & Titi, 2016).

Study Area

Geographical coordinates of Dandot village are 32°. 39' North latitudes and 72°. 58' East longitudes in district Chakwal. Chakwal District is surrounded by Jhelum District on the east and south-east, Mianwali District on the west, Rawalpindi and Attock districts on the north and District Khushab on the south. Total area of Chakwal district is 6,524 square kilometers.
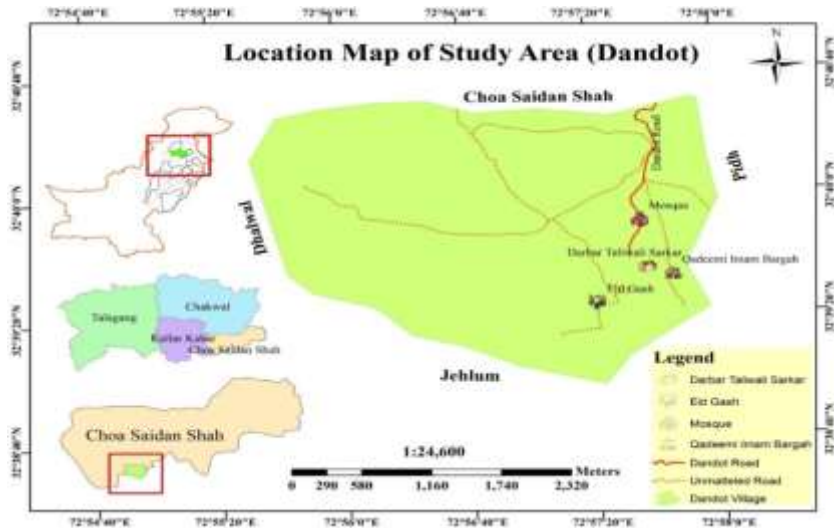
Figure 2: Location Map of Study Area (Dandot)
Source: Shabana, 2017

Geology

Geographically district Chakwal is located in the Potwar region. It is a mountainous region which can be classified into hills, rocks, mountains, weather-rocked plains and piedmont plains. 388 mines of numerous minerals are located in Chakwal including 246 mines of Coal (GOP, 2016) The Punjab authorities have given 424 mines leases in the Chakwal region while almost 15,000 to 17,000 miners are used to work in these mines which are operating there. Amount of miners varies from 15,000 to 17,000 depending upon the mining season. (MLWO, 2015).

Figure 3: Satellite Imagery of Dandot
Source: Google Earth, 2017

MATERIALS AND METHODOLOGY

Scientific method distinct the way to approach problem resolution and explains the methods employed (Rosenthal, Robert, & Rosnow, 1991). For this quantitative study, cross sectional design of survey research is used to measure the geographical pattern of financial wellbeing of coal mine workers of Dandot, district Chakwal. For this purpose both primary and secondary type of data was collected by the researcher. Primary data was collected through both census and sample surveys in the form of structured questionnaire method. Secondary data was collected from books, relevant articles from journals, various reports of Bureau of Statistics, National census and Punjab mining offices. The survey was conducted from October 2016 to March 2017.

There were total 19 coal mines operational in the area. The population of this study is comprised of approximately 1127 coal mine workers functioning in area of Dandot in Tehsil Chua Saiden Shah, District Chakwal. To answer the research questions, multistage probability sampling is used in this study. At 1st stage, systematic random sampling was done to determine the coal mines for collection. Every 3rd coal mine was selected for data collection. While at 2nd stage number of respondents were selected from each identified coal-mine. At this stage systematic random sampling was used. Sample size was determined by using Solvin's formula (Ryan, 2013)

$$n=N/(1+N e^2)$$

Where: n = Number of samples, N = Total population, e = Error tolerance
In this research total population was 1127 coal mineworkers from the 19 active coal mines. The confidence level was undertaken as 95 percent, considering the margin of error of 0.05
$n=N/ (1+N e^2)$
$n=1127/ \{1+1127(.05)^2\}$
$n=1127/3.82$
$n=295$
For data collection, a questionnaire was designed by the researcher, based on the theory of five capitals from Sustainable livelihoods & indicators for regional development in mining economies (Horsley, Prout, Tonts, & Ali, 2015). Response of the respondents was measured on 5-point Likert scale I.e. 1= strongly agree, 2=agree, 3= Neutral, 4=disagree & 5=strongly disagree. Arc GIS 10.2 software was used to prepare maps to show distribution of coal mines of Dandot and location of study area.
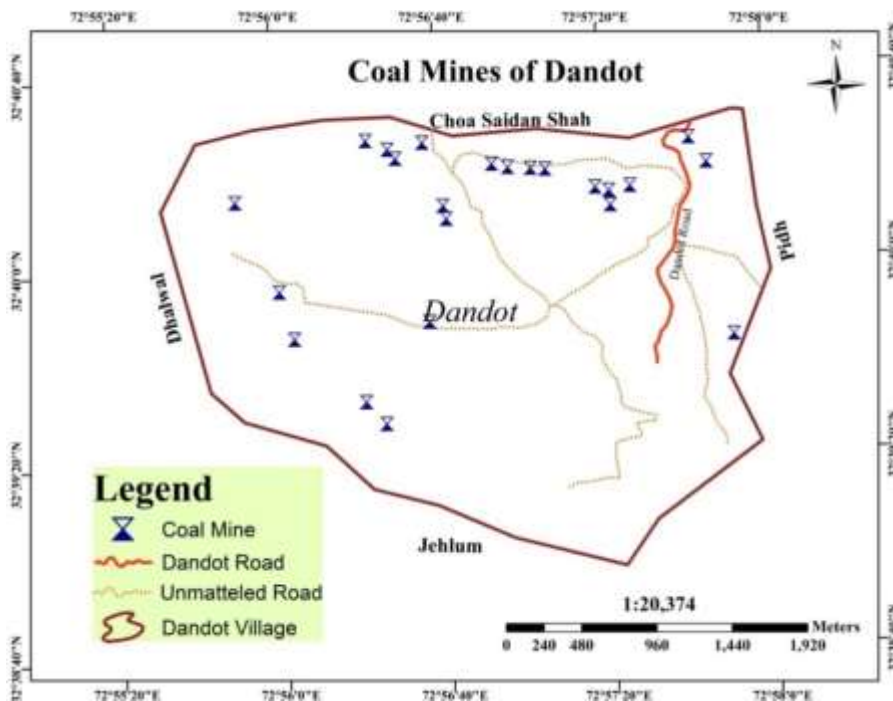
Figure 4: Coal mines of Dandot
Source: Shabana, 2017

RESULTS AND DISCUSSION

The major objective of statistics is to communicate information contained in the data set. Data usually have no meaning for a researcher; it needs to be structure and group together into a set to create meaning and logic out of it (Wasson, 1965). The sample comprised of 325 coal mine workers from six coal mines that are anticipated in the survey.

Socio-Demographic Characteristics of the Respondents

No female worker is working in coal mine and all workers are male. In our sample most of the coal mine workers are ranging from 31 to 40 years of the age. 26 workers are less than 20 years of age. 30 coal mine workers are more than 51 years of age. 70 workers range from 21-30 years of age. 90 workers range from 41-50 years of age. The sample consists of 269 married workers, 54 unmarried while 2 divorced workers.

149 workers are residents at Dandot city and 176 workers are migrated from other areas. 74 out of 325 respondents have no children. Rest of the respondents (i.e. 251) has children. These respondents have altogether 575 male children and 536 female children. Most of the coal mine workers have no or very less education i.e. 103 respondents have no education. 127 respondents did not study more than fifth standard of education. While

only 87 respondents passed their qualification of matric. Only 7 respondents have studied more than high school classes. Experience wise, there were exact 48 respondents who are working for less than five years in coal mines. 10 workers were working for more than 40 years of experience while most of the respondents have less than 25 years of experience.

Mining Activity

Descriptive analysis shows that mining activity in our research area is a significant profession. Most of our respondents agree to the fact that mining activity is important and is providing livelihood to the workers working there. Also a noteworthy number of respondents also remain neutral about the variable. The mean is 2.52 and mode value is 2 (i.e. people are agree with significance of this variable.)
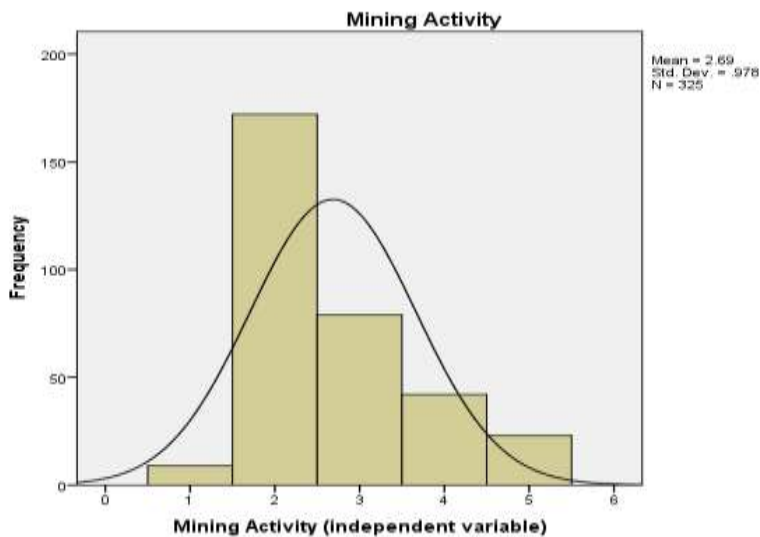

Figure 5: Histogram of frequency of mining activity

Financial Capital

The constructs of financial capital are income and job creation. When we plotted the frequencies and scores of these two variables jointly in a form of histogram, we witnessed a bimodal figure. Most of the respondents agree on the fact that financial capital is high for coal mine workers in coal mines of Dandot, Chakwal.

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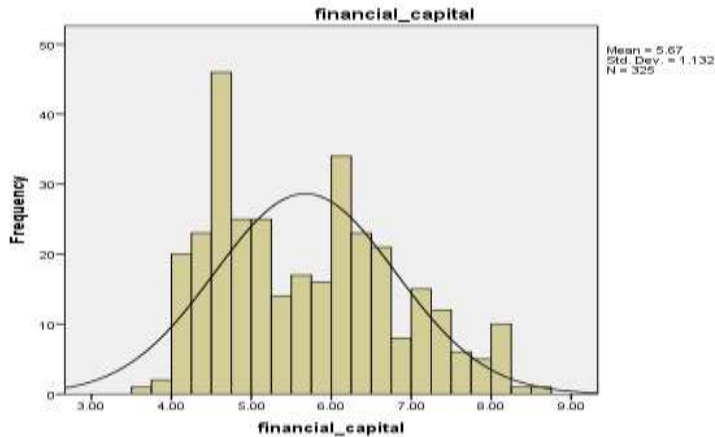
Figure 6: Histogram of perception of financial capital

Individual descriptive analysis is given below:

Economic Growth

According to perceptions of our respondents, income level is high in our research area. Most of the respondents are agreeing and strongly agree with the fact that income level is high (i.e. strongly agree79, Agree: 61). Almost 94 respondents are strongly disagreeing and disagree collectively while remaining respondents remain neutral on a satisfied income in the coal mine area. The mean is 2.68 and mode value is 3.
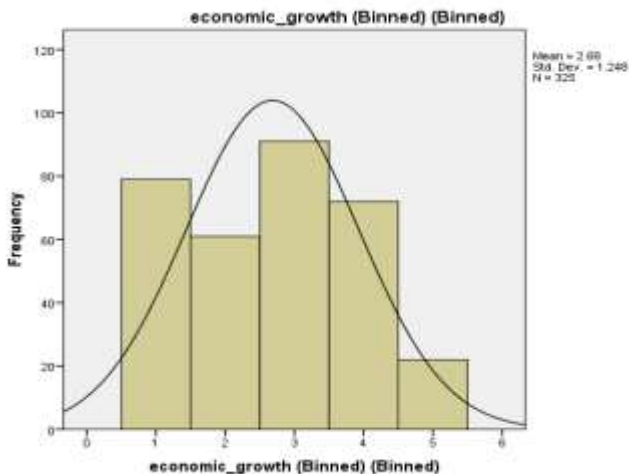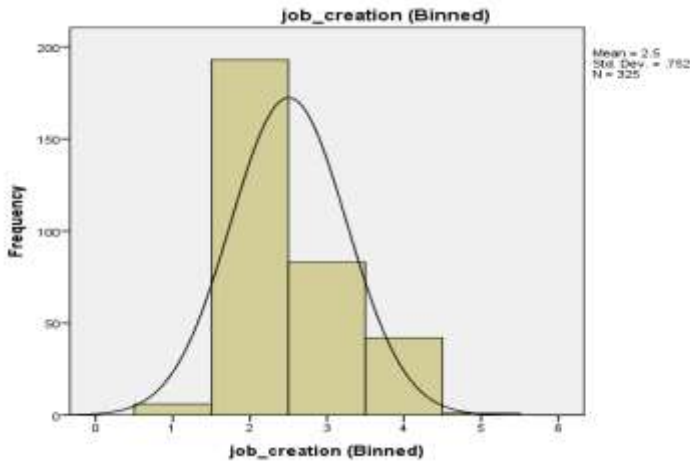

Figure 7: Histogram of perception of Economic growth

Job Creation

According to perceptions of our respondents, job creation is also high in Dandot. Most of the respondents are agree (i.e.193 respondents) with the fact that mining activity helped to create job in their area.83 respondents

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remain neutral on this stance while only 43 respondents disagreed from or strongly disagreed. Mean value is 2.5 and mode value was 2.

Figure 8: Histogram of perception of Job creation

HYPOTHESIS TESTING AND DISCUSSION

The hypotheses were tested on the basis of correlation and regression. All prerequisites were fulfilled before performing regression. Following are the further details

H1: Mining activity has direct & significant influence on economic growth of the coal-mine workers.

On performing linear regression between two variables, mining activity (IV) and economic growth of the area (DV) were resulted with three tables. The table shows the results of R value which represents simple correlation and is .661, this value shows a positive and strong correlation between these two variables. The value of R^2 indicates the total variation in dependent variable and that is .437. In this case, 43.7% can be explained by this model, which is satisfactory.

	B	T	sig
(Constant)	1.339	11.415	.000
Mining activity	.709	15.832	.000

R^2 = .437 Adj. R2=.435, p<.05, N = 324, df=323

Our regression model is statistically significant (i.e. $p < 0.05$). Since our independent variable mining activity significantly predicts the outcome variable i.e. economic growth of the coal mine workers so we can conclude that it is a good fit for the data which means mining activity significantly contributes to the economic growth of the coal mine workers. The regression equation can be defined as:

Economic growth= 1.339+0.709 (Mining activity)

From above discussion we can accept our hypothesis i.e. mining activity has direct & significant influence on economic growth of the coal-mine workers. Study of Tonts, et al., (2012) also found out the same positive and substantial effect of mining activity and economic growth. Moreover, they also concluded that, remote mine areas offer more wages to the local workers due to availability of fewer laborers. Naik & Pradhan (2005) stated in their research work that coal companies pay high wages to the regular company workers in comparison to contract workers.

H2: Mining activity has direct & significant influence on job creation of the coal-mine workers.

On performing linear regression between mining activity (IV) and job creation in the area (DV) were also resulted in three tables. The R value shows .361, which means that there is a positive minor correlation between two variables. The value of R^2 indicates that total variation in dependent variable is .130 only, means only 13% variation is explained by this model.

	B	T	sig
(Constant)	1.773	15.464	.000
mining activity	.305	6.960	.000

R^2 = .130 Adj. R2=.128, p<.05, N = 324, df=323

The regression equation fits and this understudied relationship is statistically significant (i.e., $p < 0.05$). So mining activity significantly predicts the outcome variable i.e. job creation of the coal mine workers and it is a good fit for the data. The mining activity is significantly contributing to job creation but the effect is very less according to the perceptions of coal mine workers. The regression equation can be defined as:

Job Creation= 1.773+0.305(Mining activity)

From above discussion we can accept our hypothesis i.e. mining activity has direct & significant influence on job creation of the coal-mine workers. The similar hypothesis surveyed by Tonts, et al., 2012) in 33 towns of Western Australia and was concluded that mining activity has a significant and direct effect on unemployment. Whereas Freudenburg & Wilson (2002) has contradictory results i.e. the more resource dependence the lesser job creation would be due to remoteness of area. Naik & Pradhan stated in their research that mining jobs attract more young and energetic workers than any other field. Obiri, et al., (2016) found in their research that in Tarkwa, Ghana there are lesser job opportunities for the local population because mining companies prefer the highly skilled and trained workers to job in mining projects. Only 2% local staff has been employed by the companies who were diploma holder or relevant first degree from University.

Table 2: Final results of hypothesis testing

Hypothesis	Statement	Result
Hypothesis 1	Mining activity has direct & significant influence on economic growth of the coal-mine workers.	Accepted
Hypothesis 2	Mining activity has direct & significant influence on job creation of the coal-mine workers.	Accepted

CONCLUSION

The aforementioned study provides evidence that mining activity leads to raise the level of social wellbeing of the mineworkers. Mining plays a vital role in making perceived income growth, high among mineworkers. Most mining activity needs more workers and companies are ready to pay even a high amount of income when they needed it (Obiri, et al., 2016). Same goes with our results, the area of Dandot, Chakwal mine workers feel more job security and economically well-off to attain all needs of livelihood, even they usually able to save some of their money on a monthly basis that is why their rejoinder is very much positive in response to our questions.

Mining activity plays a pivotal role in creating jobs in study area as the statistics of our area also explaining that 60 percent of the population is associated with the profession of mining. The coal mines and linked industries are the major employer of the working population of the study area. The population of the Dandot is increasing day by day as a considerable ratio of skilled youngsters migrated to mine area to get permanent employment in my projects. Most of the respondents agree to the fact that increase in mining activity is leading to job creation. A study done in Botswana also found that relation of job creation and mining activity have the similar effects. (Asare & Darkoh, 2001).

RECOMMENDATIONS

- Most of the miners are not very much literate, informal education and training should be provided to the workers.
- Skills of different mining procedures should be taught to the native youth, so that they may get better job opportunities in mining sector.
- Wastage of produced coal should be avoided to get better income from coal market as well as more national and international markets should be discovered for trading purpose.
- Government should introduced more clear policies of job security in mining sector with handsome wages to the miners

and other financial benefits like penalty in case of death and any health loss.

- More mining tasks should be planned to provide more wealth and job opportunities to the local population.
- Mining Companies should revise their mine safety management policy in order to secure the human capital as well as earning handsome profits.
- Mines companies should pay more taxes and profit share for the welfare of the area. Companies should do more efforts at providing hospitals, clinics and health centers. Currently Government health centers few, which are not sufficient at all for the need of all residents.
- Government should intervene and make such related policies for coal mine workers, because it ultimately contributes to strengthen the country's economy.
- Last but not the least Government and private partnership needed to perform their roles effectively in enhancing the financial-wellbeing of mine workers in mining area.
- The research conducted is limited in its scope and magnitude. The research area is only a small portion of Pakistan so we cannot generalize the results to the population of all mineworkers in Pakistan. In future, this result can be replicated in a larger sample to generalize the results.
- This research is conducted for only coal mine workers but mineworkers who are working in other metal and mineral extraction may have different working conditions and education level.

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