



RESEARCH PAPER

Relationship between Human Capital and Labour Productivity

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ABSTRACT

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This study aims to examine the role of human capital in labor productivity with special reference to Pakistan. The dependent variable of our study is labor productivity and independent variables are human capital which is measured by employee age, employee education, employee training, employee wage, financial participation and working hour. This study uses the Generalized Method Moments (GMM) technique to examine the effect of human capital on labor productivity. The coefficient of employee education indicates that there is positive correlation between employee education and labour productivity. Hence, in Pakistan education is more powerful element to increase labor productivity. The coefficient of employee training tells us that one percent increase in investment on training will result in 0.10 percent increase in labor productivity. The variable employee age has negative correlation with labor productivity. However, this relationship is not statistically significant. The variable Financial Participation and labour productivity has insignificant relationship. The finding further indicates that variable working hour and labour productivity has positive association. The coefficient of Employee Wage is 0.007454, which tells us that wages has positive and significant effect on labor productivity. Key words: Labor Productivity, Human Capital, Human Resources.

Introduction

Development Economics literature gives greater importance on boosting the human resources as well as physical resources to promote the growth and development for the well-being of people of specific economy (Black & Lynch, 2015). Developing human capital ensures the effectiveness and efficiency of labour force and ultimately this will improve the overall performance of economy.

The significance of labor productivity (LP) is best defined by Nobel Laureate Paul Krugman:

"Productivity isn't all that matters, yet over the long haul it is nearly everything".

More specifically, productivity isn't the ultimate economic objective; however it is an imperative intermediate target that serves to improve economic welfare and living standards. With expanding globalization and the development of competition in industrial products market, LP more than before has advanced toward becoming deciding component in the competitiveness of industrial products and in this manner profitability of industries in domestic and foreign markets. Globalization is connected with LP through different ways including exposure to new technology, trade liberalization or open economy and FDI. A nation's ability to improve its national output growth over time depends for the most part on the size of its labour force (Qaisar & Foreman-Peck, 2007). Numerous countries these days have integrated across national boundaries, societies grew larger and more complex and labor became more specialized. The country has a high level of labor productivity benefiting from capability to face global trade barriers compared to other less efficient countries (Ismail et al., 2011). The impacts of good productivity isn't just influences an organization performance all in all, it additionally impact way of life of society through increment in income per capita. High LP implies lower per unit cost and, in this way, capacity of the firm to match prices on the global markets.

Theory of human capital is based on the assumption that training, education and employees benefit increases labor productivity (Schwarzer, 2017). Study of the literature indicates that the proper use of HC has positive effect on labor productivity and performance of the firm. Education has also positive effect on growth of labor (Albert & Barabási, 2002). Recent literature shows that investment in human capital is most important for improving labor productivity and sustainable economic development (Schwarzer, 2017). Educated workers use new techniques for more production. Training is also a significant part of HC as it plays an important role in raising wages and labor productivity. According to Schultz (1961), human capital is the main factor which improves a firm's resources and helps employees to increase their productivity. Firm's performance is greatly linked with the workers wage and profit sharing which considerably improves employee's thoughts towards work (for detail see Alvarez & Lopez, 2005).

According to (Arnold & Hussinger, 2005) productivity is essential part of life. It is most often defined as the ability of production factors to produce (Latruffe, 2010). The importance of the human aspect and characteristics such as education level or having sufficient resources is extremely important for the process of productivity. Innovation is also important for productivity (Aw et al., 2007). The important factors in increasing labor productivity are development of skill and knowledge (Benavente, 2006). In 21st century continuous improvement in the economy, is due to improvement in human capital (Barrett & O'Connell, 2001).

A closer examination of Pakistan's labor productivity patterns is both revealing and profoundly stressing. Pakistan began well in early 1990s however latter went into time of productivity decrease. Since the 1980s, and as of not long ago, quick globalization has permitted several developing nations, including India and China, to exploit these improvements and accomplish outstandingly high rates of economic growth, even soaring to double digits. Unfortunately, Pakistan, which was among the ten speediest developing economies of the world amid 1960- 90, has not been one of

them. This is paying little heed to the route that, from different points of view, Pakistan was a more open and globalized economy than either China or India in the mid-1980s. Appeared differently in relation to the 1980s, when labor productivity created at 4.2 percent per annum, by the 1990s this had pigeon to 1.8 percent, falling further to 1.3 percent amid 2000– 15. Since 2007, it has developed at just 1 percent. In India, the example has moved the other way, with labor productivity developing to well in excess of 5 percent amid 2000– 10. While Pakistan's low and declining economic growth amid 1990–2015 (except for a short spurt in 2003– 06) has been the subject of huge rumination, a basic factor capable of this outcome, i.e., labor productivity, has not gotten the consideration it merits.

The annual growth rate of Pakistan's economy was around 5% since independence however the 5 decades has witnessed wide fluctuations in growth rate. As compare to other developing nations the capital to output ratio of Pakistan is low as shown by the 5% economic growth and 17-18% annual ratio of investment to GDP. Essentialness of productivity contemplate is, hence, extremely self-evident. Nevertheless, at the macroeconomic level in Pakistan there have been commonly couples of assessments of productivity improvement and few studies to examine the drivers of productivity of labor.

Tangen (2002) clarify that labor Productivity is every now and again talked about by administrators however once in a while characterized, frequently misconstrued and mistook for comparative terms, for example, efficiency, effectiveness, profitability, and only from time to time estimated in a proper manner, prompting productivity being neglected or even to that contra beneficial choices are taken. Although, there is no one specific definition of labour productivity, but that most of the concepts of labour productivity focused on productivity from two perspectives: quantitative approach " term labour productivity " as "equal to the ratio between a volume measure of output (gross domestic product or gross value added) and a measure of input use (the total number of hours worked or total employment" (OECD, 2008, p.5), and the administrative aspect, " term labour productivity is based on the concepts of efficiency and effectiveness of labour in achieving optimal use of available resources , and the administration's ability to convert the input to the output of the Organization specifications required and at the lowest possible cost. (Al Hawari, 2008).

Independently of the measure utilized, the economic literature for the most part concurs in saying that the long run economic growth of countries is at last dictated by productivity growth. Surely, over the long haul, progressively beneficial laborers experience higher expectations for everyday comforts in light of the fact that expanded efficiency leaves space for bigger salary and more relaxation time. Productivity is normally perceived as the wellspring of the remarkable ascent in human welfare in the earlier century, when expectations for everyday comforts extended six-fold in the US, Italy and Germany, among others.

Literature Review

Various research investigations have been done that manage the determinants of labour productivity in various nations and distinctive businesses. Preceding imagining the research methodology for this examination, it was important to distinguish existing significant research work. Literature identified with the

measurement of productivity and performance have been genuinely limited (BFC, 2006). Majority of the literature has focused on developed nations to investigate labor productivity (e.g., Chudnovsky et al., 2006; Crespi, et al., 2012; Masso & Vahter, 2008); on the other hand little work has been done in developing countries.

The literature suggests that when human capital is properly utilized there is a positive effect on labor productivity. In the early neo-classical economic models not much attention is paid to the role of human capital. Crespi and Zuniga (2012) worked on it and pay attention to the role of human capital. Demirbag et al. (2006) argues that human capital effect labor productivity. Yoram (1967) investigated that main element of productivity is proper training at work. He further shows some implications of differences in investing in human capital i.e. 1) higher educated people spend more in training at work, 2) people that are extensively concerned in training in one time are more likely to be concerned in training in future, 3) more skilled and higher knowledgeable people are more busy in training at work than the people with equal education level'.

Crespi and Zuniga (2012) told that human factor is critical for the improvement of our life and measure human capital as "labor managerial skills, entrepreneurial and innovative abilities qualities and physical condition as health and strength. Di Matteo and Ahmed (2005) analyzed that in a less industrialized country, lack of education and storage of skilled worker are two main obstacles to the economic development. According to Eliasson, Fernald and Shapiro (2012) the mismatch between job qualification and education levels negatively affects labor productivity. Fening, Collins and Virmani (2008) focuses on labor skill. According to him, employers prefer to hire people with higher education on prevailing wage. When worker does not get the job according to his skill, then they cannot worker properly. This has a negative effect on labor productivity. According to Firouz (2010) educated personal can get better advantage of technology and get more productivity.

Fryges and Wagner (2007) measure human capital as a person knowledge, skill of worker, experience of worker, attitude and behavior of worker, health condition of worker and wages of workers. According to them the concept of human capital is multidimensional. All these variables have positive effect on labor productivity. Crespi and Zuniga (2012) work on labour productivity growth model. In this model human capital is measure with two main variables education and health. They argue that human capital related to formal education and training in work, physical and mental health also affects labor productivity.

Black and Lynch (1996) present a Cobb-Douglas production function to analyze the impact of human capital on labor productivity. They found that for the higher production, firm required higher educated worker. Demirbag, Guo, Haksar, and Zdzienicka (2006) argued that older workers have more skill and experience. These experiences and knowledge help in increasing the production of firm. Older workers work better on the basis of own experience as compare to newly workers. Di Matteo and Ahmed (2005) argued that additional years of schooling by workers had small effect on the productivity.

According to Eliasson, Fernald, and Shapiro (2012) workers can get more production with the use of new technology. If worker adopts new techniques for production it positively affects labor productivity. Fening, Collins, and Virmani

(2008) also analysis the role of education in labour productivity at firm level. They argued that there is positive and significant relationship between education and labor productivity. Firouz (2010) has analyzed the impact of education on labor productivity. He argue that marginal productivity of higher educated workers is higher than less educated workers. Granovetter (2005) investigates whether training affect productivity of labor. The finding indicates that there is significant positive link between the two variables and blue-collar labors' production was higher than white-collar labors.

For the period 1997-2004, Fryges and Wagner (2007) investigate the relationship between productivity and growth factors. They found that technology and productivity of labor are significantly positively correlated. Productivity of labor is a main factor that determines the living standard because high level of per capita income directly affects output per worker. Harash, Suhail and Jabbar (2014) argue that average working hours of workers and training positively impact productivity of labor but business size negatively impact productivity.

Lobby and Rosenberg (2002) examined the relationship between labour productivity and innovation in the context of Italy. Their findings indicate that process innovation via capital investment positively influence labor productivity. They further finds that there is positive link between product innovation and productivity of labor. Arvanitis and Spyros (2011) and Kurta and Kurtb (2012) also studied the impact of innovation on labor productivity. Their findings suggest that innovation positively influence labor productivity. Moreover, in Indian firms Hasan (2010) investigate knowledge spillovers, R&D and labor productivity for the period 1994-2006. Using panal data and GMM estimator their results suggest positive relation between R&D and labor productivity.

Ngoc and Phuoc (2011) studied the drivers of labor productivity for 1,943 SMEs. Their findings indicate that in different sectors the important productivity drivers fluctuates and the most important determinant affecting labor productivity in all sectors is labor cost. Furthermore, Firouz (2010) and Papadogonas and Voulgaris (2005) finds that export status significantly affect productivity of labor. Kien (2012) investigate a sample of French and Swedish firms over the period 1987-1993. The results indicate that training positively affects productivity in France however a non-significant impact is found in Sweden. Kirby and Kaiser (2013), utilizing a panel of around 1,500 Portuguese firms for the period 1995 and 1999, find that an expansion of 10 hours out of each year in training per laborer prompts an increment in productivity of about 0.6 percent. There are numerous studies that show positive impact from education and training on productivity development and innovation and this will prompt quicker industrial growth.

Kofi and Harrison (2013) found that the impact of training has brought about a positive productivity elasticity of 0.04, despite the fact that the training expenditure is very low. On an alternate view, Kofi, Tanyeh and Gaeten (2013) contended that training subsidy will build productivity, keep up company's development and help firms to rival technological change. In an examination by Love and Ganotakis (2013) utilizing a longitudinal data of in excess of 13000 firms in Belgium demonstrated that on-the-job training increment firm' productivity by 1-2% contrasted to firms without training offices. According to (OECD, 2008) as compare to small firms, larger firms achieve higher productivity in developed economies. Sharma (2006) makes an

attempt to analyze the role of firm's size in productivity. The results suggest that large size firms have 9-11 percent productivity premia over other sized firms. Also, smaller firms are significantly inferior in terms of productivity performance in comparison to other sized firms.

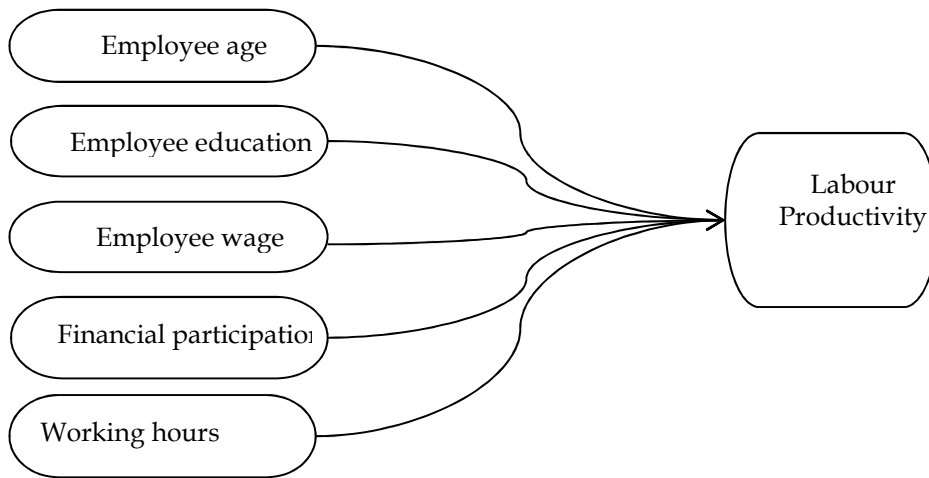


Figure 1 Theoretical Framework

Table 1
Summary of Research Questions and Hypotheses

<p>Research Question 1: Does Employee age influence productivity of labor?</p> <p>H₁: There is a significant association between Employee age and productivity of labor.</p>
<p>Research Question 2: Does Employee education influence productivity of labor?</p> <p>H₂: There is a significant association between Employee education and productivity of labor.</p>
<p>Research Question 3: Does Employee wage influence productivity of labor?</p> <p>H₃: There is a significant association between Employee wage and productivity of labor.</p>
<p>Research Question 4: Does financial participation influence productivity of labor?</p> <p>H₄: There is a significant association between financial participation and productivity of labor.</p>
<p>Research Question 5: Does working hours influence productivity of labor?</p> <p>H₅: There is a significant association between Working hours and productivity of labor.</p>

Material and Methods

Research Design

A quantitative research method is used in this study. The aim of present study is to discover the effect of human capital on labour productivity. This is studied using quantitative approach along with empirical evidences that were given for finding

these issues. According to (Kolb, 2020), the benefit of adapting and using this method is that the variables will be examined in actual state of their existence and it is also convenient for the researcher to produce an empirical linkage amongst under studied variables.

Data Analysis Tools

Outlier analysis was being performed. The missing value analysis was performed. Different tests which relates with current study such as; correlation and regression analysis was applied on data to find out results as desired to interpret the current study purpose. In addition, to check multicollinearity and to find correlation between explanatory variables Pearson correlation test is applied. Furthermore, to determine the link between independent and dependent variables this study employs regression analysis.

Empirical Model

STATA 12 software is utilized to complete the statistical analysis. Generalized Method of Movement (GMM) is used to test the hypothesis. This section presents the econometric models to test the hypothesis presented in previous chapter. To study the impact of HC on LP the model is given as follow:

$$LP_{it} = \alpha + \beta_1(EA)_{it} + \beta_2(ED)_{it} + \beta_3(ET)_{it} + \beta_4(EW)_{it} + \beta_5(FP)_{it} + \beta_6(WH)_{it} + \varepsilon_{it}$$

Where,

LP = Labor Productivity

EA = Employee Age

ED= Employee Education

ET= Employee Training

EW= Employee Wage

FP= Financial Participation

WH= Working Hour

Population and Sample

The population of the study consists of all Small and Medium Enterprises in Islamabad, KPK and Punjab. Practically it was difficult for the researcher to collect data from a large sample therefore the researcher adopted convenience sampling method in this study. Hence, accordingly a sample of 50 firms is selected. The employees of these firms are surveyed to collect data. This study is cross-sectional in nature. The time period of the study is 2020.

Results and Discussion

Instrumental GMM is used to tackle the problem of endogeneity and to test the hypothesis, Tables 2 shows the results. Test of endogeneity suggest that the variables employee education and employee training are not exogenous as the p-value is less than 0.05, thus we can reject the null hypothesis that variables are exogenous. In Table 2a further test is conducted to find out whether the instruments used are weak instruments are not; here we are interested in the correlation between instruments and endogenous regressors. The f statistic value is much larger than any of the critical values shown in our table hence we would reject the null hypothesis that our instruments are weak. Thus we have good instruments in this case.

Regression Analysis

In this section we analyze the results from our regression model. First of all we present the summary of results in table below and then explain these results in detail in coming lines. This study uses the generalized method moments (GMM) technique to examine the effect of human capital on labor productivity. The GMM technique is tested to regulate endogeneity problem. When one or more explanatory variables are associated with errors term ($\mu_{i,t}$, the endogeneity problem arises. The omission of variables or measurement errors originate endogeneity problem. The usage of proper instrument variables deals with endogeneity problem which associates with endogenous independent variables but does not associate with errors.

Employee Education with the coefficient 0.251243 indicates that there is positive correlation between employee education and labour productivity. Specifically, the result shows that 1% increase in employee education brings an increase of 25% in labour productivity. Hence, in Pakistan education is more powerful element to increase labor productivity. The P-value of 0.0006 indicates that the coefficient of employee education is significant.

As previously mentioned, the positive link between employee education and productivity of labor is established by vast number of studies from developed nations (e.g., Griffin et al., 2006; Mairesse & Mohnen, 2010). Nonetheless, results in the developing nations are fairly contrasting; such as a positive association was found by Chowdhury and Wolf (2003) in the context of Sub-Saharan Africa SME's. On the other hand, no significant relationship between employee education and productivity of labor was found by Goedhuys et al. (2008). However, Esselaar et al. (2007) demonstrate that employee education upgrades productivity of labour among SMEs.

In addition, for the period 1995-2003, Love and Mansury (2009) examined the relationship between labour productivity and employee education in the context of Italy. Their findings indicate that employee education positively influence labor productivity. Arvanitis and Spyros (2011) studied the effect of employee education on productivity of labor. The period of study was 1994 to 2002 and sample consists of Swiss manufacturing firms. Their findings suggest that employee education positively influence labor productivity. Pianta and Vaona (2006) examined the labour productivity effect of employee education. They find that in Europe process employee education plays an important role in enhancing labor productivity. Kurta and Kurtb (2012) studied the impacts of employee education on productivity of labour for the 5 nations characterized as BRICS which have attracted consideration late years because

of their economic performances by utilizing panel data. The findings indicated a positive connection among employee education and productivity of labour.

Employee Training has the coefficient 0.106898, which tells us that one percent increase in investment on training will result in 0.10 percent increase in labor productivity. The P-value 0.0058, which is less than level of confidence, indicates the significance of coefficient.

A large number of studies (e.g., Griliches, 1979; Rogers, 2006; Luintel et al., 2010, Sharma, 2011) investigate the link between Employee Training and labor productivity and finds a positive relation between the two variables. Moreover, in Indian firms Saxena (2009) investigate Employee Training and labor productivity for the period 1994-2006. Using panel data and GMM estimator their results suggest positive relation between Employee Training and labor productivity. Perez et al. (2005) also examine the link between Employee Training and productivity in India for the period 2000-2006. Their sample comprise of firms from information technology sector. Their results indicate that Employee Training positively influences productivity. On the other hand, Bönnte (2003) also studied the impact of Employee Training on labor productivity in manufacturing firms in the context of Germany. The findings show that Employee Training has a much higher productivity impact. For a period of 6 years, Lokshin (2005) investigate whether labor productivity is influenced by Employee Training. The sample consists of 372 firms. Their findings indicate a positive link between the two variables when he uses panel data model. However, when they use a linear model the results become negative.

The variable Employee Age with the coefficient -0.285 indicates that it has negative correlation with labor productivity. However, this relationship is not statistically significant as shown by p-value. The variable Financial Participation and labour productivity has insignificant relationship as shown by p-value. The finding further indicates that variable Working Hour and labour productivity has positive association. The positive sign tells us that working hour increases labor productivity. It is strange in our analysis. The result indicates that 1 percent increase in working hour raises labour productivity by 4.9 percent. The P-value is 0.0001, which is significant. The coefficient of Employee Wage is 0.007454, which tells us that wages has positive and significant effect on labor productivity. The wages are very crucial in determining the labor productivity. The P-value is 0.0189, which is significant.

Table 2
Instrumental variables (GMM) regression Results

F = 244.65

Prob > F = 0.0000

R-squared = 0.4453

Adj R-squared = 0.4321

GMM weight matrix: Robust

Root MSE = 0.0401

LP	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]
Employee Education	0.251243	0.0032505	3.41	0.0006	0.1821915 0.2249422
Employee Age	-0.285723	0.0003416	-1.23	0.2189	-0.2219923 0.2233327

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Employee Training	0.106898	0.0000791	3.08	0.0058	0.0703756	0.1200653
Financial Participation	0.000123	0.0000507	0.19	0.8530	-0.0001024	0.0000965
Working Hour	0.049634	0.0005222	3.66	0.0001	0.0005051	0.0015432
Employee Wage	0.007454	0.000362	2.49	0.0189	0.0002926	0.0001583
Con	0.136476	0.025859	4.01	0.0000	0.081213	0.1758062
Instrumented:	Employee Education Employee Training					
Instruments:	Employee Age Employee Wage Financial Participation Working Hour Skilled_Lab In_House_Rd					

Test of endogeneity (orthogonality conditions)

Ho: variables are exogenous

GMM C statistic chi2 (2) = 2.986 (p = 0.0247)

Table 2a
First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	Robust F	Prob > F
Employee Education	0.3953	0.3850	0.0293	132.8747	0.0000
Employee Training	0.6700	0.6576	0.6566	88.05804	0.0000

Minimum eigenvalue statistic = 45.277

Critical Values
regressors: 2

of endogenous

Ho: Instruments are weak
instruments: 2

of excluded

2SLS relative bias	5%	10%	20%	30% (not available)
	10%	15%	20%	25%
2SLS Size of nominal 5% Wald test	7.03	4.58	3.95	3.63
LIML Size of nominal 5% Wald test	7.03	4.58	3.95	3.63

Conclusion

HC is the main factor which enhances a firm's resources and helps employees to increase their productivity. HC includes training, education, and the level of knowledge, skills, and abilities that improve the performance of firm. Therefore, modern and developed countries make huge investments and take initiatives to boost their HC. The system of education, health facilities, food quality and neat and clean environment makes the difference between developed and under developed

countries. Developing human capital ensures the effectiveness and efficiency of labour force and ultimately this will improve the overall performance of economy. The importance of the human aspect and characteristics such as education level or having sufficient resources is extremely important for the process of productivity.

This study uses the generalized method moments (GMM) technique to examine the effect of human capital on labor productivity. Employee Education with the coefficient 0.251243 indicates that there is positive correlation between employee education and labour productivity. Specifically, the result shows that 1% increase in employee education brings an increase of 25% in labour productivity. Hence, in Pakistan education is more powerful element to increase labor productivity. The P-value of 0.0006 indicates that the coefficient of employee education is significant. The Employee Training has the coefficient 0.106898, which tells us that one percent increase in investment on training will result in 0.10 percent increase in labor productivity. The P-value 0.0058, which is less than level of confidence, indicates the significance of coefficient.

The variable Employee Age with the coefficient -0.285723 indicates that it has negative correlation with labor productivity. However, this relationship is not statistically significant as shown by p-value. The variable Financial Participation and labour productivity has insignificant relationship as shown by p-value. The finding further indicates that variable Working Hour and labour productivity has positive association. The positive sign tells us that working hour increases the labor productivity. It is strange in our analysis. The result indicates that 1 percent increase in working hour raises labour productivity by 4.9 percent. The P-value is 0.0001, which is significant. The coefficient of Employee Wage is 0.007454, which tells us that wages has positive and significant effect on labor productivity. The wages are very crucial in determining the labor productivity. The P-value is 0.0189, which is significant.

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