HIGHER EDUCATION AND ECONOMIC GROWTH: AN EMPIRICAL STUDY OF PAKISTAN

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ABSTRACT
Generally, Education is considered as human capital which is contributing positively to economic prosperity and growth. The research paper attempts to identify a relationship between different disciplines of higher education and economic development of Pakistan for the period of 1990-2017 using the Cobb-Douglas production function. The application of ordinary least square methodology examined the long-run relationship between higher education and Pakistan's economic development. The empirical study found that in the long-run higher education has strong impact on economic growth of Pakistan. Seven academic disciplines are selected to observe the impact of educational categorization i.e. Medical, Engineering, law, commerce, home economics, Education, and Agriculture. Estimated results revealed a positive and significant impact of getting higher education on Pakistan's economic growth where the role of engineering and medical sciences was found prominent among all of the selected disciplines with respect to economic development. The findings of the study validate the assumption that human capital and economic growth are strongly correlated in Pakistan in the long run. However, there is a dire need to focus on research and development to enable the country to face competitiveness in the contemporary world and to adopt to the robust technological innovations. Research and Development institutions in Pakistan should pay attention on high-tech and scientific research so as to expedite economic development in the country.

KEYWORDS
Human capital, Higher education, Economic growth, Research and Development

INTRODUCTION

Education measured as a substantial component in growth. In a period when intellectual human capital, both for individuals and country, is increasingly valued, higher education becomes extremely essential. Higher education helps in public policy formation such as health care and democratic renewal. It also sustains high standard of living and social flexibility. High economic progress is also linked with higher education in Pakistan. In 1947, government policies about education were documented at the National Educational Conference (NEC). Different governments set up a number of boards and panels to make variations in Pakistan's higher educational system. They have established multiple national educational reforms proposed in last 73 years of Pakistan. However, each round of policy making repeats the same arrangement, significance of education and educational improvement is focused and new plans are advised to achieve new objectives. But the objectives are not yet achieved. The expenditure by government on education was very low during the last seven decades in Pakistan. Public spending on education was 2.9% of GDP in 2017 as contrary to 4% of GDP, which UNESCO was fixed for education. The expenditure of the GDP highest value over the past years is 3.02% in 1997 while in 1972 it has lowest value of 1.58%. According to the UNDP, Pakistan is one of the 12 countries that having expenditure on education is less than 3 % of GDP.

In this research, the influence of discipline wise higher education on Pakistan's economic evolution over the period 1990–2017 is observed. In order to better observe each discipline of higher education and its impact on economic growth, it is separated into seven disciplines. These Seven academic disciplines are selected to observe the impact of educational categorization i.e. Medical, Engineering, law, commerce, home economics, Education and Agriculture.. The main aim of research is to discover the link concerning higher education and economic development by using ordinary least square method. This study is superior over other studies because two different methods are applied for human capital i.e. the total number of years of education which are taken by per person in the labor force, and the figure of persons who have completed higher education. Secondly, those people who have obtained higher education are examined according to their discipline wise, so as to determine their effect on economic growth. The remaining portion of the study is structured as: literature review, the methodology and the econometric model, empirical analysis based on OLS method and conclusions and recommendations.

LITERATURE REVIEW

There are numerous studies concerning importance of advanced education and economic development. Some of previous studies focused on higher and advanced education and its effect on economic growth. There is a vast literature showing association between advanced education and economic growth. But some studies also

concluded no association between higher education and economic growth. There is briefly review of the empirical literature done in this area for developing and developed economies.

Lucas (1988) measured human capital is known as one of the production element in endogenous growth model and the key element in formation of human capital is education that accelerates the production of human capital accumulation. According to Lucas, besides labor and physical capital, education was considered as important factor and considered as skills development factor as well as a production factor. This shows that improvement in the educational achievements has a positive effect on efficiency and production that give rise to economic growth.

Mankiw *et al.* (1992) proposed Solow growth model showed cross-country income discrepancies. OLS method has been applied for estimation on a data from 121 different countries from 1960-1985. The Cobb Douglas production function containing investment, labor and human capital are descriptive indicators while output as a dependent variable. Human capital define by using education as a proxy variable. Human capital variable created by multiplying percentage of enrolled students in school under the age of 12-17 with the percentage of working age population of the same age. The results described approximately 80% income deviation across countries and this structure is suggested for further studies on economic development.

Gurkanak and Bernanke (2001) reconsidered the Romer, Mankiw and Weil (1992) methodology, with a stretched dataset. By using (OLS) method on a stretched yearly data for the period of 1960 1995 and use Cobb Douglas production function and "School" used as a proxy variable for human capital. Their results were not same with augmented Solow model and concluded growth rate correlated with other indicators such as saving rates etc. So the conclusion was that growth rate is not exogenous, but it is endogenous. Rebelo (1991) later stressed the growth model by presenting investment as an additional input. However, according to Romer (1990), the model of endogenous growth assumes that the creation of new ideas is a form of human capital as a result investment is indications to progress in physical capital which in turn causes to economic development.

Armer and Liu (1993) carried their study on education. They studied different stages of schooling by taking annual data for Taiwan from 1953 to 1985, and used an empirical model. Those who had completed different stages of schooling were taken as human capital. They concluded that only primary school educations had robust positive effects on economic development.

According to Fogel (1994) worked on human capital improvement which according to

them human capital can be improved by education. However, education unaided does not progress human capital. It is also established by other collective activities that can contribute to the improvement in the human capital. Besides common education that is schooling and training, nutrition, healthiness, physical strength and professional training shows a significant part in accumulation of human capital.

Tallman and Wang (1994) find the higher education significant by using annual data from 1965–1989 for Taiwan. Those who had completed different level of schooling were used as proxy of human capital in their model. The growth model is improved by combining a labour quality index into labour input in Taiwan.

Lee, Liu, and Wang (1994) have find out education as a proxy of human capital in economic growth in South Korea and Taiwan. They took annual data of these two countries and concluded that technical progress is the main cause of economic growth in South Korea and Taiwan. while Taiwan's economic growth based profoundly on human capital formation. In addition, Lau, Jamison, Liu, and Rivkin (1993) studied average number of schooling as a proxy of human capital by employing cross country data from Brazil in 1979 and 1980. They find that education has a positive and significant effect on economic growth.

McMahon (1998) studied human capital by proxy of gross enrolment rates in his model by taking panel data of cross country from East Asia. The results find that in the event of primary enrolments, expenditures on secondary and higher education were more significant.

Yao and Wang (2001) took data from 1978 to 1999 to study China's economic growth as a consequence of factor accumulation. They used growth model in which growth in labour; capital and human capital are taken while the residual captures growth in Total Factor Productivity and employee yearly data set from 1953 to 1999. Average schooling years of population as a proxy for human capital aged between 15 to 65 years are used in this study. They determine that growth was factor accumulation and Total factor productivity growth was negative in the pre reform period (1953 to 1977) while in post reform period, factor accumulation as well as Total factor productivity growth played positive part in strong growth.

Lin (2003) examined the effect of education and the role of technical progress over the period 1965–2000 on economic growth in Taiwan. He work on finding education and technical progress importance and found that achieving education had a optimistic and significant impact on growth, but the impact of technical progress did not have optimistic impact on growth.

Duma (2007) considered annual data from 1980 to 2006 in Sri Lanka to find economic growth. He used Cobb Douglas production function in his study where labour, physical capital and human capital were taken as independent variables while GDP was taken as a dependent variable. All the unexplained variations in output growth are captured by Total factor productivity (TPF) which is taken as residual in the equation. The data on average years of schooling was not available therefore this study followed an altered process to create a variable that could be used as a proxy for human capital. The findings are very little impact of human capital to economic growth. Human capital only impact about 10% of productivity growth from 1980 to 2006 while physical capital contributed 17% and labor contributed 27% to economic growth respectively. The main contribution was Total Factor Productivity which contributed around 46% to growth. In the era after 1980's there was rapid growth in the capital intensive industries while slowdown in the labor intensive product. Total factor productivity played a significant and dominating role in Sri Lanka's economic growth after 1980's. Kiani and kausar (2009) shows that labour force and primary school enrolment ratio is optimistically related to the real GDP growth by using regression analysis during period 1980-2007. It indicates that primary school education is an essential requirement for increasing economic growth. Similarly labor force participation rate is a substantial interpreter of economic growth. Health indicator tells insignificant consequences, which could be due to a poorly managed basic health units (BHU) in Pakistan. In addition, higher education revealed very robust influence on economic growth which indicates the positive sign for economic growth and supports the education return of economy to some extent.

RESEARCH OBJECTIVES

1. To identify the relationship between higher education and economic development in Pakistan.
2. To identify which discipline of higher education has major contribution to the economic development in Pakistan.
3. To identify the importance of Research and Development in the process of innovations.

RESEARCH QUESTIONS

1. What is the impact of higher education on economic growth in Pakistan?
2. Which discipline of higher education has highest impact on economic growth of Pakistan?
3. Is research and development a priority in Pakistan?

REASEARCH HYPOTHESES

1. Higher education and economic growth are strongly correlated.
2. Different disciplines have different impact on economic growth.

3. Research and development has been a high priority in higher education institutions in Pakistan.

RESEARCH METHODOLOGY

The model

Cobb–Douglas production function has been applied showing as a function of labor, physical capital, and human capital. The Cobb–Douglas production function is given as:

$$Y_t = A_t K_t^{\alpha} L_t^{\beta} H_t^{\gamma} \quad (1)$$

Introducing E as human captical.so the equation for growth becomes as follows

$$Y_t = A_t K_t^{\alpha} L_t^{\beta} E_t^{\gamma} \quad (2)$$

Where Y represents real GDP output, physical capital denoted by K, labor is denoted by L, E the quality of human capital which is education stock, where A is technological factor and exogenous knowledge and α, β, and γ are shares of human capital, physical capital and labor respectively, and t subscript is time.

The log transformation of equation (2) is as follows:

$$\text{Log } Y_t = \log A_t + \alpha \log K_t + \beta \log L_t + \gamma \log E_t \quad (3)$$

Where log Y_t is the dependent variable in which we taken real GDP, log A_t is the constant term log, log K_t is taken as physical capital log. It is a proxy of gross fixed capital formation (GFCF). Log L_t is variable of labor and it is taken as the log of employed labor force and log E_t is the variable of human capital and taken as log of variable (education stock), in production function. Now we will explain how the above variables have been quantified.

The Research Methods

The data of Pakistan used in this study for 1990–2017 comprised on yearly basis of economic output GDP as dependent variable, the physical capital, labor, and educational stock as independent variable.

Output (Y=GDP)

The variable is taken as real GDP (gross domestic product) of a country, or the accumulation of all final goods and services in a country taken from 1990 to 2017. Taking GDP values on 1980 base year and convert them to 2000 base year. The data of Gross Domestic Product is being collected from State Bank of Pakistan. It is denoted by "Y_t".

Physical capital (K_t)

Physical capital is used as proxy variable of gross fixed capital formation (GFCF) which represents real capital stock, and growth in physical stock of a country. This term is measured in millions of Pakistan rupees at 2000 constant prices taken from

federal bureau of statistics from year 1990 to 2017. The perpetual inventory method to create a capital stock series and the formula is given below

$k_t = (1-\delta)k_{t-1}+I_{t-1}$ (1)

Where,

K_t = capital stock series at time trend t,

I_{t-1} = gross fixed capital formation at time trend t level

δ = physical capital's rate of depreciation.

We need three types of information to investigate the capital stock series

1. A time series data required on gross fixed capital formation in constant factor cost at domestic currency units (DCU), 2. The rate of depreciation. 3. Initial capital stock level.

In some cases, we do not have an initial capital stock series. The primary value of physical capital (capital stock) is predicted by steady state technique. At steady state indicating physical capital's rate of change and productivity equal. Hence

$$dK = I_t - \delta K_t \quad (2)$$

Where it is investment and K_t is physical capital stock in t time trend while δ is physical capital's rate of depreciation. Taking eq (2) and dividing it by (Y) gives:

$$\left(\frac{dK_t}{Y_t}\right) = \left(\frac{I_t}{Y}\right) - \delta\left(\frac{K_t}{Y_t}\right) \quad (3)$$

It is shown in terms of growth rate of capital; equation (3) is dividing and multiplies by k_t i.e.

$$\left(\frac{dK_t}{K_t}, \frac{K_t}{Y_t}\right) = \left(\frac{I_t}{Y_t}\right) - \delta\left(\frac{K_t}{Y}\right) \quad (4)$$

At steady state, Kt and Yt grow at the same rate which indicates

$$\left(\frac{dY_t}{Y_t}, \frac{K_t}{Y_t}\right) = \left(\frac{I_t}{Y_t}\right) - \delta\left(\frac{K_t}{Y_t}\right) \quad (5)$$

Symbolizing steady state growth rate of output as g*, we get

$$g * \left(\frac{K_t}{Y_t}\right) + \delta\left(\frac{K_t}{Y_t}\right) = \left(\frac{I_t}{Y_t}\right) \quad (6)$$

$$\left(\frac{K_t}{Y_t}\right) = \left(\frac{I_t}{Y_t}\right)(I/g * +\delta_t) \quad (7)$$

Multiply the above equation with Yt gives the estimate of Kt for the initial period t i.e.

$$K_t = (I/g * +\delta_t) \quad (8)$$

Where Kt, is the value of initial capital stock series. Here, I_t is gross fixed capital formation of constant (2000) in LCU, g_t* is the output growth rate at steady state, and δ shows depreciation at 5% (Bosworth and Collin 1996). If we have a value of δ, initial

capital stock value and a time series on gross fixed capital formation, then we can create a capital stock series. When the output growth rate does not come equal to actual growth rate, (king and lavine (1994)) supposed that

$g^* = \lambda g+(1-\lambda)gw$ (9)

g^* is the growth rate of output at steady state
g is the economy's average growth rate.gw is the world growth rate taken as 4.5%
λ is the quantity of mean decline of output taken as 0.25(Esterly et al.1993)

Human capital as stock of education (E).

Educational stock is taken as per person years of education who are engaged in working. It is calculated as: The per person average years number of eductaion = (primary enrolments * 5 + middle enrolments * 8 + secondary enrolments * 12 + tertiary enrolments * 16)/total number of people who are working.

Here primary enrolments are taken as all those people who are employed and have accomplished primary school but not advanced stages of education, middle school enrolments refers to all those people who are employed and have accomplished 8 years of education but not advanced levels, secondary school enrolments refers to all employed people who have accomplished 12 years of education but not advanced stages, and tertiary enrolments refers to all those people who are employed and have accomplished 16 years of education or advanced education. Education system in Pakistan is based on 5 years (primary school), 8 years (middle school), 12 years (secondary school), and 16 years (college or university).

Graduates of Higher Education (G).

We take graduates of higher education i.e (med for medical), (eng for engineering),(law),(com for commerce),(HE for home economics),(AGRI for agriculture) disciplines as the total number of enrolments at higher education programs such as masters.

Labor input (L)

Labor in our model is taken as the number of persons employed in different sectors of the economy. By definition, an employed individual includes working persons at the age of 15 >. Here we do not include unemployed persons. It is taken in thousands of employed persons.

Econometric Technique

Ordinary Least Square (OLS) methodology has been adopted to test the relationship between above mentioned variables and GDP from 1990 to 2017 after converting the variables into their logarithmic form. The OLS least square method is a very

widespread method used to calculate estimations of parameters to fit data. Nowadays, the least square method OLS is generally used to evaluation and estimation of the statistical values of the parameters to fit a set of data into a function and to describe the statistical properties of estimates. There are some strong statistical properties of OLS estimates specially when the data acquired create a random sample from a distinct population, model of the population is linear, the expected value of error is zero, the independent variables are linearly independent, and there is normal distribution of error term and it is uncorrelated with the independent variables (homoscedasticity assumption) then the OLS estimate is often denoted with the acronym "BLUE" the best linear unbiased estimate. Each OLS fitted coefficient provides a measure of the change in the left side variable as the right side variable changes among the observations. In this sense, OLS offers a method of decomposing the overall changes in the left side variable as several right side variables change simultaneously from observation to observation. The summation of all the squared residuals is known as (RSS) the residual sum of squares and provides a measure of model-fit for an OLS regression model. Furthermore the R square statistics is also commonly consider whether the model is best fit and provides a result that specifies the percentage of variation in the response variable that is explained by the model. Although R-square is extensively used, it will always escalate as more variables are added to the model. One resolution to this problem is to determine an adjusted R-square statistic which does not necessarily increase as more terms are added and the number of terms entered into the model. General log linear form of model presented in the next section is

$$loggdp = f(log(gfcf),log(l),log(E))$$

$$loggdp = f(log(gfcf),log(l),log(dd)$$

Where GDP is gross domestic product, GFCF is gross fixed capital formation, l is employed labor force, e is education stock, dd is enrolments in different disciplines. Since the variables are in the log form, the estimated coefficients can be termed as elasticities. All the variables are expected to have positive signs. Significance of the variables will determine factors which are more responsible for surge in GDP.

ESTIMATION AND RESULTS

We observed the connection between economic growth and discipline wise higher education. For this purpose OLS technique has been applied. This needs the subsequent significant steps. 1) To avoid the spurious relationship, the stationarity of the data was checked. 2) To find the association between economic growth and discipline wise higher education coefficients, OLS method was set. 3) Was established the long run relationship between economic growth and higher education.

STATIONARITY OF DATA

Properties of stationarity would be taken in to account as our analysis is based on time

series data. Time series data which is considered as stationary has a constant mean, a constant variance and the covariance is independent of time. Stationarity is important for ordinary econometric theory. A regression of non-stationary series can generate misleading results and inference statistics would be incorrect. An essential sign of spurious regression is that coefficient of determination will be higher than Durbin-Watson statistics. We will be comfortable to use OLS model, if such complications does not arise in the model, rather than to use complex technique. Therefore, The Augmented- Dickey Fuller (ADF) test is used for logarithms of all variables tested for unit roots. The ADF tests are based on the following regression:

$Y_t = \rho Y_{t-1} + u_t$

$-1<\rho<1$

eq (i)

Here u_t is white noise error term. If $\rho=1$ there exists a unit root i.e., variable is non stationary.

We subtract Y_{t-1} from both sides of equation (i) to attain

$Y_t - Y_{t-1} = \rho Y_{t-1} - Y_{t-1} + u_t$

$= (\rho-1) Y_{t-1} + u_t$

eq (ii)

This can alternatively be written as

$\Delta Y_t = \delta Y_{t-1} + u_t$

eq(iii)

Δ is the first difference operator and $\delta = (\rho-1)$. Unit roots can be tested by running the above regression. Hypothesis is as follows

Null: $\delta = 0$

Alternative : $\delta \neq 0$

If $\delta = 0$ then $\rho = 1$,

Which infers that the data is non-stationary. If the data is non stationary, then first difference of the data is tested for unit roots. As expected the variable have been found to be stationary at first difference with the exception of output gap as it is already a difference of two variables. Our stationarity results of the variables are at the first difference. Therefore we applied OLS technique. The outcomes of the Augmented Dickey Fuller test are non- stationary of all variables at conventional level of significance i.e. 5 % in level of significance. However after application of unit root test, all these variables are stationary at first difference and hence it is determined that all the variables are integrated of order 1. This specifies the probabilities of long run relationship between the variables. To verify this sign, OLS method is applied on our data.

The Higher Education Stock Impact On Economic Growth

Model constructed from the production function, in Eq. (1), the econometric model is indicated as:

$$lnYt = \alpha + \beta 1 lnK + \beta 2 lnL + \beta 3 lnE + \varepsilon t \quad (1)$$

Where stochastic term is εt, supposing a mean 0 and a variance δ^2.We initiate the observed examination by challenging our null hypothesis i-e. Higher education, employed labour force and gross fixed capital has a significant influence on economic development. The null hypothesis rejected at 5% level of confidence and concluded that estimated one per cent of higher education stock increases real output.

Table 1: ***Impact of education on growth***

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-8.02E+10	6.86E+09	-11.69661	0.0000
GFCFI	4230.941	19487.18	-0.217114	0.0298
ELF	56559898	3955593.	14.29872	0.0000
EDU	5036061.	844892.9	5.960591	0.0000
R-squared	0.985811	F-statistic	602.1151	
Adjusted R-squared	0.984173	Prob(F-statistic)	0.000000	

The estimates given in table 1 describes the association between education and economic growth where education is an essential characteristic of economic growth of the country, it has significant effect on the growth and development. The p-value is less than 1%,5%,10% means the education is significantly affect the economic growth the 1 % increase in education it gives 5.03 percentage points increase in economic growth. Hence it is proved that education plays a very essential role in the progress of Pakistan.

Different majors graduated in Higher Education

We afterward examined the effect of higher education graduates on real output development. Fresh university graduates lacking work experience require time to gain experience, and familiarize with new work place and its atmosphere before achieving efficient productivity. To determine the influence of higher education on output growth, seven educational categories were carefully chosen for better analysis in this study that is medical, engineering, commerce, law, education, home economics, and agriculture. So now the regression model is given by:

$$lnYt = \alpha o + \beta 1 lnL + \beta 2 lnK + \beta 4 lnG + \varepsilon t \quad (2)$$

Long-Run estimates based on OLS finding relationship between different majors and Economic growth

Table2: ***Impact of Agriculture on growth***

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.47E+10	6.07E+09	-12.30919	0.0000
GFCFI	70759.82	18307.82	3.865006	0.0007
ELF	56094243	3768124.	14.88652	0.0000
AGRI	-2196054.	340184.2	-6.455486	0.0000

R-squared	0.987099	F-statistic	663.1118
Adjusted R-squared	0.985610	Prob (F- statistic)	0.000000

The outcomes of the production function estimation from Eq. (2) are shown in Table 2. Estimates reveals that agriculture graduates have negative impact on output growth. Agriculture as a discipline is significant with p value 0.000 at all the three levels of significance 1%, 5%, and 10%.Estimates revealed that when there occurs increase in number of students taking Agriculture as their major subject they participates 2.19 % less than those who study professional subjects. The reason behind this decrease is the less opportunities in farm practicing. Agriculture sector is mostly handled by uneducated and illiterate people.

Table 3: ***Impact of commerce on growth***

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.29E+09	1.87E+10	-0.228961	0.8207
GFCFI	25838.84	24196.85	1.067860	0.2954
ELF	33469097	8657257.	3.866016	0.0007
AGRI	682734.7	217713.4	3.135933	0.0042

R-squared	0.975636	F-statistic	347.0505
Adjusted R-squared	0.972825	Prob(F-statistic)	0.000000

From Table 3 it is clearly revealed that commerce have positive impact and found significant at 1%, 5% and 10% level showing substantial association among output development and this discipline as growing scope of commerce specially in industries.

Table 4: ***Impact of Medical on growth***

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.24E+10	1.90E+10	-3.817730	0.0008
GFCFI	32557.73	27988.25	1.163264	0.2553
ELF	56140584	6085086.	9.225931	0.0000
AGRI	595390.9	696531.3	0.854794	0.0005
	0.967339	F-statistic		256.6830

R-squared			
Adjusted R-squared	0.963570	Prob(F-statistic)	0.000000

Furthermore, all other disciplines of higher education that is, MED significantly influence on economic growth such as 1% graduates from medical is expected to grow real productivity almost 5.9 %, correspondingly. The positive and significant impact reflects that those who studied major i.e. Medicine and medical at university level and got higher education performs significantly for the growth of the economy.

Table 5: ***Impact of Engineering on growth***

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.06E+10	8.21E+09	-4.942808	0.0000
GFCFI	24677.93	26760.05	-0.922193	0.3649
ELF	66525301	5548063.	11.99073	0.0000
AGRI	1909983.	476955.3	-4.004533	0.0005
R-squared		0.979231	F-statistic	408.6186
Adjusted R-squared		0.976834	Prob(F-statistic)	0.000000

Furthermore, all other disciplines of higher education that ENG influence the economic growth significantly such as 1% graduates from engineering is expected to grow real productivity almost 1.90 % correspondingly. The graduates with engineering degree plays vital role in economic development.

Table 6: ***Impact of Law on growth***

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.93E+10	1.10E+10	-3.555813	0.0015
GFCFI	75950.46	30285.27	2.507835	0.0187
ELF	35223820	9811390.	3.590095	0.0013
AGRI	1826525.	743323.2	2.457242	0.0210

R-squared	0.972749	F-statistic	309.3681
Adjusted R-squared	0.969605	Prob(F-statistic)	0.000000

Furthermore, all other disciplines of higher education that is LAW shows a positive and significant impact on economic growth such as 1% graduates from law is expected to grow real productivity almost 1.8% correspondingly.

Table 7: Impact of Home economics on growth

Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	-6.07E+10	7.64E+09	-7.953381	0.0000
GFCFI	22365.66	24501.32	0.912835	0.3697
ELF	51387739	5350901.	9.603568	0.0000
AGRI	6722308.	2186281.	3.074769	0.0049

R-squared	0.975375	F-statistic	343.2797
Adjusted R-squared	0.972534	Prob(F-statistic)	0.000000

Home economics have positive impact but found insignificant at 5% level showing substantial association among output development and this disciplines. The positive relationship shows that the graduates with i.e. law, medicine, engineering and education disciplines at university level and got higher education plays significant role in the economic growth of the economy. Only agriculture discipline plays insignificant role because most of the agricultural work is done by illiterate workers whom do not need higher graduation.

DISCUSSION

This study observes the impact of different academic disciplines in higher education on Pakistan's economic growth during the period of 1990–2017. Human capital is measure as an additional input which is the chief improvement in the application of production function. In addition, the uniqueness of this study which is not found in other research: i.e. division of higher education by discipline. To observe the probable distinction impact of different disciplines, seven diverse disciplines were carefully chosen: i.e. Medical, Engineering, Commerce, Law, Education, Home Economics and Agricultural sciences to observe the effects of each discipline of education on the Pakistan economy. Study results reveal that higher education, through six of these seven academic disciplines; overall give us a positive and significant result on economic growth in Pakistan from 1990 to 2017. In addition, different discipline higher education graduates exercise different impacts on Pakistan's economic growth. Conclusions reveal that agriculture major did not essentially fit with labor market requirements, and that medical, commerce, engineering, education and law majors played the most bulging role in this development.

RECOMMENDATIONS

Spending on education sectors generally leftovers on a poorer side in Pakistan as compared with the other nations in the region. The results of this study support the finding that human capital has certainly positive relationship with economic growth in Pakistan in the long run. The human capital proxy in this study was education stock that was found significant which requires a distinct emphasis on the education sectors of the economy.

The progressive and significant association specifies that those educated in law, commerce, engineering, home economics, medicine and education majors in organizations of higher education meets the requirements of the economy. The evidence therefore may advise that the Pakistan's government should pay more consideration to a high-technology education policy that contains upgrading the quality of graduate schools, improving the environment of laboratories, and providing more funding for medical, engineering, commerce, law and education. Scholars locating through education and training to face the trials of globalization and competitiveness in the wake of skilled-based society is the major problem of Pakistan. Moreover, to endorse the economic growth, development of social sector, employment creation and integrated set of labor market policies is needed.

Another essential aspect of the knowledge-based economy is Research and development and therefore, Pakistan desires an extensive diversity of researchers who could be able to carry out high quality applied scientific research. Scientific knowledge and research could be materialized into industrial output by decreasing the gap between the industry and university should be associated properly so that it would further contribute to the economic growth. Unfortunately in Pakistan, the total investment in research and development is negligibly low as compared to the other developing and developed countries like Korea, Malaysia, Singapore, Thailand, India, China, and Japan (Khan, 2005). The importance of R&D in the perspective of globalization and increasing competition should take into considerations by the national research and development organizations and take suitable actions to improve the R&D activities.

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