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Impact of Human Capital on Economic Growth- A Growth Accounting Equation for Pakistan

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ABSTRACT

The interest of researchers in exploring the various dimensions of human capital and observing its considerable impact on economic growth has caused the human capital theory to become a fascinating field of research for economists. The study focused on the impact of the human capital along with estimating a growth accounting equation for Pakistan. To fulfill the objectives of the study, two models have been estimated utilizing time series data from year 2001 to 2014. The first model transforms the standard Cobb-Douglas production function to its linear form using trans-log function. The 2nd model used three proxies of education enrolment at various levels along with two health proxies for human capital. The result drawn from model first concluded that Pakistan economy undergone through decreasing returns to scale during period under consideration. The 2nd model showed that the output per person is positively related to middle & higher secondary education enrolments while the enrolment at higher secondary education level & life expectancy showed a non-significant relationship contrary to infant mortality rate & primary education enrolment that showed negative and significant relationship. The study recommended policy implications that amongst the chosen enrolments at three levels, the education department may focus on enhancing enrolment at middle level while the health department may focus on reduction in infant mortality rate for enhancing per capita output in the country. The study has emphasized, for the first time, the need for inclusion of human capital as a separate factor of production like traditional labour and capital in national accounts statistics of Pakistan.

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INTRODUCTION

Human resources are active while physical and natural resources are passive factors of production. In order to use other resources properly, it is imperative to develop the capacity of human beings through literacy, trainings, skill development, access to health facilities and improving quality aspects. Human beings can enhance physical capital and are able to establish economic and social institutions (Adelakun, 2011).Conventionally amongst the four factors of production i.e, labour, capital, land and organization, the first two were considered more important. Economists presented production function to focus on capital, labour and their interaction and considered land and organization being fixed in the short run. Schultz (1961) at first recognized the role performed by human capital in economic development and claimed that that the productive capacity of human beings is greater than all other forms of wealth.

Semantically the term human capital is the mixture of human and capital. The physical Capital refers to factor input utilized to create goods and services but not exhausted in production process significantly (Boldi Zoni 2008). Human in this context takes charge of production, consumption, exchange and distribution in creation of goods and services. So the combined human capital term will mean human capital as a separate factor of production affecting output like other factors of production. The production function shows a technical relationship between input and output. Considering physical capital and labour as factors of production and finding their relationship with output can easily be presented through a production function. One such famous form is a production function developed by US senator Paul Douglas and Charles Cobb, a mathematician in the year 1927 generally known as Cobb Douglas production function and is commonly used in explaining effects of inputs on output (Abel & Bernanke, 2011).

Economic literature describes human capital as physical capacity and acquired mental abilities of human beings through education, training, skill development, health care and spiritual activities & practices like yoga (Singh, 1999). (Singh, 1999). The essential requirement for economic progress is the development of human resources (Harbinson and Myers, 1964). (Harbinson and Myers, 1964). Generally, the notion of Human Capital is used for education, health, skill development and other attributes of individuals that can boost their productivity and efficiency (Todaro, 2002). (Todaro, 2002). To correlate human capital within historical context in Pakistan, it is necessary to highlight that when Pakistan was created in 1947, proper attention was given to build up physical capital & natural resources but sadly investment in human capital was disregarded. For the first time in 1970's appropriate attention was given to manpower planning and education. A decision was made to nationalize many industries in Pakistan including education and resultantly labour was sent to abroad in gulf countries.

The rationale for the study is that when a researcher seeks to analyze human capital as a factor of production, a larger challenge is faced in obtaining precise data due to its non-reporting in national accounts. The existing form of national accounts data in Pakistan does not report human capital as a factor of production. A probable argument is because economists have still not yet agreed on a standard worldwide measure for human capital like well-known GDP& GNP measurements. This implies that attempts be made to develop either an Index for Human Capital or to apply some proxies to solve the problem. This study attempts to use proxy variables depicting some elements of education and health to address the issue and explores that in case the labour and capital is considered in growth accounting equation, and the human capital is ignored as a factor of production, the result is a decreasing return to scale for the period 2000-2014 in Pakistan.

It is crucial to state that the curiosity of academics in investigating the many characteristics of human capital and seeing its great impact on economic growth has caused the human capital theory to become a fascinating subject of research for economists at international level. As far as Pakistan is concerned, a long term plan called as vision 2025 has been established recently by the government of Pakistan under the scope of Ministry of Planning, Development and Reforms (former Planning Commission of Pakistan) (former Planning Commission of Pakistan). Human capital has been given top most attention as pillar 1stfor economic growth and development. This allowed the researcher to study that how some chosen metrics of education and health will affect the long run economic growth in Pakistan.

Why growth matters?

Standard of living of a nation is determined by growth rate of output over a longer period of time. Even an apparently small difference in the rate of economic growth over a longer span of time can cause a large difference in average income per person. A historical comparison of two countries Japan and Australia can be quoted as an argument as shown in the table 1.1.

Table 1: *Economic Growths in Eight Major Countries, year 1870 to 2006.*

Real GDP per capita for year 1870-2006					**Annual Growth %**
Country	**1870**	**1913**	**1950**	**2006**	**1870-2006**
Australia	3,273	5,157	7,412	**24,343**	**1.5**
France	1,879	3,485	5,186	**21,809**	**1.8**
Canada	1,695	4,447	7,291	24,951	2.0
Japan	737	1,387	1,921	**24,462**	**2.5**
Germany	1,839	3,648	3,881	19,993	1.8
Sweden	1,662	3,096	6,739	24,204	2.0
United Kingdom	3,190	4,921	6,939	23,013	1.5
United States	2,445	5,301	9,561	31,046	1.9

(Source adopted from Angus Madison available at www.ggdc.net/moddison)

The Australia had a four times greater per capita GDP than Japan in 1870's but Japan catch up in 2006 just with only 1% faster growth rate. This signifies that growth really matters in a country's economic Development. The higher the growth rate in a country, the higher is per capita income of its people, thus enjoying higher living standard. Economists are always thinking that why some countries are developed and some others are under developed. Although they did not develop a simple formula or magic wand yet, to convert all countries in to develop ones, but the scrutiny of economic history of countries has given many insights into understanding the economic growth and development process and procedures. Research findings point to a strong connection between human capital and productivity growth (Abel & Bernanke, 2011).

The Output of a country although capturing many diverse activities i.e. production of goods and services in agriculture, industry and services sector but is represented through a single measure of GDP or per capita so there exist a possibility of representing human capital through a single measure. This necessitated that efforts can be made to construct either a Human Capital Index or to use some proxies to solve the problem. This study attempts to use proxies of education and health and attempts to improve our understanding of the human capital and its role in economic growth. Apart from that a growth accounting equation has also been estimated for Pakistan to explore contribution from physical capital and labor with some suggestions at policy levels. Similarly, this study has to answered the question that whether the Human capital is having an impact on output and growth? And what is the growth accounting equation for Pakistan? Therefore, the present study aimed to assess the impact of human capital on economic growth and to estimate a growth accounting equation for Pakistan.

This study is having dual peculiarities of judging the impact of human capital as factor of production through proxy education &health indicators besides other factors like labour &capital and estimating a growth accounting equation for Pakistan. The research is helpful in improving our understanding about the role of human capital in economic growth. It intends to contribute to the prevailing literature and considers human capital as a factor of production. Above all it can also be helpful for policy making at different levels. The study can be helpful to all those interested in increasing the Pakistan's output and its growth rate. Similarly, the Pakistan growth dynamics once explored can be enhanced with focus on human capital aspects rather than traditional labour and capital context and framework. Apart from that, the education department can focus on choosing specific enrolment rates at primary, middle or secondary education levels as they are positive/negative contributors to economic growth by channelizing more resources as per the conclusion drawn based on empirical basis. Similarly, research can also be helpful to health department once it is established that two variables of life expectancy and infant mortality has some effect on Pakistan economic growth rate. The health practitioners and development planners can mold their policies accordingly in order to increase Pakistan's growth rate by targeting these variables with relevant magnitudes.

LITERATURE REVIEW

To trace back the research problem, it is imperative to mention that at first economists focused on physical capital and labour being responsible for economic growth. It was nearly in 1960s that explicit attention given to the human beings responsible for economic growth. Now economists consider human capital as a separate factor of production. Some of the scholars have even gone beyond and divided human capital into tangible and intangible elements like self-esteem, trust and other considerations like psychological and sociological capital. Hence, some of the relevant literature is listed as under:

According to Bills and Klenow (2000), countries with high rates of school enrolment can expect higher growth in per capita income. Increased educational participation speeds up productivity gains. Research shows that education has a long-term impact on economic growth, hence raising educational standards is suggested in order to boost productivity. In the long run, this will have an impact on the rate of growth as well. Abbas (2001) investigated empirically the importance of human capital in economic development by analyzing Sri Lanka and Pakistan. Human capital was clearly shown in the production function, whereas output per person was

chosen as the dependent variable in growth accounting. Sri Lanka and Pakistan's economy grew significantly as a result of human capital, according to the empirical evidence. Agiomirgianakis et al. (2002) used extensive panel data to assess the impact of human capital on economic growth. A dynamic panel data approach was used over a period of 27 years in ninety three nations. The study's findings revealed that economic growth and education have a strong beneficial link. Increasing educational attainment has also been found to have a positive effect on economic growth. Rodrik (2003) found that economic growth is distinct from its maintenance and sustainability. He went on to explain that just modest reforms are required to kick-start the economic process, but larger reforms are required to keep it going and keep it sustainable. Continuous institutional improvements, he says, are essential for economic progress because they keep productive dynamism alive. He came to the conclusion that there are some principles that can aid great growth, such as competition in the market, the protection of property rights, and low inflation levels. Governments can use these concepts to create a variety of policy options. Amjad (2005) looked into the factors that contributed to Pakistan's relatively strong economic growth. He did a lot of research on the reasons for the wide range of human capital formation quality. According to his research, faster growth rates can be attained through increasing physical capital and boosting the quality of institutions. In addition, he came to the conclusion that economic growth may be considerably effected if education and health care are improved.

To calculate Pakistan's factor productivity (TFP) between 1985 and 2005, Azam (2006) employed two functions of Cobb-Douglas and Trans log: Cobb-Douglas and Trans log. In the manufacturing sector, productivity rose an average of 2.4% per year, with output growth mostly driven by increases in capital. Due to a rise in labour and total factor productivity (TFP), agricultural production grew at an average rate of 1.75 percent per year. Compared to other developing countries, Pakistan's sectorial Total Factor Productivity estimates are found to be on par or even above the average level. Even back then, Pakistan's economy was lagging behind that of East Asia. TFP in Pakistan has risen at an annual average rate of only 1.1%, which has resulted in GDP growth due to an increase in manpower and capital. First, Khan (2006) used the standard growth accounting framework to estimate Pakistan's Total Factor Productivity (TFP) and then established its macroeconomic factors, such as GDP. There was no evidence that education spending had any impact on the study's Total Factor Productivity (TFP) from 1960 to 2003, according to his analysis of historical data. According to Akram's (2008) estimates, economic growth has a positive correlation with people's health. He discovered a symbiotic relationship between increased economic prosperity and better health care. Human capital, such as health and other forms of human capital, boosts the GDP per capita by increasing the productivity of human beings. When some of the increased revenue is invested in human capital, the growth of the population continues to rise.

For the years 1947-2007, Husain (2010) focused on Pakistan's long-term growth drivers and factors. As a result of his research, he makes some recommendations on how to keep the country's economic momentum moving forward. In Nigeria, Adelakun and Johnson (2011) looked at the connection between economic growth and the development of human capital. An ordinary least squares method was used to examine the association between economic growth in Nigeria and human capital development. The gross domestic product (GDP) was utilized as a proxy for economic growth, while the enrolment patterns of primary, secondary, and postsecondary institutions were employed as proxies for human capital. There is a high correlation between economic growth and the development of human capital, according to the findings.

Human capital generation and economic growth in Pakistan were studied by Sajjad et.al (2012). He used data spanning the years 1972-73 to 2010-11 as his source. The findings suggest that physical capital, school enrollment, and health, a proxy for human capital, are essential for promoting economic growth in countries. Gross Domestic Product in Pakistan is affected by human capital, fixed capital, and the employed labour force in non-unidirectional and non-unidirectional causality. Following an estimation of the model, the author concludes that in Pakistan, the education enrollment index, gross fixed capital formation, and the Gini coefficient have a significant and positive impact on GDP, while the CPI inflation rate, infant mortality rate, head count ratio, and investment growth rate have a negative and significant impact.

According to Mohammad et al. (2013), the health sector in Pakistan has an impact on economic growth. The study makes use of secondary data that spans the years 1975 to 2010. Pakistan's economic performance is thought to have been affected by health-related problems. This was done using the auto-regressive distributed lags (ARDL) method. We utilized as independent variables: gross fixed capital formation, the number of dispensaries, the number of hospital beds, the number of people employed, the cost of healthcare, the exchange and inflation rate, and the total number of doctors registered in the country. Except for the exchange rate, which has a negative relationship with growth, all other variables are linked favourable to economic growth. Pakistan's economic growth was shown to be boosted by better health facilities, and it was recommended that the government offer better and enhanced health services to the population. An increase in health care spending is possible in this year's budgets. Researchers Tariq and Maqbool (2014) looked at the nonlinear relationship between Pakistan's complementarity assets and the country's economic production. At least three long-term co-integrating equations were found to exist, according to the results. Complementary assets exhibit a decreasing return to scale for capital creation and a positive and increasing return to scale for labour when the rate of change is determined and regressed on the rate of productivity change. Khan and Safdar (2014) looked at the role of education and the importance of effective labour when assessing human capital. It is found that greater levels of education have a significant impact on economic growth when it comes to assessing the impact of human capital. In addition, a well-trained and well-equipped workforce was a major factor in the expansion of all educational levels. In developing countries like Pakistan, the importance of human capital investment is well acknowledged. Using time series annual data spanning the years 1979 to 2010, Samar & Waqas (2014) investigated the effect of human capital formation in Pakistan's economic growth. The multiple regression model incorporates variables such as the infant mortality rate, the Gini coefficient, fixed capital formation, the education enrollment index, and GDP. Education and health are essential for Pakistan's economic progress, according to the findings of this study. Gross Domestic Product (GDP) was found to be significantly influenced by human capital formation.

Economic growth can be influenced by human capital, according to Ongo et al. (2014). Secondary education has a positive effect on human capital development, according to a multiple regression model applied to the individual countries first, and then to the entire sub-region, using the method of Generalized Least Square (GLS). Workers' productivity rises as they gain experience on the job. Human capital is strengthened and improved by a well-functioning health care system. As a result, the CEMAC region's economic growth is strongly influenced by human capital accumulation. Numerous methods have been employed to examine the link between human capital and economic growth from 1982 to 2014, and academics have identified several sorts of proxy variables for human capital. Almost majority of the researchers who conducted these

analyses used education and health as proxy for human capital. Because national accounts do not include statistics on the stock of human capital, proxies have been employed instead. As far as the selection of procedures and variables in the study is concerned, these have been chosen based on their relative importance on both theoretical and empirical grounds. It is consistent with other researchers' decisions to use the same variables and methodology (Mankiw 1992, Romer 1990, Barro and Lee 2000 and Sajad Ali etal, 2012). Human capital is not included as a separate element of production in Pakistan's national accounts, thus the study aims to find an issue that has not been addressed, compute a growth accounting equation, and assess the influence of human capital on Pakistan's per capita output.

METHODOLOGY

This section deals with scope and time period of the study, type and sources of data, definitions of chosen variables, conceptual and theoretical aspects, model specification, and analytical techniques used in the study. The study attempts to explore the impact of human capital on economic growth in Pakistan from year 2000 to 2014 and the output per Person has been considered for that instead of GDP or GNP figures as the real output per person is a relatively better term to report the economic growth over longer period of time. The study used annual time series data ranging from year 2000 to 2014 in Pakistan. The data is taken from State Bank of Pakistan publications and various issues of Pakistan Bureau of Statistics and economic Survey of Pakistan.

Models Types and Definitions of Variables

The first model is used for estimating a growth accounting equation for Pakistan economy using Cobb Douglas Production function. The second is used for finding the impact of human capital on economic growth that uses some proxy variables of education and health. Multiple regression models are used using OLS method for estimation of unknown parameters in these two models. The human capital is not observable in data directly, therefore it is included through some proxy variables. The relationship in 2nd model is showing output per person as dependent variable associated with seven independent variables labour, Gross total investment, enrolment rate at primary, middle, secondary level, life expectancy and infant mortality rate.

Theoretical and conceptual framework

Two models have been estimated in the study utilizing time series data from year 2010 to 2014. The first model transforms the standard Cobb-Douglas production function to its linear form using Trans log function. The 2nd model used three proxies of education enrolment at various levels along with two health proxies for human capital. The Choice of techniques and selection of variables have been made keeping in view their relative importance on theoretical and empirical ground. (Mankiw 1992, Romer 1990, Barro & Lee 2000 and Sajad Ali etal, 2012).The Explanation of attempted variables and their desired hypothetical impact are described as follows: -

i. **Labour:** Civilian labour force is considered as labour. All persons having age of ten years and above who worked at least one hour during reference period, either paid employees or self-employed. Theoretically Labour force and output per person are positively correlated. The more is the labour, the more is the output and so on.

ii. **Capital:** The gross total investment is taken which is summation of gross fixed capital formation and change in inventories as proxy for capital. It is presumed that with increase in capital, the output per person increases, showing that these are related in positive way.

iii. **Enrolment at primary level:** It is the education centric human capital proxy to represent the number of student enrolled at primary level from class 1 to 5th. The relation between output per person and enroll at primary school is considered as positive.

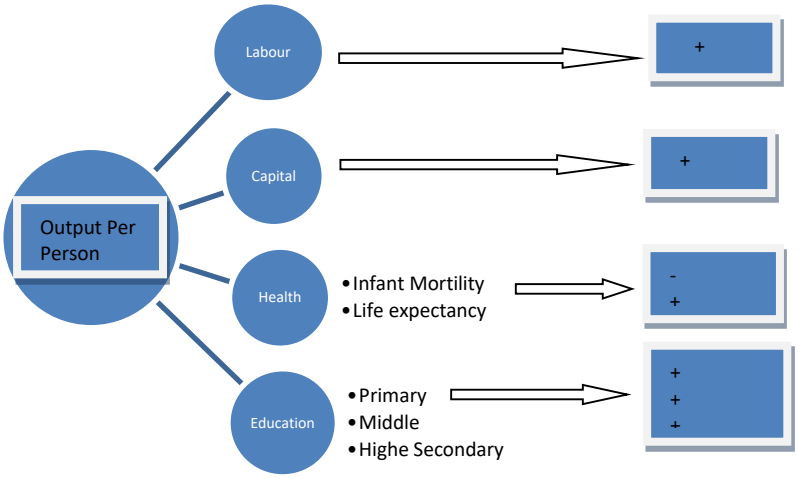
iv. **Enrollment at middle:** It is the education centric human capital proxy to represent the number of student enrolled at middle level from class 5th to class 8th. The relation between output per person and enroll at middle school level is considered as positive.

v. **Enrollment rate at higher secondary**: It is the education centric human capital proxy to represent the number of student enrolled at higher secondary level from class 9th to 12th. The relation between output per person and enrollment at higher secondary school level is considered as positive.

vi. **Life expectancy:** It is the Health related human capital proxy to represent the average time in years an individual is expected to live, based of year of birth, as independent variable. The higher the life expectancy, the higher will be output per person and vice versa.

vii. **Infant mortality:** The infant mortality defined by number of live births per thousand population and average growth rate are negatively related. As the infant mortality increases, the output per person decreases and so on.

Figure 1: *Depicting theoretical and conceptual frame work*



Analytical techniques

This study focuses on the specific form of the Cobb Douglas production function in growth accounting form where physical capital and labour are inputs and output per person as output.

$$Y_i = \beta 1\, L^{\beta 2}\, K^{\beta 3}\, e^{ut} \qquad (1)$$

Where **Y**=output, **L**= labour input, **K**=capital input, **u**= stochastic disturbance term,

e= base of natural logarithm

From equation No.1, it is clear that the situation is nonlinear, however if we long transform this model, we obtain.

$$\ln Yi = \ln \beta 1 + \beta 2 \ln Li + \beta 3 \ln Ki + ui$$

$$= \beta o + \beta 2 \ln L + \beta 3 \ln K + ui \qquad (2)$$

Where $\beta_o = \ln\beta_1$

Some of the properties of this type of production function can be shown as follows:

- B_2 is elasticity of output (partial) with respect to labour input and if others things are held constant, B_2 is the percentage variations in output, in response to a 1% variation in labour input.
- B_3 is the elasticity of output (partial) with respect to capital input which measures the percentage variations in output in response to a 1% variation in capital, holding labour input constant.
- The sum ($\beta_2 + \beta_3$) gives returns to scale that means, the elasticity of output with respect to proportionate change in both capital and labour inputs. If the sum is greater than 1, there is an increasing return to scale. In case the sum is equal to 1, it represents a constant returns to scale and if it is less than 1, that represents a decreasing returns to scale.

A Multiple Regression Model

Model-2 takes output per person as dependent variable while labour force, total investment, Enrollment at primary level, middle level and high secondary school level, life expectancy and infant mortality as independent variables with form as under.

$$OPP = A\ F\ (L, K, Pry, Mdl, High, Expy, IM) \qquad (3)$$

Where

OPP = output per person, **F**= function form, **L**=civilian labour force, **K**= Total Investment, **Pry**=enrolment at primary level, **Mdl**=enrolment at middle level, **High**=enrolment at high secondary level, **Expy**=life expectancy, **IM**=Infant mortality. The econometric log form of the equation, expressed in multiple regression form is as under:

$$Ln\ Opp = \beta 0 + \beta 1 \ln Lt + \beta 2 \ln Kt + \beta 3 \ln Pry + \beta 4 \ln MDl + \beta 5 \ln High + \beta 6 \ln Expy + \beta 7 \ln + \beta 8 \ln IM + ei \qquad (4)$$

Where $\beta i$are the unknown parameters to be estimated and *ei* is error term.

Unit Root Test

The first and foremost thing in time series data is to determine whether the data used in a series is stationary or otherwise. The regression is said to be spurious or meaningless in the presence of non-stationarity in data. In this study unit root test (ADF along with PP test) are used

for such purpose. The other tests like Heteroscedasticity, Multicollinearity and Autocorrelation were also considered.

RESULTS AND DISCUSSIONS

This section deals with the analysis of the data, results of analytical techniques, results of the diagnostic test and discussions. Some basic statistics have been used for analyzing the data and its changes over the chosen time period of fourteen years. The table 4.1 shows Minimum, Maximum, Mean, Median, Skewness and Kurtosis values for chosen variables.

Table 2: *Basic Statistics for 08 Chosen variables.*

	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
Ln OPP	10.007	11.814	1.09556	.631425	-.254	-1.320
Ln L	3.719	4.103	3.94343	.137121	-.300	-1.480
Ln K	13.334	14.962	1.41604	.637306	-.328	-1.725
Ln PRY	9.554	9.840	9.76029	.101695	-1.230	-.057
Ln MDL	8.232	8.771	8.52793	.182219	-.563	-1.056
Ln HIGH	7.356	8.012	7.70821	.234537	-.474	-1.316
Ln IM	4.191	4.443	4.30164	.081730	.442	-1.076
Ln LE	4.135	4.205	4.16871	.023779	.721	-.979

(Source: Pakistan Bureau of Statistics, 2015)

Test of Stationarity

The first stage in the application of the regression analysis is to check whether the time series data is stationary or otherwise? The non-stationarity of data, influences its behavior and properties. As a result, the analysis undertaken would be misleading. Thus it is strongly recommended to check the stationarity of the series. Among the several test of stationary that are available, this study had used the unit root test for check the stationarity of the data used in the model. The first and foremost thing is to check and determine whether the series of variables are stationary or otherwise. The regression is said to be meaningless or spurious in the presence of the unit root in a series. The co-integration test is applied in situation when the variables have the same order of integration. The Augmented Dickey Fuller (ADF) and Philips-Perron (PP) test is used for determining the level of integration between the variables. The study has tested stationarity of the data using Peron Person (PP) and Augmented Dickey Fuller Test. Both the tests have been applied on the levels and series were not stationary on level. The tests confirmed that all the series of variables become stationary after the first difference. It also shows that all the variables have the same order of integration that is I(1). The results of unit root test in the series have been based on estimation of E-views 6 and are shown in table 4.2.

Table 3: *Model 1 Result of Unit Root Tests*

Variables	ADF		PP		Integration Order
	Level	1st Difference	Level	1st Difference	I(1)
Ln opp	0.94	-4.28*,**	-1.56	-5.02*,**	I(1)
Ln L	-1.21	-3.99*,**	-1.05	-5.62*,**	I(1)
Ln K	-1.91	-3.00*,**	-1.91	-3.26*,**	I(1)
Ln Pry	-1.35	-3.71*,**	-1.05	-5.66*,**	I(1)
Ln Mdl	-1.54	-3.38*,**	-1.43	-2.65*,**	I(1)
Ln High	-1.74	-4.95*,**	-1.21	-2.59*,**	I(1)
Ln Expy	-1.36	-2.75*,**	-1.54	-2.75*,**	I(1)
Ln Im	-1.45	-4.96*,**	-1.41	-5.39*,**	I(1)

te:- The steric notations of *, ** and *** denoted the rejection of unit root at different levels of significance of 1%, 5% and 10% , respectively.

The result from Augmented Ducky fuller test indicates that as the series is not stationary in its level, so the null hypothesis of the unit root cannot be rejected at all conventional levels of significance. The ADF with one lag test statistics rejected the hypothesis of unit root at all conventional levels of significance, and suggests that all series seems to be first difference stationary I(1)). Results from the PP tests validates conclusion that each of the series, after first difference, is stationary. This is an indication that differenced data has to be used in the study. As both the test variables are integrated of the same order, so application of co integration test is advisable to check whether there exists a stable long run relationship to show whether there exists a long term relation between economic growth and other chosen human capital proxied variables.

Consider equation No.02 in section 4 as under:

$$\boldsymbol{lnY = ln\beta o + \beta 2 lnL + \beta 3 lnK + ui}$$

The regression output using OLS estimate through SPSS is obtained in table #. 5.3 as under:

Table 4: *Determinants of Gross Domestic Product (GDP)*

Model		Unstandardized Coefficients		T	Sig.
		B	Std. Error		
	Const	3.588	1.218	2.945	.013
	Ln L	2.021	0.423	4.774	.001
	Ln k	0.311	0.160	2.946	.007
R-Square= 0.96		F Statistic= 4.75		D.W = 2.54	

Source : Pakistan Statistical Bureau, 2015

Ln GDPt = 3.588+ 0.708lnLt+ 0.289lnKt+et **(6)**

Equation No. 05 can also be called growth accounting equation as it tells the separate contribution of labour and capital used in generating output/GDP. As is shown in Eq. 05 that from period 2000 to 2014, the output elasticity of capital and labor were 0.289 and 0.708 respectively. In other words, about 0.70 percent increase in the output, on the average, has been caused by a one percent increase in the labor input only. Similarly, a 1% enhancement, on the average, in the capital input led to about a 0.28 percent increment in output, holding the labor input as constant. Adding the two output elasticities, we obtain 0.98. The following model is estimated using OLS estimates. The regression result is obtained through ordinary least square (OLS) method and co-efficient.

Table No. 5: *Impact of Human Capital (proxy variables) on Economic Growth*

Variable	Coefficient	Std. Error	T-Statistic	Prob.
Ln L	3.395544	0.540080	6.287116	0.0004
Ln K	0.469954	0.126633	3.711157	0.0075
Ln PRY	-1.516796	0.420587	-3.606378	0.0087
Ln MDL	1.836899	0.647200	2.838224	0.0251
Ln HIGH	0.609141	0.895336	0.680349	0.5181
Ln IM	-1.403994	0.555971	-2.525302	0.0395
Ln EXPY	1.128362	0.676898	1.666961	0.1395
R-squared	0.97175	Durbin-Watson statistics		2.29726

(Source : Pakistan Statistical Bureau, 2015)

The results indicates the model is fit at best as the co-efficient of determination R square is 0.97 meaning that the independent variables chosen explains 97% of variation in dependent variable of out per person (OPP).The Durban Watson test value is 2.29 signifying that no autocorrelation exists. Regarding the co-efficient of parameters and determining the significance/non-significance of the independent variables with respect to dependent variable it is stated that the ln labour is having the co-efficient of 3.39 and is also significant as the probability valve is .0004-less than .05 as shown in table above. This means that a one percent variation in labor will vary the out per person nearly 3.4%. The positive magnitude indicates that any increase in labour will also brought about a more than thrice increase in output per person and vice versa. The results is consistent with the economic theory of production function where labour is an active factor of productive and brings changes in output. On macro level same is the case, as the number of labour increases, as a result, the ouput/GDP also increases. Specific to our case, when we correlate output per person to labour, it is also confirmed from this research findings that the more is the number of workers in an economy, the more output will be produced by each individual. This is a striking result because many economists consider increase in population a cause of decrease in output per person but our results is somehow focusing on this issue in a different way. This research finds that despite increase in population, output per person can be increased considerably if that increase constitute an increase in labour force and not just increase in other segments of population like unemployed or not in the labour force. The ln capital is shown by K and its co-efficient value is obtained as 0.46 indicating that one percent variations in capital will bring about a less than 1% variation that is precisely 0.46 percent change in output per person. Although the co-efficient obtained through this model is significant as the valve of probability is less than .05 and as shown in table 5.4 its magnitude is similar to the theory. The economic theory states that as capital increase, the output also increases. The results of the variable are in conformity with the theory.

The enrolment at various school levels is also used in the model as independent variables because many researches support that increase in enrolment also increase the GDP in a country. In our case three enrolment at primary, middle and high levels are taken to show which level determines how much changes in output. The results indicates that the middle enrolment rate will be a decisive factor in determining a change in output per person in Pakistan as the valve of co-efficient is 1.83.This indicated that a one percent increase in enrolment at middle level will bring about more than 1 % increase in output per person and precisely to be 1.83%. The sign of the variable chosen is consistent with economic theory and other researchers that also show a positive relationship between the two. Last but not the least it is also to comment that the valve is significant as 0.025 is less than .05 accordingly. The enrolment at higher level and life expectancy both exhibited a sign as expected. Both variables shown positive relationship with output per person but for both the values of probability as being 0.51 and 0.13 respectively that make them non-significant thus concluding these variables are not significant enough to bring about variations in output per person as per findings in this research. The case with primary level of education is not observed as per expectations. The findings indicate that the co-efficient of primary enrolment is -0.46 but still significant as having valve of 0.008.This indicates that an inverse relationship exists between enrolment at primary level and output per person and one wonders why the case is so? To search for probable reasons of the issue the education data along with data trend in output was analyzed and scrutinized. It is realized that as a major portion of children of primary aged group are out of school nearly 25 million in Pakistan (Alif Ailan 2015), it is likely that majority of them will be involved in child labor activities. Thus an increase in enrolment at primary level may

associate with lower output due to their non-involvement in work anymore. Some researches confirm interplay between the out of schools children and child labour to state that out-of-school children are more likely to be child laborers. (Lorenzo et al, 2014).

The infant mortality showed negative relationship with output per person as the value of the co-efficient is -1.40. This indicates that any one percent increase in the infant mortality rate per thousand populations will decrease output per person even more than that i.e 1.4% in this case. This is also striking concussion from the research that health indicators also is having a strong link with the national output as suggested by this research. When the infant mortality rate increases, lower number of children survives and adds to the labour force thus causing output to fall. The results are entirely consistent with the economic theory and other researchers' findings.

FINDINGS, CONCLUSION & RECOMMENDATIONS

Findings from 1st Model -Growth accounting equation

The following can be concluded from the research findings.
As is evident from equation No. 05 that the elasticity of output(GDP) with respect to labour is 0.7 while that of capital is 0.28 signifying that labour is the decisive factor in determining output(GDP) in Pakistan. Although many economists argue that capital is more important to cause variations in output, this study found that output is more responsive to variations in labour input rather than in capital. The Pakistan economy is undergoing a decreasing return to scale because the sum of the elasticities of output with respect to labour and capital is 0.98 which is less than one. Thus any effort to increase the amount of inputs for enhancing output may not be successful and just mere variations in the amounts of inputs may not enhance the GDP even at similar or higher increments in inputs.

Therefore it is recommended based on findings from this research that the government of Pakistan must not only focus on just labour and capital but should make efforts to bring about other structural reforms that may lead to increasing productivity of both labour and capital so that the status of economy characterized by decreasing returns is converted to at least constant or preferably increasing returns to scales. These measures may include increasing the productivity of labour through investing in human capital by imparting different trainings, use of modern tools, application of entrepreneurial abilities and focusing on technical skills as Pakistan will be having the highest number of young people in the upcoming years and this youth bulge can turn Pakistani economy into a fastest growing economy. The following can be concluded from the 2nd portion of research findings.

The output person and of enrolments at middle & high levels showed positive relationship while primary enrolment showed negative relationship with output per person due to the little importance of primary education in job market. Amongst the chosen proxies used for assessing the impact of human capital on average output (output per person), the findings indicate that increase in enrolment at middle level and high secondary levels bring increase in output per person. The magnitude of labour indicates that the labour will bring about a more than thrice increase in output per person as is evident from table No. 4.6 terming, it as the most decisive factor in determining output per person or per capita Income. The infant mortality showed negative relationship with output per person as expected. This is also striking conclusion from the research that health indicators are also having a strong links with the national output.

Recommendations and Limitations

The government may focus on enhancing total factor productivity through technological advancement, innovations other structural reforms and investment in human capital. The human capital investment may be focused on education in general and middle level in particular along with acquisition of training and skills as it will have positive impact on per capita growth and output/income in Pakistan. The life expectancy can be increased by provision of affordable and quality health care facilities to the masses of the country. Improvement in health indicators, specifically reduction in infant mortality rate can be achieved through specialized health care facilities for new born children and provision of nutritional security to mothers so that its negative impact on economic growth is controlled. The "Human Capital" may be estimated and included in national account statistics of Pakistan like traditional labour and capital.

The data on human capital is not directly observable in national accounts; therefore, a proxy measure for human capital is taken so that five variables capture the human capital aspects. The human capital in analysis has only limited to cover the two major components of education and health and not all exhaustive lists. Even then the research is in line with other researchers' studies, methodologies and approaches where they also focused on these two major segments of education, health along with use of proxies for them. Additionally, it is to mention that economic development is a long-term process and can fully be explored when all available data is used and long term relationships are established but this study is restricted to the period 2000 to 2014. The reason is the paucity of time, resources and manageability. The existing growth models need to be reconfigured wherever necessary, in the context of new insights from the field of "Institutional Economics".

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