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Human Capital and Labour Productivity A Case Study of District Lahore

Abstract

Human capital is an intangible asset of an organization. Firms always try to properly utilize their workforce through comprehensive human capital development.The main concern of an entrepreneur is not only to achieve business goals but also achieve long term survival and sustainability. This study is designed to investigate the role of human capital in labour productivity in district Lahore. For analyzing this relationship, cross sectional study is conducted and data is collected from 243 firms, which include manufacturing, trading and service sector.The empirical analysis reveals that all the sectors have heterogeneous effect of human capital on labour productivity. Education appears to be significant and positively related to labour productivity in all the sectors with greater effect in manufacturing sector. Skills and training have also noticeable effect on labour productivity. The descriptive analysis shows heterogeneous results in different sectors. Moreover, variance inflated factors and correlation matrix is also determined to detect the multicollinearity problem and there is no correlation among variables. The results of the study suggest that firms as well as government should invest more in human capital is developing skills in labour force so that it can become more productive. The study recommends that government should also provide more funds for the promotion of technical education in these countries.

Keywords: Human Capital, Labour Productivity, Labour Force, Technical Education

Introduction

Human capital plays a significant role both at micro and macro level. The idea of human capital was recognized in 1960s.First of all,Schultz (1961) gave the idea of human capital and its importance. However, this idea got more familiarity in 1990s by Romer (1990) and Mankiw *et al*. (1992), when proxy of human capital was used in production function for the first time by them. In an organizational perspective, human capital represents the value of the organization's intellectual

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capital (education, skills, training etc.). In any organization it is also renewable source of creativity and innovativeness. Thushealth care, education and training are the major sources of human capital.

According to Schultz (1961), human capital is an important element which improves a firm's assets and helpsemployees to increase their productivity to sustain competitive advantage. Human capital includes education, training and other professional initiatives that increase the level of knowledge, skills, abilities, values, and social assets of an employee which leads to an increase not only in employee's satisfaction and performance but also improves the firm's performance (Marimutho *et al.*, 2009).

"To build up a competitive advantage, it is very important for every firm that it should truly influence on the workforce as a competitive weapon. Firm's strategy to increase the labour productivity to make it higher value for the firms has become an important issue. Firms always try to utilize their workforce to optimize them through comprehensive human capital development programs not only to achieve business goals but also for a long term survival and sustainability. To accomplish this task, firms invest their resources to make sure that employees have at least minimum knowledge, skills, and abilities they need to work effectively in a rapidly changing and complex environment"(Marimutho *et al*, 2009).

Human capital is just like an intangible asset of an organization. It includes all of the competencies and commitments of the workforce within an organization, i.e. skills, experience, potential and capacity. Human capital theory is based upon the assumption that education, training and employees benefits raise the marginal physical product of labour. Firm's performance is greatly linked with the workers remuneration and profit sharing which significantly improves employee's attitude towards work (for detail see Blanchflower, 1991). "Performance Related pay (PRP) is the most popular instrument that increases the efficiency of workforce. Firms with PRP scheme have higher productivity than those which do not adopt" (Gielen *et al*., 2010).

The existing literature suggests that proper utilization of human capital hasits positive impact on firm's performance. Education of entrepreneurs is also positively related to the growth of firms. More educated people put more efforts and adopt new technology and hence earn more sale revenue (Abdul and Tetsuski, 2010).Recent literature has shown that investment in human capital is substantial for sustaining and improving the economic growth over time. Educated people adopt new techniques of production more quickly and technological change is an increasing function of educational attainment in the long run and connection between education and economic growth has significant implication through the technological progress(Nelson and Phelps, 1966).

The literature indicates that training is a part of human capital which has significant impact on raising productivity and the impact of training on blue-collar workers productivity is higher than the white-collar (Clerks and Executives) workers (Colombo and Stanca,2008). Previous literature also suggests that training has positive and significant impact on productivity but its effect on wage is small (Conti, 2005). Training has positive impact on both productivity and wages but

impact on wage is smaller and almost half of the productivity in magnitude (Dearden *et al*., 2006).

Recent literatures have identified the importance of human capital in productivity and empirical evidence has indicated that education, capital labour ratio, wages of labour and training have higher return to productivity of both labour and firm.[1] Owners and managers with higher education and experience carry out more innovation in manufacturing industries which increases productivity(Hoang, 2014). Number of studies regarding human capital concluded that better educated individuals earn more through more productivity (Lebedinski andVandenberghe, 2013).

The objective of this study is to investigate the role of human capital in raising labour productivity through empirical case study in district Lahore. For this purpose, cross sectional data of manufacturing, trading and service sector of firms in Lahore has been used. The rest of the study is organized as follows: In section II, a brief review of earlier studies has been presented. Section III presentsdata source and methodology. Results and discussions are presented in section IV.Finally, conclusion and recommendations are given in section V.

Literature Review

Nelson and Phelps (1966) carried out a research on investment in human technological diffusion and economic growth on the agriculture sector of United States. They suggested that manager with more education adopts new techniques of production more quickly. Farmers with less education are prudent to delay to invest in technology than the educated farmers. Their hypotheses predict that technological change is an increasing function of educational attainment in the long run. Finally, they concluded that connection between education and economic growth has significant implications through the technological progress.

Tsang (1987) analyzed the impact of underutilization of education on productivity in 22 US Bell companies. The author found that job satisfaction decreases with the higher level of education and younger employees are less satisfied with their jobs than older. The results of the study revealed that there exists negative and significant relationship between education and firm's output.The study pointed out that underutilization of education increases output cost whichresults in lower productivity.

Blanchflower (1991) investigated the effects of profit sharing in Great Britain. The study depicts that British gas and Telecom Companies offered shares to their employees and which have increased the numbers of employees.The study revealed that profit sharing significantly improves employee's attitude towards work and employee's view about company.The study concluded that firm's commercial performance is greatly linked with the workers' remuneration.

Fafchamps and Quisumbing(1999) pointed out that numbers of studies regarding impact of human capital on agriculture output have been conducted but these studies did not consider the allocation of labour between farm and off-farm

[1](For detail see, Delmas and Pekovic, 2013; Aggrey, 2010; Artige and Nicolin, 2006; Colombo and Stanca, 2008).

activities. The authors investigated the impact of human capital on productivity and labour allocation of rural households. The results of the study showed that males and females with higher education have higher non-farm incomes.

Conti (2005) analyzed the effect of training on productivity and wages in Italy using panel data from 1996-1999. Both Ordinary Least Square (OLS) and Fixed Effect (FE) estimates showed that training and capital-labour ratio have significant and positive impact on productivity. Research and Development (R&D) also showed strongrelation with productivity but increase in working hour resulted in fall in productivity. The study concluded that training has long run relationship with productivity but the impact of training on wages is low.

Fleisher *et al.* (2011) investigated the role of education on worker productivity using the data of firms in five cities of china from 1998-2000. The results of the study indicated that marginal productivity of more educated people exceeds by large margin than less educated workers. The estimated returns to education were found significant and positive in two cities of china. Moreover,the study found that marginal products were higher than wages of workers and this gap was bigger between the highly educated workers than less educated workers.

Colombo and Stanca (2008) analyzed the impact of training on productivity and providedcomparison between employer and employee's returns to training. The results of study showed that capital per worker, share of executives, patents intensity and training were significantly and positively associated with the labour productivity. Moreover,impact of training on blue-collar workers' productivity was more than the white-collar (Clerks and Executives) workers.

Hamid and Pichler (2009) analyzed the factors of growth and productivity in manufacturing concerns over the period of 1971-72 to 2004-05. Empirical results of their study showed that technology has significant and positive relation with value-added growth in the manufacturing sector in Pakistan. Similarly, capital stock, human capital and labour showed significant and positive effect on the growth and productivity.

Aggrey (2010) investigated the impact of human capital on labour productivity in the manufacturing industries of Sub-Sahara countries by using Generalized Least Square (GLS) method.Data was collected through agricultural manufacturing firms across Kenya, Tanzania and Uganda during 2002-2003. The results of the study showed that capital-labour ratio, average education and training were positively associated with labour productivity in Kenya and Uganda. Moreover, foreign ownership, size, proportion of skilled workers had also positive impact on labour productivity in Uganda. While, in Tanzania education of a manager and proportions of skilled workers were positively associated with the productivity of labour in the manufacturing concerns.

Delmas and Pekovic (2013) tried to analyze the impact of social and green capital on labour productivity.The results of the study showed that financial participation, interpersonal relations, environmental practices had significant and positive impact on labour productivity. Moreover, average working hours of employees and training were also positively associated with the productivity of labour but firm size was negatively associated with productivity.

Jana and Petr (2013) discussed the impact of profit sharing on productivity, profitability and competitiveness and found that most of the studies reported positive effects on productivity and profitability. Weitzman (1987), Wadhwani and Wall (1990) and Cooke (1994) found that profit sharing was significantly and positively related to productivity. But Wadhwani and Wall (1990) failed to find positive relationship between profit sharing and employment. The study concluded that profit sharing increases the competitiveness of firms by increasing cooperation between employers andemployees but it may be harmful when profit sharing is incorrectly implemented.

Burger and Teal (2014) estimated the effect of schooling on the productivity of workers in the industrial panel of South African countries. Pooled OLS results indicated that productivity of workers was higher for educated workers at low level of schooling than the high level of schooling. Moreover, capital stock and employment level were also significantly related to productivity of workers but at first difference level schooling affect was insignificantly related to product.

Lebedinski and Vandenberghe (2014) estimated the effect of education on productivity at firm's level using panel data in Belgium. Overall impact of education on productivity was found positive and significant, i.e., two years college and university educational workers were more productive than primary education workers. The study concluded that better educated individuals earn more due to more productivity.

Data and Methodology

Cross sectional study is conducted to analyze the role of human capital in labour productivity and primary source of data is used after designing questionnaire. There are many techniques and sources of collecting primary data.The study used field survey technique and interviewed employers, directors and managers of the firms and collected data of those firms and industries, which have factories, head offices and regional offices located in Lahore.

For sampled designed first of alla list of companies is prepared, which are listed in Lahore Stock Exchange (LSE). Only 90 companies were found registered in LSE including all the sectors which are under consideration of the study (i.e., manufacturing, trading and services). In order to increase sample sizethose companies were also approached, which were not registered in LSE but registered in Lahore Chamber of Commerce (LCCI). In LCCI more than two thousands of firms and shops were registered. The selection of companies in the sample was based on proper working environment and the existence of different departments like human resource account and which have at least ten employees on payroll. For sample purpose we visited 400 factories, offices of different firms in Lahore by using convenient random sampling.The data was collected from 243 firms out of which 150were manufacturing concerns, 43 were trading concerns and 50 were service concerns. For analyzing the impact of human capital on labour productivity Ordinary Least Square (OLS) estimation techniques was used.

Model Specification

For examining the relationship between human capital and labour productivity the following model is proposed.

$$\boldsymbol{LnLP = \beta_0 + \beta_1 LnAge + \beta_2 LnEDU + \beta_3 LnTRAIN + \beta_4 LnSWP + \beta_5 LnWH + \beta_6 LnFP + \beta_7 lnMW + \varepsilon}$$

Variable's Description

LnLp = Log of labour productivity

Like previous study labour productivity is measured as firm's gross value added divided by the labour input.Firm's gross value added is measured as total sale of the firm less cost of intermediate inputs which include cost of raw material and expenditure on electricity, water, fuel and gas. Labour input includes total number of permanent or contractual employees during the year.

LnAGE = Log of age

Age is measured as weighted average Age of employees in a firm. Weights were given from 1-3 for different age ranges of employees. Employees with age less than 30 years were given weight as "1". Employees range between the age of 30-45 were given weight as "2" and employees who have age above 45 years were given weight as "3".

Ln EDU = log of education

Education is measured as weighted average education of employees in a firm. Weights were given to average schooling years ranges from 1-5. Lower weight was given to lower schooling and vice versa. Employees who were under metric were given weight as "1". Employees who were matric were given weight as "2". Employees who have education of intermediate were given weight as "3". Employees who have education of bachelor (i.e., 14 years education) were given weight as "4" and the higher weight was given to employees who have Master's degree or equalant as "5".

Ln DOT = Log of training

Training is measured as average duration of training in number of days per year of employees inside or outside the firm.

Ln SW = Log of skilled workers

Skilled workers are the asset of any firm. "Skilled workers include technicians, managers, engineers, scientists, foremen, supervisors, accountants and production workers" (Aggrey, 2010). In this research proportion of skilled workers is used to check the relation with firm's productivity, which is computed as skilled workers to the total number of employees in a firm.

Ln FP = Log of Financial Participation

Financial participation includes the share of firm's profit paid to the employee. Profit sharing significantly improves employee's attitude towards work (Blanchlower, 1991). Incentives are positively associated with firm's productivity (Black and Lynch, 2000). Profit sharing is measured as allowances given to employees. In this context three questions were asked about allowances. (1) Does your firm provide benefits (Food, pension and gratuity funds, house or rent allowances etc.) to permanent employees? (2) Does your firm provide medical allowances to permanent employees? (3) Does your firm provide Insurance facility

to permanent employees?If firm pays allowance to its employees otherwise value was given "1" otherwise "0".

Ln WH = Log of Working Hours

Following the previous literature (e.g., Artige and Nicolini, 2006; Dearden *et al*., 2005), the study includes the average working hours of employees per week in the model.

Ln MW= Log of Manager's Wage

Dearden *et al*. (2005) found that managers are more productive and have higher wages. To check the relationship between manager's wage and productivity log of monthly wage of managers is considered.

Results and Discussion

Descriptive Statistics

For describing the data set the study highlights the measureof central tendency and measure of variability or dispersion which include minimum and maximum value, mean, median and standard deviation. Table 1 shows the minimum value, maximum value, mean and standard deviation of data series of manufacturing sector. The minimum value of labour productivity is recorded as Rs.22908.68 and maximum value is Rs.446683592.2 and the mean value of 150 firms is Rs.2691534.80. Average age (AGE), average education of workers (EDU.) and average duration of training per year is 113.13, 85.22 and 28 (days) respectively. Average skilled worker proportion (SW) is 18% and average working hours of employees (WH) are 50 per week. Average value of financial participation is 0.65; it means most of the manufacturing concerns paying incentives to their employees. Average manager wage is Rs.57544. Variability in skilled workers proportion, financial participation, working hours and manager's wage is low. While variability in training (DOT) is moderate. Average age of workers and average education are changing with more variance. The minimum value of age, education, training, skills, working hours and financial participation is 1.5, 1.07, 0, 0, 36 and 0respectively. The maximum values of these variables are 480, 450, 90, 1, 72 and 1 respectively.

Table 1:Descriptive of Manufacturing Sector

Variables	Minimum	Maximum	Range	Mean	SD
LP	4.36	8.65	4.29	6.43	0.70
Age	1.5	480.0	478.5	113.13	148.04
Edu.	1.07	450.0	448.93	85.22	117.59
DOT	0	90.0	90	27.69	23.94
SW	0.0	1.0	1	0.18	0.20
WH	36.0	72.0	36	49.70	5.57
FP	0.0	1.0	1	0.65	0.33

MW	4	6	2	4.76	0.36

Table 2 shows the descriptive measures of data series of trading sector. The minimum value of labour productivity is recorded as Rs.288403 and maximum value is Rs.87096359 and the mean value of 43 firms is Rs.6456542. Average age (AGE), average education of workers (EDU.) and average duration of training per year is 19.54, 15.73 and 18 (days) respectively. Average skilled worker proportion (SW) is 35.23% and average working hours of employees (WH) are 51 per week. Average value of financial participation is 0.63; it means most of the manufacturing concerns paying incentives to their employees. Average manager wage is Rs.48978. Variability in skilled workers proportion, financial participation, working hours and manager's wage is low. While variability in training (DOT), average age of workers and average education are changing with more variance.

Table 2: Descriptive of Trading Sector

Variables	Minimum	Maximum	Range	Mean	SD
LP	5.46	7.94	2.48	6.81	0.52
Age	1.67	40	38.33	19.55	12.73
Edu.	1.13	34.67	33.54	15.73	10.44
DOT	5	30	25	18.35	7.41
SW	0.15	1	0.85	0.35	0.16
WH	42	60	18	51.12	4.70
FP	0	1	1	0.63	0.32
MW	4.26	5.26	1	4.69	0.22

Table 3 shows the descriptive measures of data series in services sector. The minimum value of labour productivity is recorded as Rs.301995 and maximum value is Rs.257039578 and the mean value of 50 firms is Rs.4677351. Average age (AGE), average education of workers (EDU.) and average duration of training per year is 71.04, 79.35 and 24 (days) respectively. Average skilled worker proportion (SW) is 47.36% and average working hours of employees (WH) are 53 per week. Average value of financial participation is 0.67; it means most of the firms paying more incentives to their employees in trading sector. Average number of friends and memberships with other institutions is 19 and 4 respectively. Average manager wage and known supplier and customers are Rs.67608 and 54 respectively. Variability in skilled workers proportion, financial participation, manager's wage, voluntarily organizations (NOM) and trader relation is low. While variability in informal network of friends (NOF), training (DOT) average age of workers and average education are changing with more variance.

Table 3: Descriptive of Service Sector

Variables	Minimum	Maximum	Range	Mean	SD
LP	5.48	8.41	2.93	6.67	0.69
Age	2.33	389.83	387.5	69.18	89.58
Edu.	1.13	341.67	340.54	78.01	91.76
DOT	0	75	75	23.50	15.32
SW	0.13	1	0.87	0.47	0.23
WH	45	72	27	52.90	5.67
FP	0	1	1	0.67	0.39
MW	4.2	5.48	1.28	4.83	0.26

Table 4 provides the summary of descriptive statistics of all three sectors (i.e., manufacturing, trading and service sector). The minimum value of labour productivity in whole data is Rs.22909 and maximum value is Rs.446683592 and the mean value of 243 firms is Rs.4466836. Average age (AGE), average education of workers (EDU.) and average duration of training per year is 88, 71.72 and 25 (days) respectively. Average skilled worker proportion (SW) is 27% and average working hours of employees (WH) are 51 per week. Average value of financial participation is 0.65. Moreover, average wage of manager in these firms is Rs.58884. Variability in skilled workers proportion, financial participation and manager's wage is low. While variability in training (DOT), average age of workers and average education are changing with more variance.

Table 4: Descriptive Statistics of Overall Data

Variables	Minimum	Maximum	Range	Mean	SD
LP	4.36	8.65	4.29	6.55	0.68
Age	1.5	480.0	478.5	87.99	128.12
Edu.	1.07	450.0	448.93	71.72	104.41
DOT	0.0	90.0	90	25.17	20.56
SW	0.0	1.0	1	0.27	0.24
WH	36.0	72.0	36	50.61	5.57
FP	0.0	1.0	1	0.65	0.34
MW	4.0	6.0	2	4.77	0.32

Variance Inflating Factors (VIF)

For the detection of multicollinearity problem, variance inflation factor (VIF) is used as an indicator of multicollinearity, which is the reciprocal of tolerance: 1 / (1 - R^2).

$$\mathrm{VIF} = \frac{1}{1 - R_i^2}$$

Table 5 shows the values of VIF of different factors of human capital to check the multicollinearity in the data. All the values of VIF are below 10 in all sectors and in none of the sector value of 1/VIF is below 0.10 indicating no multicollinearity in the data of any sector.

Table 5

Variables	**Manufacturing**		**Trading**		**Service**		**Overall Data**	
	VIF	**1/VIF**	**VIF**	**1/VIF**	**VIF**	**1/VIF**	**VIF**	**1/VIF**
Age	5.97	0.1675	7.9	0.1266	3.31	0.3021	3.93	0.2545
Edu.	5.83	0.1715	8.9	0.1124	4.72	0.2119	3.88	0.2577
DOT	1.29	0.7752	5.02	0.1992	3.74	0.2674	1.33	0.7519
SW	1.11	0.9009	1.36	0.7353	3.79	0.2639	1.27	0.7874
WH	1.08	0.9259	3.47	0.2882	3.84	0.2604	1.26	0.7937
FP	1.49	0.6711	2.73	0.3663	1.58	0.6329	1.47	0.6803
MW	1.67	0.5988	2.87	0.3484	1.45	0.6897	1.6	0.625

MULTIVARIATE ANALYSIS

Human capital and Labour Productivity in Manufacturing Sector

Table 6 reports the results of manufacturing sector analysis, whichindicate that the model is good fit. Average education, training and skilled worker proportion are positively and significantly related to labour productivity. Results indicate that 0.4% variation in the labour productivity is due to average education.The results of the study are in line with Tsang, (1987), Fleisher *et al*. (2006), Abdul and Tetsuski (2010), Lebedinski and Vandenberghe (2013). Training also increases productivity by 0.63% and several studies available in the literature likeConti (2005), Colombo and Stanca (2008), Dearden *et al*. (2005),Aggrey (2010), Menon (2013), Delmas and Pekovic (2013) have similar findings which describe the importance of training on labour productivity. Skilled worker proportion affects labour productivity by larger proportion than average education and training and 58% variation is recorded in labour productivity due to skills. Findings of skilled worker proportion in manufacturing sector are similar to the previous studies likeCahus and Dormant (1997) andAggrey (2010). Average weekly working hours are insignificant and negative in the model but it showsnegative relation with productivity. Artige and Nicolini (2006) have also the same results in European region of countries and found significant and negative relation of working hours

with labour productivity in manufacturing sector. Moreover,workers with low performance rating, work for more hours and have fewer days of absentees (Engellandt and Riphahn, 2004).

Manager's wage is insignificantly related to labour productivity. Delmas and Pekovic (2013) also found no relation between wage and productivity.The possible reason may be that in Pakistan, firms in manufacturing sector hire managers mostly for supervision. They have to work according to responsibilities to sustain their job. So their wage may not have any impact on productivity. Moreover, average age of employees and working hours are also insignificantly and negatively related to labour productivity in manufacturing sector.

Table 6: Estimation of Human Capital in Manufacturing Sector: Dependent Variable: Labour Productivity

Variables	**Co-eff.**	**RobustSE**	**t-value**	**p-value**
Age	-0.0011	0.0008	-1.3500	0.1800
Edu.	0.0040***	0.0009	4.5900	0.0000
DOT	0.0063***	0.0021	2.9500	0.0040
SW	0.5779***	0.2147	2.6900	0.0080
WH	-0.0159	0.0099	-1.6000	0.1130
FP	0.1351	0.1611	0.8400	0.4030
MW	0.0229	0.1603	0.1400	0.8860
Constant	6.5222***	0.8179	7.9700	0.0000
R-Squared	0.3900	**F-Value**		11.12 (0.0000)

***, **, * show the level of significance at 1%, 5% and 10% respectively.

Human Capital and Labour Productivity in Trading Sector

Table 7 shows the estimation results of trading sector. Data set of 43 firms is used for this sector. The results yield that average education, training; working hours, financial participation and manager wage are positively and significantly related to labour productivity in trading sector. Only one variable skilled worker proportion is insignificant to labour productivity. It may be due to the reason that skill might not require in trading sector but the education and training matter more in trading sector. Value of average education indicates that 2% variation in labour productivity in trading sector is due to average education. This effect is large as compared to manufacturing sector. Coefficient of DOT is also significant, which shows that one day increase in average duration of training increases productivity by 2.5%.Our results are in line with previous study like Conti (2005), Dearden *et al.*(2005),Colombo and Stanca (2008), Aggrey (2010). The results of the study reveal that there exists positive and significant relationship between Labour Productivity with working hours, financial participation. In trading sector effect of financial participation appears to be substantial. Firms, which pay more to their

employees especially to their managers, induce them to be more efficient to get more benefits, which leads to increase in average labour productivity. Previous literature also supports our findings in this regard. Profit sharing significantly improves employee's attitude towards work. Incentives are positively associated with firm's productivity (Black and Lynch, 2000).Furthermore, average age is negatively related to labour productivity and the results of study are consistent with Nam (2014). This indicates that a firm with lower age and less employees has more average productivity.

Table 7 shows that F value is significant which indicates that the model is a good fit and the value of $R^2$is point 0.91 which means that 91% of the total variation is the dependent variable are explained by the independent variables

Table 7: Estimation of Human Capital in Trading Sector: Dependent Variable Labour Productivity

Variables	**Co-eff.**	**RobustSE**	**t-value**	**p-value**
Age	-0.0116***	0.0044	-2.6600	0.0120
Edu.	0.0206***	0.0063	3.2600	0.0020
DOT	0.0259***	0.0082	3.1500	0.0030
SW	0.2481*	0.1422	1.7400	0.0900
WH	0.0252**	0.0100	2.5400	0.0160
FP	0.3389***	0.1156	2.9300	0.0060
MW	0.3390**	0.1354	2.5000	0.0170
Constant	3.0515***	0.6881	4.4300	0.0000
R-Squared	0.9106	**F-Value**		63.23 (0.0000)

***, **, * show the level of significance at 1%, 5% and 10% respectively.

Human capital and Labour Productivity in Service Sector

Table 8 shows the estimation results of service sector in which human capital variables are regressed on labour productivity. Data set of 50 observations is used in this model. The results indicate that labour productivity is associated positively with average education, skilled worker proportion and working hours in service sector and all are significant at 1% level. Generalized Least Square (GLS) estimation shows that 0.25% variation in labour productivity is due to average education in service sector. However, this effect is very small as compared to manufacturing sector and trading sector. The coefficient of SW is 0.8 which indicates that one percent increase in skilled worker proportion increases productivity by 80%. It means skills count more value with education in service sector. So it can be inferred that if a firm has more educated workers but not skilled workers cannot improve productivity. Like manufacturing sector, average age is insignificant in service sector. It means younger people are more efficient, innovative and productive. The results of the study reveals that training is

insignificant in service sector because in this sector mostly employees are educated and have skills, so less training was required in most of the firms. Therefore, training is not showing significant impact on Labour Productivity (LP) in service sector. Working hours of employees increase labour productivity by 3%. During the survey it was observed that in service sector and trading sector employers take more work from their employees than the normal routine for increasing their income. Our findings are consistent with Dearden *et al*. (2005) and Delamas and Pekovic (2013).

Value of R^2 is 0.89, which means all the explanatory variables influence labour productivity by 89% in service sector.

Table 8: Estimation of Human Capital in Service sector: Dependent Variable Labour Productivity

Variables	**Co-eff.**	**RobustSE**	**t-value**	**p-value**
Age	0.0009	0.0008	1.2100	0.2350
Edu.	0.0025***	0.0007	3.8000	0.0000
DOT	0.0053	0.0049	1.0700	0.2890
SW	0.8005***	0.2858	2.8000	0.0080
WH	0.0293***	0.0105	2.7900	0.0080
FP	0.0773	0.1176	0.6600	0.5140
MW	0.1405	0.2009	0.7000	0.4880
Constant	3.6238***	1.0894	3.3300	0.0020
R-Squared	0.8850		**F-Value**	53.22 (0.0000)

***, **, * show the level of significance at 1%, 5% and 10% respectively.

Multivariate Analysis (All Sectors)

The results of all sectors including manufacturing, trading and service sector containing data set of 243 observations for human capital are presented in Table 9.Estimates of model depict that average education; training, skills and financial participation are significant and positively related to labour productivity. The coefficient of average education is 0.004, shows that an increase in average education increases labour productivity by only 0.4% and coefficient of DOT is 0.006, which shows that one day increase in average duration of training increases labour productivity by 0.6%. Similarly, skills and financial participation also increases labour productivity by 82% and 29% respectively. Average age is significant but negatively related to labour productivity. This indicates that more aged employees in the firm are less productive and young age workers are more productive. Manager's wage and working hours of employees have no relation with labour productivity. Value of $R^2$is 0.44, it means that 44% changes in labour productivity are due to the factors of human capital.

Table 9: Estimation of Human Capital: Dependent Variable Labour Productivity

Variables	Co-eff.	RobustSE	t-value	p-value
Age	-0.0010**	0.0005	-1.9800	0.0490
Edu.	0.0035***	0.0006	6.0600	0.0000
DOT	0.0061***	0.0021	2.8600	0.0050
SW	0.8215***	0.1654	4.9700	0.0000
WH	0.0062	0.0094	0.6600	0.5090
FP	0.2904***	0.1129	2.5700	0.0110
MW	0.0645	0.1318	0.4900	0.6250
Constant	5.2028***	0.6990	7.4400	0.0000
R-Squared	0.43670	**F-Value**	30.93 (0.0000)	

***, **, * show the level of significance at 1%, 5% and 10% respectively.

Comparison among Different Sectors

The main objective of this study is to analyze the role of human capital on labour productivity. As data is taken from three sectors (manufacturing, trading and service) and coefficient values of each factor of human capital is estimated for all sectors separately. For the purpose of the comparison of the effect of human capital instruments on labour productivity, elasticities of variables are estimated to check the percentage change in labour productivity due to percentage change in human capital instruments. The results are presented in Table 10.

Table 10

Variables	Manufacturing	Trading	Service
Age	-0.1206	-0.2277**	0.0628
Edu.	0.3444***	0.3247***	0.1964***
DOT	0.1755***	0.4757***	0.1249
SW	0.1017***	0.0874*	0.3791***
WH	-0.7885	1.2906**	1.5514***
FP	0.0877	0.2130***	0.0516
MW	0.0229	0.3390**	0.1405

***, **, * show the level of significance at 1%, 5% and 10% respectively.

From Table 10 it can be observed that average education is significantly and positively related to labour productivity in all sectors. Training is significant in manufacturing and trading sector. In manufacturing sector, increase in number of days of training of employee's increases, labour productivity by 0.18% and in trading sector it increases productivity by 0.48%. Skilled worker proportion is

significant and is positively related to labour productivity in manufacturing and service sector. In manufacturing sector, if skilled worker proportion increases by 1%, then labour productivity also goes up by 0.10%. In service sector, if skilled worker proportion increases by 1% then labour productivity goes up by 0.38%. Working hours of employees are positively and significantly related with labour productivity only in trading sector and service sector. Remaining two variables; financial participation and manager wage is significantly related to labour productivity only in trading sector.

Conclusion and Recommendations

The present study is conducted to analyze the role of human capital on labour productivity. Descriptive analysis points out the differences in productivity level in different sectors. Regression analyses also confirm the productivity determinants with the statistical evidence on the source of this heterogeneity. The study shows that in sector-wise analyses, labour productivity is heterogeneous among different sectors. Average education is positively and significantly related to labour productivity in all sectors, but the effect is slightly larger in manufacturing sector. Average duration of training is also positive and significant in manufacturing and trading sectors. Skills are related to productivity positively in manufacturing and service sector. But in service sector, skills contribute more to productivity than in manufacturing sector. Financial participation and manager's wage are significant and positively related to productivity only in trading sector. The study concludes that human capital, especially education, training and skills are important factors which raise the productivity.

The study recommends that firms should increase investment in the various aspects of human capital not only to attain greater performance but also to remain competitive for their long run survival. Furthermore, government should increase the budget of education along with the other sector of economy and government should allocate at least 4% of GDP for education in every circumstances. There is a need to allocate more funding for technical and vocational institutes for developing skills in workers. The manufacturing sector needs highly skilled and technical workers and there is a need to provide training facilities to the workers on priority basis so that labour productivity can be enhanced. For this purpose, government should pay more attention for promoting the role of Technical Education and Vocational Training Authority (TEVTA)in the province.

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