Nexus between Public Education Expenditure and Human Resource Development: An Empirical Analysis

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Abstract

There was always a gap between recommendations and implementations especially in case of public expenditure on education which has serious implications on human resource development of the country. Lack of funding is one of the serious concerns which may also be reason for low ranking of India in terms of Human Development Index. It can be easily observed that the total state expenditure on education in the country has hung around 3% of GDP, far below the 6% of GDP as resolved by the National Education Policies. Descriptive method is used to study the relation between Education expenditure by the Government and Human Resource Development of India by using the secondary data collected through the reliable and authenticated sources like Union Budgets of India and Human Development reports published by UNDP. Granger Causality Test is applied to examine the causal relation between the Public Education Expenditure and Human Resource Development. Multiple regression analysis is used to analyse the contribution of education in Human Development Index. The result of the study will help to understand the Government's role in Human Resource Development through expenditure on education.

Introduction

India is second highest populated country which also means that there is abundance of human resource. But just having abundant human resource cannot guarantee the prosperity of a nation. Therefore, the comprehensive objective of education is to generate a substantial population who are able to bring about radical changes in the society as well as economy. The education policy, therefore, place added emphasis on the education for all (Rao, 2004). As per FICCI report (2013), the median age of India's 1.5 billion strong populations is 32 years and India is the largest contributor to the global workforce, its working age population exceeding 950 million. India has the potential to emerge as the world's third largest economy by its unique demographic advantage. "Skill India, Build India" is the need of the hour which rightly hints that the dependence of nation's growth is on its human resource development. The learning, knowledge and abilities of an employee have an economic value for organizations and for the economy as a whole. A nation's human capital endowment—the skills and capacities of people that can be put to productive use—is more important determinant of its long term economic

achievement than fundamentally any other resource. This resource must be capitalized and leveraged competently in order to generate returns, for the individuals involved as well as an economy as a whole. To understand and solve the problems related to human capital is central to stability as well as growth, prosperity and competitiveness of nations.

The National Knowledge Commission's (NKC 2013) recommendations have been shaped to achieve the objective of capitalizing India's vast human resource, to activate human endowment and build an educated generation with access to remarkable potentials. India's demographic dividend is a greatest asset with 550 million below the age of 25. NKC has recommended the reforms in education and associated sectors which should provide ample opportunity for efficiently converting human resource into human capital, which has the capability to change the path of development in the country. It is rightly said that a nation's growth depends not only on its material resources but also on its human resources. In the pursuit of converting human resource into human capital, National Education Policies have stressed on equity, quality and access of education and fulfilment of these objectives require huge public funding. The real wealth of a nation lies not in "material resources" but in "human resources" and the importance of education in

development of human resource can't be overlooked by the policy makers. Education as a sector which comes in concurrent list has been given due importance in various plan documents. The Government of India has formulated National Policy on Education in 1968, 1986 and revised in 1992. Presently, the draft of New Education Policy is proposed in 2016. The Kothari Commission (1966) suggested initially and the National Policy on Education (1986) and Ramamurthy Committee (1991) stressed subsequently that 6 per cent of GDP should be spent on this sector. The Delors Commission (1996) has clearly argued for increasing public spending on education. Education expenditure should be regarded as a necessity everywhere, and especially in developing countries, since it is a vital investment for the future. As a rule of thumb, not less than 6 per cent of GNP should be devoted to education". UNESCO and UNDP also favoured it, as a desirable level for the developing countries. Education commission has suggested 6 per cent target based on the requirement of the system for next 20 years. The level of spending by the economically advanced countries like Japan, the US and the USSR as a proportion of their GNP on education and the likely trends in future was also considered in recommending 6% of GDP for education expenditure. Out of many recommendations given by Kothari commission, government of India accepted 6% of the GDP as education expenditure. But it was explored that there was always a gap between recommendations and implementations especially in case of public expenditure on education which has serious implications on human resource development of the country. Successive governments have promised to increase state spending but never fulfilled the promise. Lack of funding is one of the serious concerns which may also be reason for low ranking of India in terms of Human Development Index.

Literature Review

According to the Endogenous Growth Theory, Lucas (1988) regarded Human Capital as a factor of production and sustainable economic and social progress. To the policy maker, human capital is the capacity of the population to drive economic growth. The interaction between human capital and economic growth has been an object of research for several decades, both in macroeconomic and microeconomic literature. Theoretically speaking, education expenditures should speed up economic growth. However, that is a necessary but not sufficient condition for growth. There are certain other factors also such as the country's institutional structure which determines whether investments in education sector will affect growth significantly or not (Ghosh et al. 2013). Blundell, Dearden, Meghir and Sianesi (1990) gave more direct evidence on the importance of human capital for national productivity growth by growth regressions, where the education

measures have been found to be significant explanatory variables, with higher education being the most relevant education variable for more developed countries. Ranis et al. (2000) estimated the effects of economic growth as the result of human capital development and the effects of human capital development as the result of economic growth. Outcomes showed that economic growth had constructive and strong bearing on human capital development. Results also showed that substantial and robust GDP per capita income growth leads to higher human capital development. The belief, that education promotes economic growth through human growth has led governments of many developing countries to invest in the education sector. Even the theoretical literature also provides a backing for such a policy (Pissarides, 2000). Musai et al. (2011) revealed that the elasticity of the production of human capital, physical capital and labour force are 0.28, 0.696 and 0.044 respectively while studied the relationship between education and economic growth of 79 countries. According to their study, increase in education spending, physical capital and labour force will increase the economic growth of a country. Shi Mei-ling (2014) showed through the empirical regression equation that the income elasticity of personal education investment is 1.074, the income elasticity of health investment is 1.539, are more than 1 which means that educating people of the country can greatly promote the economic growth. Becker, Murphy and Tamura (1990) argued that since 1960 education expenditure has been an important element of the successive growth in per capita incomes for around hundred countries. Douglass (2010) found that educational achievement of a nation's population is an important factor for greater national productivity and global competitiveness. Dukkipati (2010) quoted that for India to maintain its economic growth in a global marketplace fuelled by the knowledge economy, it needs to nearly double its number of students in higher education by 2012. Without proper access to education the country's demographic dividend could turn into a demographic disaster. He proposed that the Government of India expenditure on education and more specifically higher education does not correspond with the country's economic growth. Bhatia & Dash (2011) observed that Public expenditure on education represents a higher proportion of GDP in rich countries, where the EFA (Education for all) goals are already achieved, as compared to poorer ones, where the coverage of under-resourced systems needs to be both expanded and improved.

Further, Bhatia and Dash (2013) showed that Human Development Index of India used to be the lowest among all the countries. India spent the lowest on education in the year 2005 (3.7% of GDP). They suggested that Government can also work towards provision of free education to all till graduation which indicates a huge public expenditure on education. India's youth can be an asset only if there is an investment in their capabilities. If

denied this investment, it will become a social and economic liability. Hence, there must be an investment in building the knowledge base of coming generations.

Education expenditure, which may develop human capital, is public good in LDCs and need Government involvement to function effectively. It can be easily observed that the total state expenditure on education in the country has hung around 3% of GDP, far below the 6% of GDP as resolved by the National Education Policies. Thus, the purpose of the study is to analyse the relation between expenditure on education by the governments and Human resource development in India.

Purpose of the study

Consecutive governments have promised to increase education expenditure to 6 per cent of GDP as recommended by National Education Policy, but never exceeded from 4%. Shortage of fund could be a potential reason for failure of the governments to bring out a proper programme of action and implementation. Human capital is increasingly proving significance in the overall development of the country. While governments commonly pledge to increase education expenditure and bring in structural reforms, this has rarely been delivered in practice which can be a reason for India's ranking at 131 among 188 countries in terms of human development according to the Human Resource Development Report (2016) released by United Nations Development Programme. Therefore, the purpose of the study is to analyse the relationship between education expenditure and human resource development in India.

Data and Methodology

The descriptive research method helps to explain educational phenomena in terms of the conditions or relationships that exists, opinion that are held by the students, teachers, parents and expert, processes that are going on, effects that are evident or trends that are developing. Analytical method is used to analyse the relationship between education expenditure and human resource development.

Data description

Secondary data is collected from the authentic and reliable sources of Government agencies like MHRD, Union Budgets and Human development reports released by UNDP. Time series data of education expenditure as percentage of GDP, Human development index, education index, mean year of schooling, expected year of schooling, elementary education expenditure, secondary education expenditure and higher education expenditure through budget for the time period of 1990-2015.

Objectives

1. To examine the causal relationship between Public education expenditure and Human development index.
2. To analyze the relation between Public education expenditure and education component of Human development index.

Hypothesis

- H_1: There is bi-directional relationship between public education expenditure and human development index.
- H_2: There is significant relationship between public education expenditure and education component of Human development index.

Empirical Methodology

Granger Causality test is used to examine the causal relationship between public education expenditure and HDI of India and multiple regressions is used to examine the relationship between education expenditure at elementary, secondary and higher education level and education component of Human development index.

Relation between Public education expenditure and Human resource development

Since 1990, United Nations Development Program publishes Human Development Reports as independent, analytical and empirical discussions of key development issues, trends and policies. Human development is a process as well as an outcome. Human development is the development of the people through building human competences, by their active participation in the processes that shape their lives. To quantify the human development, Human Development Index was created with the purpose to adjudge that people and their capabilities should be the decisive criteria for evaluating the development of a country, not the economic growth alone. The HDI can also be used to assess national policies.

The composite Human Development Index (HDI) assimilates three basic dimensions of human development. Life expectancy at birth reveals the ability to lead a long and healthy life. Mean years of schooling and expected years of schooling reflect the ability to acquire knowledge. And gross national income per capita reflects the ability to achieve a decent standard of living. Education is argued as one of the critical factors influencing human development which contributes further to the economic development. Being public good, education sector demands attention from government in increasing the access, equity and quality. Thus, education expenditure by Government is crucial factor for human resource development. But, at times, it is human

development which asks for increasing public expenditure. According to the Musgrave and Rostow's Development model a considerable expenditure is required on education not only in early development stage, but also in the phase of high income societies because education becomes investment good due to increasing demand for skilled labor.

Therefore, the present paper attempts to examine the causal relationship between public education expenditure and human resource development by using Granger Causality test. Here, Human development index is used to indicate human resource development. Granger causality says if a signal X "Granger-causes" a signal Y, then preceding values of X should enclose information that helps predict Y. The test assumes that only past values of X can "cause" Y. If X fails to cause Y, X will be considered to be exogenous of Y. Similarly, if both X and Y fails to Granger cause each other, both the variables will be considered to be independent. Granger causality is thus a dominant tool which allows testing for things that was not considered important so far. Vector Auto regressions or VARS are often used to test Granger Causality. A VAR is the extension of the autoregressive (AR) model in case where there is more than one variable under study. VAR helps in finding that whether X causes Y or Y causes X. Before conducting the Granger Causality Test, it is necessary to validate the stationarity of selected variables. To check the stationarity of variables, one of the most popular unit root test, Augmented Dickey Fuller (ADF) test is employed on each variables.

Unit Root Test

To check the stationarity of the selected variables, Augmented Dickey Fuller Test is applied as it is considered as one of the most popular unit root test.

Table.1 Augmented Dickey Fuller Test of Stationarity

Variables	p-value without constant		p-value with constant	
	Level of variable	First level of difference	Level of variable	First level of difference
Education expenditure as % of GDP	0.6129	0.0001	0.2669	0.005978
Human Development Index	0.9706	0.5213	0.9999	0.00499
Education Index	1	0.08815	0.9805	0.0004267
Expected year of schooling	1	0.02574	0.9916	0.01444
Mean year of schooling	1	0.08492	0.9922	0.003432
Elementary education expenditure	0.1819	5.271e-005	0.4303	0.001443
Secondary education expenditure	0.6551	0.0001	0.7584	0.00261
Higher education expenditure	0.9891	0.004302	0.9866	0.01688

Source: Author's Analysis

Table 2 Granger Causality test

Null Hypothesis	Probability	Observations	df
edex does not Granger Cause HDI	0.9816	24	20
HDI does not Granger Cause edex	0.9121	24	20
edex does not Granger Cause edu index	0.2302	24	20
edu index does not Granger Cause edex	0.2644	24	20
edex does not Granger Cause expecyearsch	0.7204	24	20
expecyearsch does not Granger Cause edex	0.9919	24	20
edex does not Granger Cause meanyearsch	0.8218	24	20
meanyearsch does not Granger Cause edex	0.4368	24	20

Source: Author's Analysis

The result of the table reveals that all the variables showed stationarity when p-value is calculated with constant and at first level of difference.

A variable X Granger-causes Y if Y can be well projected using the histories of both X and Y than by using the history of Y alone. Conceptually, the causal relation is temporal if only past values of X can cause Y. X is considered to be exogenous of Y if X fails to Granger-cause Y. Variables X and Y are independent if both fail to Granger-cause the other.

Table 2 shows that all the null hypotheses are accepted which means there is no causal relation between all the variables. Neither education expenditure causes HDI nor does HDI cause education expenditure. Both the variables are independent of each other. This is widely known fact that education is one of the important factors which directly or indirectly affects two other components (life expectancy and GNI per capita) of Human Development Index along with education.

But the causality test proves no cause and effect relation between education expenditure and human development index. Human development index is a composite measure of average of three basic dimensions of Human resource development. Thus, there is no causal relation between education expenditure and human resource development. Education index, an average of mean years of schooling (of adults) and expected years of schooling (of children), is one the component of HDI. The test is conducted to find out the causal relation of education expenditure with education index and also the mean years and expected years of schooling.

In all cases, there is no causal relation found. This certainly means that either the spending by government is not sufficient enough to cause an impact on development of human resource or there are some other factors which are not allowing the education expenditure to create impact on human development which may be social, economic or institutional factors. There is a possibility that the one independent variable alone may not be related with dependent variable but may show significant relationship in presence of some more independent variables. For this purpose, multiple regression analysis is used to see if there is a statistically significant relationship between sets of variables.

Therefore, in next section, the paper attempts to find out such possibility.

Multiple Regression Analysis of Education Expenditure and Human Resource Development

Multiple regression analysis is to try to understand the functional relationships between the dependent and independent variables, to try to see what might be causing the variation in the dependent variable. The essence of regression analysis is to fit a model to our data and use it to predict values of the dependent variable (DV) from one or more independent variables (IVs).

To use multivariate regression, it is important to check for the statistical assumption violation. First assumption is linearity which denotes that the mean values of the outcome variable for each addition of the predictor(s) should lie along a straight line.

To assess the linearity, scatter plot is used and all the variables showed linearity. Second assumption is Normality of data which refers to the shape of the data dispersal for an individual metric variable.

Jarque-Bera test is applied to test the normal distribution of variables. Since p-value for all the variables for Normality test is more than 0.05, variables are normally distributed.

Table 3 Jarque-Bera test

Variables	p-value
Education expenditure as % of GDP	0.685052
Human Development Index	0.41942
Education Index	0.357041
Expected year of schooling	0.257128
Mean year of schooling	0.585949
Elementary education expenditure	0.0480781
Secondary education expenditure	0.0648986
Higher education expenditure	0.10062

Source: Author's Analysis

Model 1: Heteroskedasticity-corrected, using observations 1991-2015 (T = 25), Dependent variable: ld_HDI

Variables	Coefficient	Std. Error	t-ratio	p-value
Constant	0.00408368	0.00267427	1.5270	0.1417
ld_EducationIndex	0.0256561	0.0549504	0.4669	0.6454
ld_Lifeexpectancy	0.713147	0.345085	2.0666	0.0513
ld_GNIpercapitappp	0.114762	0.0187449	6.1223	<0.0001
R-squared		0.660726		
Durbin-Watson		2.023968		

Source: Author's Analysis

Third assumption is homoscedasticity which means that the residuals at each level of the predictor(s) should have the same variance when the variances are very unequal there is said to be Heteroscedasticity. The present study uses *Heteroscedasticity corrected model* to control the assumption of Homoscedasticity.

The fourth assumption is autocorrelation can be tested with the Durbin–Watson test, which tests for serial correlations between errors. Test Statistic close to 2 shows no autocorrelation.

The final assumption is multicollinearity which exists when there is a strong correlation between two or more

predictors in a regression model. There should be no Multicollinearity in the model, which means there should be no perfect linear relationship between two or more of the predictors. If VIF Values are less than 10.0 then there is no multicollinearity.

Further, for the symmetry of the data, log difference of all the variables is used. Log difference is a continuously compounded or exponential growth rate, as opposed to a period-over-period rate.

The value of R-squared (0.660726) interprets that independent variables account for 66% of variation in dependent variable which is good enough. Durbin-Watson test value (2.023968) shows absence of autocorrelation and Table 4 shows the absence of multicollinearity.

Table 4 Multicollinearity test

Variables	VIF
ld_EducationIndex	1.025
ld_Lifeexpectancyyears	1.286
ld_GNIpercapitappp	1.265

Source: Author's Analysis

Model 2: Heteroskedasticity-corrected, using observations 1991-2015 (T = 25) Dependent variable: ld_HDI

Variables	Coefficient	Std. Error	t-ratio	p-value
const	0.0109185	0.00116812	9.3471	<0.0001
ld_Meanyearofschoolings	0.0539577	0.0271671	1.9861	0.0596
ld_Expectedyearofschooling	0.159781	0.0341256	4.6822	0.0001
R-squared		0.525368		
Durbin-Watson		1.546720		

Source: Author's Analysis

Table 5 Multicollinearity test

Variables	VIF
ld_Mean years of schooling	1.453
ld_Expected years of schooling	1.453

Source: Author's Analysis

But, the relation of education index with Human development Index is found insignificant. This further supports the result of Causality test and reveals that education index is not significant in human resource development. Lack of funding from the Government may be one of the crucial factors responsible for India's medium human resource development. Education index is average of mean years of schooling and expected years of schooling. After finding education index related to HDI insignificantly, the paper attempts to check that if the two principle components of education index are considered as independent variables instead of using average of them, whether any significant relation could be established.

The value of R-squared (0.525368) interprets that independent variables account for 52% of variation in dependent variable. Durbin-Watson test value (1.546720) shows absence of autocorrelation and Table 5 shows the absence of multicollinearity.

The model 2 clearly indicates a significant relation between dependent and independent variables. Mean years of schooling and Expected year of schooling accounted for variation in Human development index. In this case, expected years of schooling show more significance and cause more variation as compared to mean years of schooling. Expected years of schooling is the number of years of schooling that a child of school entering age can expect to receive if fundamental patterns of age-specific admission rates continue throughout the child's life.

Mean years of schooling is average number of years of education received by people ages 25 and older, converted from education attainment levels using official durations of each level. The low variation caused by mean years of schooling indicates lower educational attainment till date for which continuously poor allocation of funds for education sector can be considered as one of the major cause.

With the data available on budgetary allocation for three important levels of education i.e. elementary, secondary and higher education level, model 3 shows the relation between expected years of schooling as dependent variable and elementary, secondary and higher education expenditure as independent variables.

Model 3: Heteroskedasticity-corrected, using observations 1992-2015 (T = 24) Dependent variable: ld_Expected years of schooling

Variables	Coefficient	Std. Error	t-ratio	p-value
constant	0.0165234	0.00200535	8.2396	<0.0001
ld_ElementEduexp	−0.000992	0.00190715	−0.5204	0.6085
ld_SecondEduexp	0.0304324	0.0109604	2.7766	0.0116
ld_HigherEduexp_1	−0.0226777	0.00858655	−2.6411	0.0157
R-squared		0.619881		
Durbin-Watson		1.733890		

Source: Author's Analysis

Table 6 Multicollinearity test

Variables	VIF
ld_ElementaryEducation	1.101
ld_SecondaryEducation	1.065
ld_HigherEducation_1	1.154

Source: Author's Analysis

Model 4: Heteroskedasticity-corrected, using observations 1992-2015 (T = 24) Dependent variable: ld_Mean years of schooling

Variables	Coefficient	Std. Error	t-ratio	p-value
constant	0.0306196	0.00153562	19.9396	<0.0001
ld_ElemenEduexp_1	−0.00134046	0.000581239	−2.3062	0.0319
ld_SecondEduexp	−0.0258497	0.00321072	−8.0511	<0.0001
ld_HigherEduexp_1	0.031487	0.00640643	4.9149	<0.0001
R-squared		0.913300		
Durbin-Watson		1.564119		

Source: Author's Analysis

Table 7 Multicollinearity test

Variables	VIF
ld_ElementaryEducation	1.101
ld_SecondaryEducation	1.065
ld_HigherEducation_1	1.154

Source: Author's Analysis

The value of R-squared (0.619881) interprets that independent variables account for 61% of variation in dependent variable. Durbin-Watson test value (1.733890) shows absence of autocorrelation and Table 6 shows the absence of multicollinearity.

In the model 3, secondary and higher education expenditure showed significant relation with expected years of schooling but elementary education expenditure does not show significant relation with expected years of schooling. Even though, secondary education expenditure and higher education expenditure significantly related with expected years of schooling but the coefficient values of both are too small to cause significant variations. The coefficient value of higher education expenditure being negative shows inverse relation with expected years of schooling.

The value of R-squared (0.913300) interprets that independent variables account for 91% of variation in dependent variable. Durbin-Watson test value (1.564119) shows absence of autocorrelation and Table 7 shows the absence of multicollinearity.

Model 4 shows that all the three independent variable are significantly related with dependent variable. But negative values of coefficients of elementary and secondary education expenditure indicate inverse relation whereas mean years of schooling is directly related with higher education expenditure. Coefficient values are too small to cause any significant variation whether inversely or directly.

Discussion

The objective of present study is to analyse Government role in human resource development through expenditure on education sector by establishing relation between public education expenditure and human development index. Granger Causality test results explain that there is no cause and effect relation between education expenditure as percentage of GDP and human development index. Since human development index is a composite measure of human resource development on the basis of three basic dimensions (life expectancy, education index and GNI per capita), absence of causal relation between education expenditure and Human development index indicates absence of influence of education expenditure on human resource development. As single independent factor, education expenditure does not cause human resource development, the study attempted to find the possibility of relationship between education and human resource development in the presence of other two components of human development index. By using multiple regression analysis, considering human development index as dependent variable and education index, life expectancy and GNI per capita as independent factors, the result found is still disappointing. While life expectancy and GNI per capita showed significant relationship with human development index, education index expressed insignificant relationship with HDI. The education index is average of mean years of schooling and expected years of schooling and when considered HDI as dependent factor and mean and expected years of schooling as independent factors, significant relationship is established. But the coefficient values are found to be too small to cause any significant variation especially mean years of schooling. In the next step, education expenditure at elementary, secondary and higher level of education are considered as independent variables and their relationship with expected years of schooling is found mixed (elementary education expenditure as insignificant and secondary and higher education expenditure as significant) and with mean years of schooling, found significant. But, in these cases too, coefficient values are very small and insignificant in causing variation in dependent variables whether directly or inversely.

Conclusion and Recommendation

Education is very crucial for people's life in the present competitive environment as it affect in one or other way long and healthy life along with the their economic status which are two very important requirement of anybody's sustainable growth and development. In spite of its immense importance in all the sphere of life whether it is individual, social or economic, education sector is actually neglected by the successive governments which is evident from the actual budgetary allocation of fund for the education sector. India has huge human resource which if not tapped effectively, would not be able to contribute to economic growth. Human resource development is the key factor for economic growth and education is the key factor for human resource development. The present study concludes that in India so far education has not been given its due importance as evident from lack of funding for education sector. There may be argument that there are factors other than education expenditure which may cause low performance in terms of human resource development and not only education expenditure may improve the human resource development. Still, the importance of education expenditure by government cannot be denied. As per the FICCI report (2013), India would be youngest nation by 2020 indicating that population demanding for education would be on increase and that's why government responsibility for providing education facilities would also be on rise. This demands for higher budgetary allocation at least 6% of GDP which was kept on recommended by National education policies and various education commissions but never actually incurred more than 4%. This lack of financial support can affect negatively the human resource development of our nation which is labour- abundant. Lack of basic education infrastructure is one of the outcomes of such scanty resource allocation to education sector that not only affects the access to education to all but also the quality of human resource. Insufficient resource allocation from central government for education and training is making education a private good in India rather being a public good. Even education is also considered as merit good by various experts and ought to be subsidised or provided free at the point of use so that consumption does not depend primarily on the ability to pay. In India, many are still deprived of education due to inability to pay for it and that's why human development index is pretty low. Though, Indian education system is regarded as one of the largest in the world but just not sufficient as per the growing demand. Thus, education deserves public finance.

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