



RESEARCH PAPER

**Efficacy of Investment in Educational Institutes and Human Capital
for Sustainable Economic Growth in Pakistan**

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ABSTRACT

Efficacy of investment in educational institutes, and human capital have drastic role in economic upturn. However, at various levels human capital demonstrated regarding infrastructure of education that becomes a more relevant measure of human capital alternative to enrollment at school in different institutions. This study has taken four decades annual data to investigate the association between educational institutions and human capital on economic upswing. The data starts from 1978 to 2018. The Cob Douglas production function is used to determine the efficacy of human capital, and upswing of the economy in Pakistan. The overall results reveal that there is a significant role of human capital (educational institutions) in economic growth in the long run. It is also observed that long-term development across countries has been propelled by productivity growth at a higher scale. Economic upswing accelerates the labor productivity, if necessary, actions should be part of Government investment. The decisions, and policies in educational institutes should be positive and proof of safe flight through human capital efficacy.

Keywords: Economic Growth, Educational Institutes, Gross Domestic Product, Human Capital

Introduction

The Efficacy of education has lucrative role in upturn of economy. High literacy rate is a key of economic growth, prosperity and labor efficiency. It was also observed that long-term development across countries has been propelled by productivity growth at a higher scale. It is the source of potential to meet the rising challenges of the recent world through the intellectual level and taking up of the new technologies. Particularly in developing countries, where mass of the world's population exists, must revamp educational policies in line with the developed nations for pretty productivity through highly experienced manpower. Similar to many developing countries, Pakistan has 58 % literacy rate and 42 % of its population is not able to read or write. Due to this situation access towards higher education and good employment opportunity become low. School enrolment rate is low while school drop-out rate is very high but the budget allocation to education sector remained around 2.0 % of GDP (Government of Pakistan 2017-2018).

The gross domestic product (GDP) is explored as the annual production (goods, and service) in a country. The GDP applies as an alternative variable of economic growth. The energetic resides, who produce goods and services to accomplish the necessities of the society. Additional studies show exposed the drastic relation regarding economic upswing, and human capital. The developing states faced the difficulty of low-level labor force participation. The developing economies exposed transmission trend and volatility in market's returns, caused instability in other sector of country (Khan, Akhter & Bhutta, 2020).

The economic growth augments by skilled labor force (Duval et, al. 2010). The GDP is power of economy's upswing for whole world. In context of Pakistan, 6.8% growth was observed in 1960s. Political instability remained part of 1970s, and the GDP decreased in Pakistan to 4.8% in Pakistan. Giving to World Bank report (2014), Pakistan per capita growth was 2.3%. According to Pakistan framework world indicator shows that youth literacy rate between ages 15-24 was 71% from 2005-12. World development indicator shows that Pakistan's GDP average annual % growth from 2000-12 is 4.4.

It is noted that economic growth has required the part of human capital in the appearance of training experience and educational realization (Rebelo, 1992; Romer and Lucas 1990). Similarly, number of time series research depicts human capital as a fundamental feature for economic growth (Waheed, 2011). Though, some of researchers are openly disagree with ordinary result arguing a weak association between human capital and growth (Klenow, 2011). Faisal et, al (2011) unveiled that human capital is positively related to growth, which relate to education attainment and health as an extremely major determining factor of economic development, which specify that the education and health guaranteed long run economic growth. The spillover effect, and volatility in market's returns sensitized the economic events which effect the performance of organizations (Khan, Akhter & Bhutta, 2020). No any inclusive study noticed yet in Pakistan, where human capital is dignified regarding education enrollment rate subject to different levels (spending, primary, secondary, and tertiary). It shows that there remains a gap among the attendance at school and entry into industry market. Moreover, spending on education at public level is not enough in terms of representation because pre-dominant private sector in education exists in Pakistan. Therefore, this study observes the role of formation of human capital demonstrated by the infrastructure of education at various levels and this becomes a more relevant measure of human capital instead of enrollment at school in different institutions in the education sector. This study addresses the following research objectives. At what extent, the impact of educational institutions of Pakistan on human capital. Furth more, at what level educational infrastructure influenced through human capital and they overall effect on economic growth of Pakistan.

Conceptual thoughts of rural people about Education

The most recent Census (2017) from Pakistan indicates that most of people are not taking education as a serious matter, according to their ideology, they have sent their children to schools or colleges are enough and their responsibility is finished, what are the outcomes, they don't bother about it. However, they don't know actual that their children are the human assets for them; furthermore, it is also religious as well as social responsibility to look after and guide our children according to modern era needs and wants. One of most common factors in their thoughts is that they preferred to teach their boys or males children in high profile institutions as relative compared to girls or females, according to their financial position. According to Census (2017) female's birth rate is more as relatively compared with males. Baker and Milligan (2016) proposed a study to investigate the parental time investment in both genders' boys and girls' differences. For this purpose, they considered three developed countries such United States, Canada and United Kingdom. Their results revealed that females start favour reading in their early age in childhood. Furthermore, the results indicate that a sex difference in both production functions is a gap human capital investment in term of costs of delivering.

The productivity regarding upturn of economy, and workforce in education evident in literature. Business performance exposed distress due to downturn, and upturn in growth rate, and inefficiency of markets (Khan et al., 2011 & Hussain et. al., 2011). Greater level of human capital goes to greater rate of economic development and it is associated by the acquaintance and abilities personified in persons that are attained under education Shabbir (2016). Though economists usually carried out education has cohabited with ancient doubts about using school enrolments as a measure of human capital since there exist a gap

between enrolment in different education levels and entrance into the labour market. Here, in this study the indicator of human capital, taken as education institutions at different level is more appropriate. Because human capital plays a role to choose the targets which motivate and provide higher returns (Khan, Hussain, and Akash, 2023). This inappropriate behavior of markets create linkage among various sectors of economy that force the inefficiency (Akash et. al., 2011).

Table1
Number of Mainstream Institutions, Enrolment and Teachers by Level

Year 2017-18	Enrolment	Institutions	Teachers
Pre-Primary	9846.2	0.172	205
Primary*	23135.4	169.7	503.6
Middle	8072.6	45.3	415.7
High	3917.6	35.2	525
Higher Sec./ Inter	1279.6	7.65	162.4
Degree Colleges	870.3	1.43	24.2
Technical & Vocational Institutes	342.7	3.61	17.2
Universities	2328.3	0.143	84.6

Source: Economic Survey of Pakistan (2017-18).

There are five levels of education in Pakistan, primary, middle, high, intermediate and university level. All education institutions are the prime responsibility of government, whereas, 2.9 % of GDP is spent only on education sector. The new education policy is approved recently which indicates that 7% of the GDP will be allocated on education sector. To increase the illiterateness ratio up to 85% by 2015 is one of the goals of Millennium Development Goals (Government of Pakistan, 2017–18). So, instead of using school enrollments in education institutions, this study is an attempt to examine the Impact of human capital (educational infrastructure at different level in Pakistan) on Economic Growth.

Literature Review

Efficacy regarding economic upturn has become a contributor factor that depends upon human capital. The role in modern theory is much significant in relation to education (Mincer, 1958). Social assets speculation in describing the difference and disparity in development and production have been exposed. However, several researchers such as, Goode (1959) and Schultz (1961) also gave their views about human capital formation. Through the appearance of endogenous development philosophy presented by Lucas (1988) and Romer (1990) human capital accumulation got importance. Human capital was used in production function and it was anticipated that greater level of human capital accelerates the economic growth. Generally human capital is associated through the information and abilities personified in persons that are attained over education, exercise and knowledge and are beneficial in the construction of belongings, amenities and extra acquaintance (Mamkiw, 1992, Caucutt; Mrochroglu and Kumar 2006).

The human capital plays a vital role to enhance the economy up by adopting world technical progress. Take higher return from investing on secondary education as invest on OECD contain extensive education under investment in Pakistan (Johnsen, 1991). In past study found the Effect of education and training on individual earning and also focus on possible biases in estimated return to education and training (Blankeau 1991). However, public spending crowding out private spending on education resembling impacts of communal teaching expenses on economic development. According to Lillard 1992 that early accomplishment of prerequisite is major module of future education attainment and salary (Greenhalgh, 1987).

Study analyzed that Gender segregation is a difference in contribution of male and female on different profession on trait like education age and other (Moheyuddin, 2005). Education and income inequality mainly in developing countries have a negative outcome on economic growth due to these girls cannot earn more due to lower education facilities than boy (World bank, 2014). The result shows that Female work as legislators, senior officials, and managers from total labor force participation is 3% from 2008-12 in Pakistan. Another study concluded that Segregation can be improved by increasing the education facilities in developing countries. Moreover, disparities are hurdle in economic growth if disparities can be removed then human being will be more productive and play important role to accelerate the economic growth (Irfan, 2013). Temple (2000) also attempted to expose the impact of education upon economic upswing and invent significant alliance among the education and GDP, education always resulting high productivity. In the case of China, explored the reevaluation regarding human capital inputs to China's economic upswing (Whaley, 2010). The investment regarding human capital in China exposed fiscal development in literature which is 38.1 above 1978 to 2008, and rising in 1999 to 2008. Economic upswing regarding Singapore human capital investment, and employment added in last decades (Maitra, 2016) In this study, researcher studied the dynamics of economic growth sustained with human capital and labor force occupation comprising a series of econometric methods. Human capital as well as employment adds to increase in economic development. This study thus tells that the human capital revolution leads to continuous upsurge in economic development. Labor force employment novelty however leads to provisional increase in the economic development of a country.

Maitra (2018) have studied about Bangladeshi incremental income due to effective investment in subject matter (Human Capital) from 1980s to 2016. The author explores that the speculation in human power (capital) as well as income have elevated the expectancy rate of life. The error correction mechanism (ECM) grounded co-integrating kin shadowed, and results derived from Granger Causality, produced revenue to gain with lag periods. Strength of these results has been long-established by connecting an autoregressive distributed lag (ARDL) model of co-integration monitored by its ECM exemplification. A positive worth of the long-run measurements of the education and human capital investments of the ECM-ARDL archetypal designate some long-run promising influence of these reserves on life expectancy and economic growth in Bangladesh. Particularly in Pakistan Abbas (2003) described that practically potential economy would be result of the efficacy of human capital. Pakistani investment (human capital) provide reliability to financial system through OECD, rather than additional education spillover profit increase. The GDP of each person rise in Pakistan i.e., one-fifth included by positive evaluation regarding spending in health provide profit extremely large. Economic development is dependent to guidelines given in 90s upon commitment regarding effects for financial contribution lacking individually. (Shabbir et al., 2015).

In another study in Pakistan Ahmad and Ahsan (2011) also analyzed the service sector in economic growth and employment generation in Pakistan. As service sector is highly diversified researchers divided them into four sub sectors that is: producer, social services, personal and distributive. Ended the past little periods economic configuration of Pakistan faced substantial variations and portion of facility segment has improved in 1960-61 from 39% of GDP to 53.3% of GDP in 2009-10 that's makes provision segment the major provider in GDP of Pakistan. The Growth of finance and insurance sectors is the major reasons behind the growth of service sector as these two sectors provide finance and insurance to investors Shabbir (2015). Researchers observed that even though Pakistan is an agricultural country but people move towards other sectors for better employment opportunities. Share of service sector in total employment increased from 27% to 34.5% from 1973 to 2009. Main reason behind this is service sector provides jobs to all kind of people whether they are skilled, semi-skilled or un-skilled. Study suggested that there is a vital need to find new avenues of service sector. In order to improve human resource

development, research and development and technology up gradation management improvement and improved policy atmosphere will have to be formulated.

Qadri and Waheed (2016) examined the power of rapport concerning human capital and production at collective and sectorial levels. The reading uses a twelve-monthly data set from the years 1981 to 2014 which have been taken from the Pakistan Bureau of Statistics. This research used total and sector-wise invention mockups and pragmatic improved Dickey–Fuller (ADF) test to see the directive of integration and JJ co-integration. Dynamic ordinary least square (DOLS) and fully modified ordinary least square procedures have been used to see the steadiness of the results and then the sensitivity examination has also been executed to see the strength of results. The study lightens the influence of human capital on the production of cultivation, manufacturing and amenities subdivisions which also links the forte of this link with the figures attained from the cumulative statistics. This study has found indication of positive human capital contribution in cumulative and sectorial productions

Material and Methods

The data of educational infrastructure at different level of education is collected from hand book of Pakistan economy from 1978 to 2018. The data of total educational infrastructure is regarded as primary, secondary, tertiary and higher level of education. This study also used different sources of data, such as State Bank of Pakistan, Pakistan Labor Force Survey, Pakistan bureau of statistics, and Pakistan Economic Survey. In this study Cob Douglas production function is used to determine the relationship between human capital and economic growth of Pakistan.

$$Y = AL^{\beta}K^{\alpha}$$

Where:

Y = total production (the actual value of all goods produced in a year).

L = labor input (the total number of person – hours worked in a year).

K = capital input (the real value of all machinery, equipment, and buildings).

A = total factor productivity.

α and β are the output elasticity of capital and labor respectively. These values are constants determined by available technology.

Where $Y = ALKH$

H = Human capital as education infrastructure

In this current econometric model numbers of educational institutions are used as measure of human capital.

$$Y_{Gdp} = \alpha + \beta_1(\text{Institution}_{\text{pri-schools}}) + \beta_2(\text{Institution}_{\text{mid-schools}}) + \beta_3(\text{Institution}_{\text{higher-school}}) + \beta_4(\text{Institution}_{\text{art\&science}}) + \beta_5(\text{Institution}_{\text{prof-co}}) + \beta_6(\text{Institution}_{\text{uni}}) + \beta_7(\text{lpr}) + \beta_8(\text{PHYC}) + \mu_i$$

All variables are converted in log form. Logarithmic of all variable is determined as follow,

$$\ln Y = \alpha + \beta_1 \ln(\text{Institution}_{\text{pri-schools}}) + \beta_2 \ln(\text{Institution}_{\text{mid-schools}}) + \beta_3 \ln(\text{Institution}_{\text{higher-school}}) + \beta_4 \ln(\text{Institution}_{\text{art\&science}}) + \beta_5 \ln(\text{Institution}_{\text{prof-co}}) + \beta_6 \ln(\text{Institution}_{\text{uni}}) + \beta_7 \ln(\text{lpr}) + \beta_8 \ln(\text{PHYC}) + \mu_i$$

As found by Acemoglu and Khawaja (2008) the relationship between the institutional development and human capital.



Infrastructure is one of the social components of human capital. It shows the investment in human capital by improving the educational institutions like school, colleges

and universities. Dessus (1999) also explored the relationship between the global differences in the excellence of the educational system and human capital.

Results and Discussion

For determining the long run relationships in time series analysis, either the data is stationary or not, following equation regarding unit root is as under.

$$\ln\text{RGDP} = \beta_0 + \beta_1 \ln(\text{EIPS}_t) + \beta_2 \ln(\text{EIMS}_t) + \beta_3 \ln(\text{EIHS}_t) + \beta_4 \ln(\text{EIASC}_t) + \beta_5 \ln(\text{EIPC}_t) + \beta_6 \ln(\text{EIUNI}_t) + \beta_7 \ln(\text{LFP}_t) + \beta_8 \ln(\text{PHYC}_t) + \epsilon_t$$

Unit Root Test

The result of Augmented Dickey Fuller (ADF) test reveals that all the variables are non-stationary at level but at first difference all the variables become stationary. However, at first difference null hypothesis of unit root is rejected for all the variables and all variables are integrated of same order at (1). When all variables are 1(1) therefore most appropriate technique for the analysis is Johansen's cointegration.

Table 2
Unit Root Test

Variables	C	C&T	None	C	C&T	None
LnRGDP	-1.030 (0.733)	-1.538 (0.798)	-3.517 (0.999)	-2.476 (0.004)	-3.227 (0.005)	-4.794 (0.000)
EIPS _t	-1.87 (0.34)	-0.34 (0.98)	-2.135 (0.99)	-4.69 (0.0005)	-3.5012 (0.053)	-1.999 (0.041)
EIMS _t	-3.2135 (0.87)	-1.687 (0.541)	-1.306 (0.696)	-4.12 (0.003)	-4.035 (0.006)	-2.430 (0.003)
EIHS _t	-1.475 (0.236)	-2.623 (0.684)	-1.253 (0.782)	-3.290 (0.002)	-4.710 (0.001)	-4.107 (0.000)
EIASC _t	-1.334 (0.455)	-2.172 (0.444)	-1.417 (0.701)	-5.091 (0.000)	-6.137 (0.000)	-4.107 (0.000)
EIPC _t	-1.328 (0.459)	-1.787 (0.741)	-1.406 (0.896)	-3.163 (0.004)	-4.045 (0.006)	-5.930 (0.000)
EIUNI _t	-2.434 (0.565)	-2.172 (0.444)	-1.427 (0.801)	-4.190 (0.002)	-4.170 (0.012)	-4.207 (0.000)
LFP _t	-1.708 (0.419)	-1.959 (0.604)	0.010 (0.680)	-4.072 (0.003)	-6.079 (0.000)	-3.258 (0.002)
PHYC _t	-1.632 (0.695)	-1.671 (0.738)	0.780 (0.878)	-7.922 (0.000)	-8.002 (0.000)	-6.860 (0.000)

Vector Auto Regressive (VAR):

The co-integration technique is always used for determining the long run relationships between dependent and independent variables. The Johansen co-integration techniques are used for finding the relationship among variables in order to find out the co integration. The very first step in Johansen test is to decide the selection of Vector Auto Regressive (VAR) order. By applying VAR, we need to transform all variables in logarithm form and it helps to determine the lag length. To conclude the lag length VAR model is used and giving to AIC criteria, lag length two is determined for this model.

Table 3
Vector Auto Regressive (VAR)

Lag	Log L	LR	FPE	AIC	SC	HQ
0	248.60	NA	1.92	-12.95	-12.559	-12.813

1	617.772	538.792	3.73	-28.528	-24.61	-27.146
2	769.163	147.299*	1.94*	-32.333*	-2.868*	-29.708*

Johansen Co-integration

The next step is to deal with determining number of co-integration vectors. The Johansson test statistics indicates the rejection for the null hypothesis of no co-integrating vectors under both the trace and maximal Eigen value forms of the test.

Table 4
Johansen Co-integration Test.

Hypothesis	Trace statistics	Maximum Eigen value
R=0	417.425*	109.981*
R≤1	307.446*	101.286*
R≤2	206.158*	67.364*
R≤3	138.794*	52.454*
R≤4	86.340*	27.237
R≤5	59.102*	26.029
R≤6	33.073**	17.927
R≤7	15.145	12.299
R≤8	2.846	2.846

Long-run Regression Analysis:

Long-run regression analysis technique is used to test the hypothesis and to examine how independent variables affect the dependent variables.

$$\ln \text{RGDP} = \beta_0 + \beta_1 \ln(\text{EIPS}_t) + \beta_2 \ln(\text{EIMS}_t) + \beta_3 \ln(\text{EIHS}_t) + \beta_4 \ln(\text{EIASC}_t) + \beta_5 \ln(\text{EIPC}_t) + \beta_6 \ln(\text{EIUNI}_t) + \beta_7 \ln(\text{LFP}_t) + \beta_8 \ln(\text{PHYC}_t) + \epsilon_t$$

Table 5
Long Run Analysis

Variable	Coefficient	Std. Error	T-Statistics
Constant	5.931***	0.617	9.601
ln(EIPS _t)	0.274***	0.069	3.927
ln(EIMS _t)	-0.169*	0.09	-1.867
ln(EIHS _t)	0.423***	0.124	3.389
ln(EIASC _t)	-0.136*	0.072	-1.882
ln(EIPC _t)	0.074	0.050	1.453
ln(EIUNI _t)	0.080**	0.029	2.699
ln(LFP _t)	0.752***	0.127	5.886
ln(PHYC _t)	0.087**	0.035	2.530
R-squared	0.942	Adjusted R-squared	0.931
F-Statistics	1866.429	Prob. Value	0.000
Durbin-Watson stat	1.642	Mean dependent var	14.809

Empirical Results

$$\ln \text{RGDP} = 5.93 + 0.274(\text{EIPS}_t) + -0.169(\text{EIMS}_t) + 0.423(\text{EIHS}_t) + -0.136(\text{EIASC}_t) + 0.074(\text{EIPC}_t) + 0.080(\text{EIUNI}_t) + 0.752(\text{LFP}_t) + 0.087(\text{PHYC}_t) + \epsilon_t$$

A positive impact is found between the educational infrastructure to population ratio at primary, higher level schools, universities, Physical capital, labor force and the

economic growth while professional colleges per person has insignificant relationship with dependent variable. Middle schools and arts & science colleges per persons have negative impact on economic growth; there is a need of more investment on middle schools and art and science colleges' infrastructure. It can be summarized from the above model that labor force and infrastructure of high schools and primary school per persons has highest effect respectively, (0.752)(0.423), (0.274) and middle school and art and science colleges, universities, physical capital have average effect respectively (0.169), (0.136), (0.080), (0.087). The professional colleges have lowest effect (0.073) on economic growth. The probability of F-statistic is 0.001 and F statistics is 1866.429, so, the general model is significant. Whereas, R- Square value is 0.942 and Value of Durbin-Watson is 1.642 which shows no multi co-linearity.

Short-run Determinants of Growth (Error Correction model)

The result of error correction model given in table indicates the presence of error correction term for the variables of model

$$\Delta \text{RGDP} = \beta_0 + \beta_1 \Delta(\text{EIPS}_t) + \beta_2 \Delta(\text{EIMS}_t) + \beta_3 \Delta(\text{EIHS}_t) + \beta_4 \Delta(\text{EIASC}_t) + \beta_5 \Delta(\text{EIPC}_t) + \beta_6 \Delta(\text{EIUNI}_t) + \beta_7 \Delta(\text{LFP}_t) + \beta_8 \Delta(\text{PHYC}_t) + \text{ECM}(-1) + \epsilon_t$$

Table 6
Short Run Analysis

Dependent Variable = $\ln Y_t$			
Variable	Coefficient	Std. Error	T-Statistics
Constant	0.033***	0.007	4.427
$\Delta(\text{EIPS}_t)$	0.183***	0.066	2.764
$\Delta(\text{EIMS}_t)$	0.021	0.050	0.416
$\Delta(\text{EIHS}_t)$	0.031	0.059	0.536
$\Delta(\text{EIASC}_t)$	-1.691	2.78	-0.609
$\Delta(\text{EIPC}_t)$	0.013	0.023	0.614
$\Delta(\text{EIUNI}_t)$	0.023	0.021	1.083
$\Delta(\text{LFP}_t)$	0.052	0.152	0.344
$\Delta(\text{PHYC}_t)$	0.043**	0.024	1.764
ECM	-0.358***	0.124	-2.894
R ²	0.331	Mean dependent var	0.050
F-Statistics	1.595	Prob. Value	0.163
Durbin-Watson stat	1.404	S.D. dependent var	0.018

The outcomes of short run dynamics exposed that assessed insulated error correction term is adverse and substantial proposing error correction is trendy in the model. The constant of (Error Correction term) is -0.35 indicates that about 35% of the previous imbalance has been removed in the present period for real GDP. The primary schools per persons and physical capital have significant impact on GDP in short run. In long run and short run it reveals that primary schools per persons and physical capital have significant relationship with economic growth

Table 7
Direction of Causality in Long Run and Short Run

Variables	Short Run Causality									Long Run Causality
	RGDP	EIPS _t	EIMS _t	EIHS _t	EIASC _t	EIPC _t	EIUNI _t	LFP _t	PHYC _t	
RGDP	....	0.668 [0.578]	3.055** [0.043]	2.507* [0.077]	0.658 [0.558]	3.175** [0.038]	3.578** [0.025]	0.240 [0.867]	2.280* [0.099]	.....
EIPS _t	0.668 [0.578]	....	5.528** [0.004]	3.347** [0.032]	0.240 [0.868]	1.682 [0.192]	5.1361* ** [0.005]	4.389** [0.012]	0.8079 [0.500]	-0.445*** [-2.691]
EIMS _t	4.502** [0.010]	4.58*** [0.009]	....	2.281 [0.100]	3.202** [0.037]	5.538* [0.004]	1.543 [0.223]	1.199 [0.326]	1.9447 [0.144]	-0.578*** [-3.062]

EIHS _t	0.479 [0.699]	2.309 [0.096]	0.302 [0.824]	....	4.104 [3.615]	1.200 [0.327]	1.808 [0.167]	0.953 [0.427]	1.004 [0.404]	.....
EIASC _t	0.658 [0.584]	0.434 [0.730]	4.825* [0.007]	3.614** [0.024]	....	1.811 [0.166]	2.934 [0.789]	1.558 [0.220]	1.933 [0.145]	.....
EIPC _t	3.175 [0.038]	1.682 [0.192]	9.59*** [0.000]	3.347** [0.032]	0.240 [0.868]	....	5.136** * [0.005]	2.408* [0.086]	0.8079 [0.500]	.....
EIUNI _t	0.819 [0.493]	0.345 [0.792]	3.641** [0.024]	1.735 [0.181]	0.818 [0.494]	1.717 [0.185]	....	3.042** [0.044]	2.069 [0.125]	.....
LFP _t	0.240 [0.867]	1.170 [0.337]	3.826** [0.020]	1.779 [0.172]	2.821** [0.056]	4.390* [0.087]	0.777 [0.516]	....	1.265 [0.304]	-0.312** [-2.110]
PHYC _t	2.280* [0.099]	0.832 [0.486]	1.462 [0.245]	2.087 [0.123]	1.700 [0.188]	4.631* [0.009]	3.132** [0.03]	2.238 [0.104]	....	.....

Long-run Granger Causality Analysis

The above table shows that unidirectional and bidirectional causation between the variables is found. The Long run causality relationship is found in primary schools, middle schools, labor force participation, university level, total labor force and independent variables.

Short-run Granger Causality Analysis:

The real GDP is granger caused by physical capital, universities, professional colleges, high schools, middle schools. Primary schools as dependent variable has bi-directional granger causality with middle and high schools and unidirectional causality with universities and labor force participation. A middle school as dependent variable has a bi-directional granger causality with Real GDP, art and science colleges, primary, high schools, and specialized colleges. The professional colleges as dependent variable has bi directional granger causality with real GDP, middle, high schools and labor force participation and unidirectional causality is found with universities. Unidirectional causality is found between universities, labor force participation in the economy. Labor force participation has bi directional granger causality with professional colleges and unidirectional causality is found with art and science, high and middle colleges, and unidirectional causality is with professional colleges, universities and physical capital.

Conclusion

Infrastructure is one of the social components of human capital. It shows the investment in human capital by improving the educational institutions like school, colleges and universities. The results revealed that there is a significant role of human capital (educational institutions) in economic growth in the long run. Findings also revealed that in the long run a significant and positive relationship exists between the educational infrastructures per person at primary, higher level schools, universities and economic growth. In this study infrastructure of high schools and primary school has highest effect and middle school and art and science colleges, universities, physical capital have average effect while professional colleges have lowest effect on economic growth. In the small time period jut primary schools and physical capital having substantial effect upon GDP. So this research implies that there is a need of more investment on the infrastructure of middle level school, art and science colleges and universities. Hence, it is suggested that Government should invest more in education division in order to have more productive labor force to accelerate the economic Growth.

By summarizing the above result, in long run there is a significant impact of educational infrastructures at primary, higher level schools, universities on economic growth. A negative relationship is found between the middle school, art and science colleges and economic growth. Professional college's infrastructure has insignificant effect on the growth and in the short run only primary schools and physical capital has significant impact on GDP. Even though promise of government before election to rise the financial plan on teaching to 4% of GDP ended the following five eons, Pakistan still devotes a miserable 1.9

% of the GDP on teaching. In line for such little expenses, Pakistan is amongst the smallest disbursements nations on teaching.

Implications and Future research

There is a need of more investment on the infrastructure of middle level school. According to Andrabi and Khawaja (2008) that increase in private schooling is decentralized, market based, and totally unaided by government subsidies or support. The children enrolled 35% in 2000 at the primary level in private schools, and that percentage has been growing rapidly. This research is limited to Cobb Douglas production function. Future research can be carried on with other econometric procedures with addition to sectors other than the education sector

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