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The Role of HEIs to Supply Human Capital and Investment Employment Opportunity Demand to Meet the Five Years Ethiopian Growth and Transformation Plan

By

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Abstract

Higher education institutions play great roles for the economic development in supplying trained human capital so as to feed the employment demand, especially in labor intensive economy of developing countries. Adam Smith, father of modern economy, defined human capital as follows: "Of the acquired and useful abilities of all the inhabitants or members of the society. The acquisition of such talents, by the maintenance of the acquirer during his education, study, or apprenticeship, always costs a real expense, which is a capital fixed and realized, as it were, in his person. Those talents, as they make a part of his fortune, so do the likewise that of the society to which he belongs. The improved dexterity of a workman may be considered in the same light as a machine or instrument of trade which facilitates and abridges labor, and which, though it costs a certain expense, repays that expense with a profit." The definition of "human capital" recognizes that people in organizations and businesses are important and essential assets who contribute for development and growth, in a similar way of physical assets such as machines and money. The collective attitudes, skills and abilities of people contribute to organizational performance and productivity. Any expenditure in training, development, health and support is an investment, not just an expense. The basic structure of R. Solow economic growth model explains that human capital, along with the physical capital, is a factor of production, and human resources are both the instrument and goal of economic development. According to Luis, David and Robert (2003), development which refers to learning opportunities should not be limited to improving employees' performance on the current job, but focus on the long run to help employees preparation for future work demands,(Benardin, 2003, p. 164). According to history of unemployment put by the classical economists, in traditional societies, salaried jobs did not exist as money was not in use. These cultures lived off the land directly, and the land belonged to the tribe or to no one. Everyone knew how to build shelter and make food. When these cultures invented currency and moved to the cities, they began to depend on money to buy food from a middle man, instead of growing, gathering, or hunting the food directly from nature. Dependence on jobs to make money to buy food and shelter was the beginning of unemployment, too. Population growth has a two edge relationship with the economic growth. Large population both stimulate and hinder growth depending on the country's capacity to allocate its population properly as a skilled labor force or not. Thus, human resources are both instrumental and goal of economic development, especially for developing states whose economy is more labor intensive than others.

Statement of the Problem

Even though the Ethiopian economy showed encouraging progress in recent years as compared to the past three decades, it could have not yet well-absorbed the existing supplied human capital from HEIs (both governmental and private institutions) annually and which, in turn, leads to unemployment problem. Large population may be a burden to a country resulting in level of underemployment crisis if suitable job opportunities are not available to allocate the skilled labor force by the economy.

General Objectives of the Study

In light of the stated problems, this research analyzes the role of HEIs to supply human capital and investment employment opportunity demand to meet the *five years Ethiopian Growth and Transformation Plan*.

More specifically, this study aims:

- To assess the human capital supply by HEIs;
- To evaluate the employment opportunity demand by the investment economy; and
- To suggest recommendations for policy makers so that they can create more employment opportunity and speed up economic growth using skilled HC.

Hypothesis of the Study

Considering the supply side (number of annually graduated students) and demand side (number of investment capacity to employ them), the researcher expects data as number of HEIs enrollment, graduated HC supply, capital and investment (both FDI and public) to affect positively the HC employment performance (permanent and temporary) in the economy.

Types of Data/Information Used

The research was conducted at macro level with secondary time series data of 20 observation years collected from the Ministry of Education, the Ethiopian Investment

Authority, the Ministry of Labour and Social Affairs, the Ethiopian Economic Association and the Central Statistics Authority websites.

Research Methodology

Econometric Analysis

Applying the Multiple Linear Regression Model, and keeping the HC demand via investment (total employment) as a dependent variable, the equation is presented as: $Y_i = (\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n) + u_i$

Where,

- . Y_i =outcome variable;
- . β_0 = the intercept of the model line;
- . β_1 = the coefficient of the first predictor (X_1);
- . β_2 = the coefficient of the second predictor (X_2);
- . β_n = the coefficient of the nth predictor (X_n);
- . β_0 and β_n are regression coefficients in the model; and
- . u_i = residual(s).

Role of Ethiopian Higher Education Institutes (REHEIs) to supply Human capital

According to Peril and Promise in their research paper (2000) entitled ‘‘Higher Education in Developing Countries’’, the world economy is changing as knowledge supplants physical capital as source of present (and future) wealth. Technology is driving much of this process, with information technology, biotechnology, and other innovations leading to remarkable changes in the way we live and work. Peril and Promise adduced that the quality of knowledge generated within higher education institutions and its availability to the wider economy, is becoming increasingly critical for national competitiveness level, even in international environment.

In the Ethiopian context, like other developing countries, its economic growth mainly depends on labor intensity of the agricultural sector; so trained HC significantly helps the

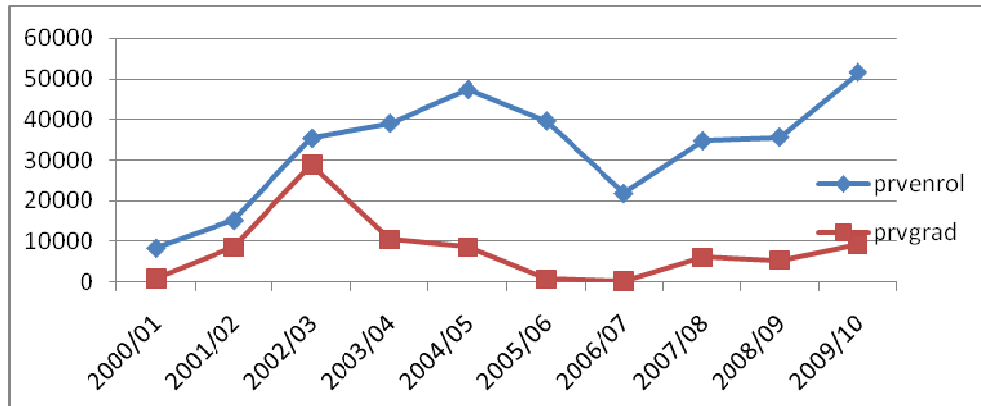
country to promote its economic growth. Benefits of education can be viewed as direct benefit - life time earnings of an educated person or indirect benefit-development of attitudes favorable for savings, small family, modernization, development response, rational outlook, democratic behavior, etc. Private benefits which accrue to an individual as monetary for social benefits in the form of taxes on income paid to the state. In general, benefits of education is the returns that individuals, states and society in large obtain by investing on education.

Governmental and Non-governmental Educational Enrollment and Graduates

Education sector supplies the manpower required for the economy as skilled human capital in production and investment process. Higher education is provided by universities, university colleges and specialized institutions under government and/or private providers, and graduates are those who complete their study at the higher education institutions, typically from one of the following programs: undergraduate degree, postgraduate masters, or postgraduate PhD. According to the source data obtained from the Ministry of Education, there were a total of 71,872 graduates from the above-mentioned three programs at both the government and the non-government institutions over the past five years; of which 16,378 were female graduates, that is, 22.8% of the total. This data represents low level of females' participation at higher level of education, but the same data shows systematic improvement of female graduates.

The Graph 1 below shows the contribution of the PHEIs for student enrollment for training and supply of skilled human capital to the economy.

Graph1- Distribution of the PHEIs' Contribution for Student Enrollment for Training and Supply of Skilled Human Capital in Ethiopia (2000/01 – 2009/10)



Source: MoE, 2010, *Education Statistics Annual Abstract (2009/10)*.

Accordingly, the PHEIs enrollment capacity was reached top (47,412) during 2004/05 contributing about 64.3% share of the total HEIs (132,986). Similarly, the PHEIs supplied 28,810 skilled human capital or resources to the economy. Comparatively, the PHEIs accepted and graduated high number of students during the 2009/10.

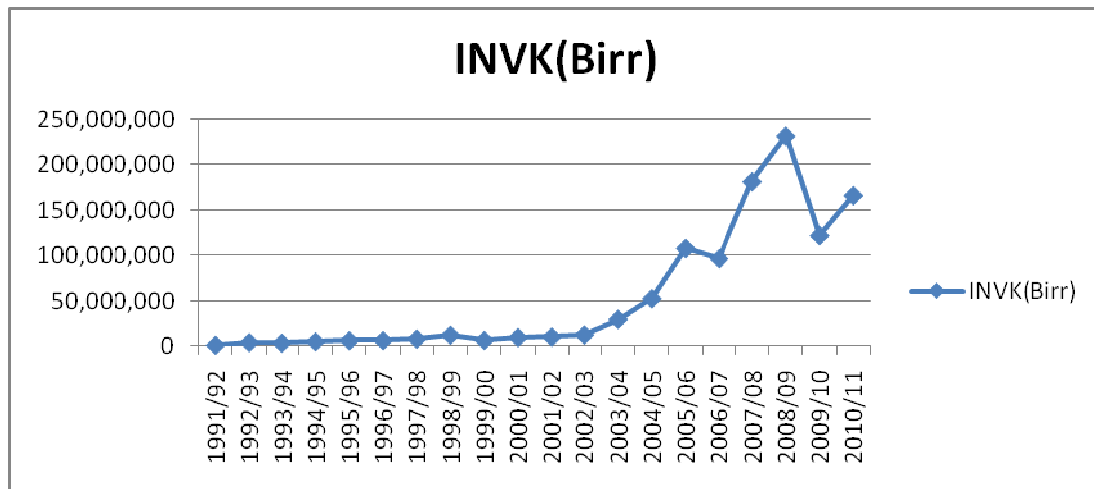
Employment Demand Opportunity by the Economy

A study conducted by the World Bank indicated that developing countries had been like long-runners. In their race against time to eliminate poverty, rapid population growth is an additional burden which slows down their economy regardless of their high economic achievements. Considering Ethiopia, according to the Ethiopian Ministry of Labour and Social Affairs (MoLSA); unemployment, underemployment and poverty are generally linked one other in the country. Thus, the government has developed a job creating economic growth program as the means to achieve poverty reduction and equitable social development, (2010, p. 1). Accordingly, Ethiopia has abundant supply of skilled workers in various fields at internationally competitive rates. In Ethiopia, wages and salaries vary on the type of profession and level of skills required, and usually determined by agreement between the employer and the employee.

As illustrated in Graph 2 below, the amount of capital investment has increased from Eth. Birr 1, 088,165 (1990/91) to Eth. Birr 1,075,562,115 (2010/11). This has been the case in the country in order to capture the human capital (HC) supplied from higher education institutions.

Based on the Ethiopian Investment Agency (EIA) data, the Ethiopian economy is based on agriculture, which accounted, in 2008/09, for about 43 percent of the gross domestic product (GDP), 86 percent of the foreign currency earnings in which overall economic growth of the country has been highly associated with the performance of the agriculture sector. Similarly, the EIA states that due to the investment-friendly environment created in the country, the inflow of foreign direct investment (FDI) has been increasing over the last eighteen years. Thus, China, India, Sudan, Germany, Italy, Turkey, Saudi Arabia, Yemen, the United Kingdom Israel, Canada and the United States are the major sources of the FDI in the country.

Graph 2 – Distribution of Amount of Capital Investment in Ethiopia (1991/92- 2010/11)



Source: Adopted from the Ethiopian Investment Authority Office, 2011.

Types of Unemployment

The population of any area, region or country is made up of three components: employed, unemployed and non-workers. Thus, employed and unemployed together compose the so called labor force. As defined by the International Labor Organization (ILO), unemployment occurs when people are without jobs and they have actively looked for work within the past four weeks. Among other types, voluntary unemployment includes workers who reject low wage jobs, whereas involuntary unemployment includes workers fired due to an economic crisis, industrial decline, company bankruptcy, or organizational restructuring.

According to Phillips curve, analyzing the relationship between inflation and unemployment rate, an economy can not have both lower unemployment rate and lower inflation due to this linear equation as: $W = a - bU$; where, W is rate of wage increase, and U is rate of unemployment keeping a and b constant. Thus, in order to lower unemployment rate using expansionary monetary policy, where more money is left in the hands of people, an economy should tolerate and deal with higher inflation.

Measurements of Unemployment

Though many people care about the number of unemployed individuals, economists typically focus on the unemployment rate which corrects for the normal increase in the number of people employed due to increases in population and increases in the labour force relative to the population. The unemployment rate is expressed as a percentage, and is calculated as follows:

$$\text{Unemployment rate} = \frac{\text{Unemployed workers}}{\text{Total labour force}}$$

As defined by the International Labour Organization, "unemployed workers" are those who are currently not working, but are willing and able to work, and have actively searched for work.

Though it is difficult to measure unemployment in less developed countries such as Ethiopia because of the lack of reliable records and the existence of various informal types of work, based on a general assessment surveys of unemployment by the Ministry of Labor and Social Affairs in Ethiopia, the unemployment rate increased 11.5 percent annually during the 1979-88 period, in which there were 715,065 registered unemployed workers in thirty-six major towns. Of those registered, a total of 134,117 persons ultimately found jobs, leaving the remaining 580,948 unemployed. The urban labor force totaled 1.7 million in 1988/89. The Ministry of Labor and Social Affairs indicated that the government had employed a total of 523,000 of those workers. The rest relied on private employment or self-employment for their livelihoods.

Among the three economic sectors, agriculture is the backbone of the Ethiopian economy which contributes about 43% of the GDP and 86% of exports where the export sector is dominated by coffee and oil seeds which together accounted to 50.6% in 2008/09. Other principal export commodities are ‘chat’, flowers, pulses, and live animals. The industrial sector, which mainly comprises small - and medium- scale enterprises, accounts for about 13 percent of the GDP. The services sector accounts for about 44 percent of the GDP. The World Bank has also witnessed the double-digit economic growth registered in Ethiopia for the last several years. In Ethiopia, , on an average, real GDP has grown by 11.5 percent per year for the last six consecutive years (2003/04-2008/09), which is the highest among the non-oil producing economies of Africa.

Regarding the tertiary economic sector, Ethiopia aspires to attract different opportunities for both domestic and foreign investors on education, health, Telecommunications, Information and Communication Technology (ICT) and tourism services.

The Ethiopian Five Years Growth and Transformation Plan to achieve the 2017 Millennium Development Goals (MDGs)

The Ministry of Finance and Economic Development (MoFED) stated that the Five Years National Growth and Transformation Plan would enable the nation to double the agricultural products and the general economic growth by registering 14.9 percent growth, on average. The Ministry Office added that the plan would facilitate for the industry sector to take the lead in the over all development activities in the country in expanding and ensuring quality health and education services towards meeting the MDGs targets in the sectors. Accordingly, ensuring the benefits of youth and women have also been the targets by enhancing capacity building and good governance issues which would help ensure food security at household and national level.

The Plan will give special attention for the industry sector, which is believed to be the base for the national development in generating foreign currency via export and creating job opportunities via investment flows by expanding infrastructure facilities by giving prior attention for the development of train (2,000 km of railway networks), road, telecommunication, renewable power (8,000 to 10,000 MW from water and wind resources) and irrigation potable water sanitation sectors.

Based on the Report of the Ethiopia's MDGs, Ethiopia was one of the 189 member states that had adopted the Millennium Declaration in 2000 and, in doing so, the country committed itself to the achievement of the MDGs. The main development objective of the Ethiopian Government is poverty eradication. Hence, the country's development policies and strategies are geared towards this end.

Human Development Index

The term Human Development Index (HDI) established in 1990 by the UNDP. HDI is a summary composite index that measures a country's average achievements in three basic aspects of human development: longevity, knowledge, and a decent standard of living. Here, longevity is measured by life expectancy at birth; knowledge is measured by a

combination of the adult literacy rate and the combined primary, secondary, and tertiary gross enrollment ratio; and standard of living is measured by GDP per capita. The UNDP Human Development Index (HDI) is an indication of a country's achievements in development-wise by taking value between 0 and 1. Countries with an index value of over 0.800; between 0.500 and 0.800; and below 0.500 are part of the high, medium and low Human Development group respectively.

As GDP could not satisfy the proper assessment and ignores completely welfare of the humanity and turns towards economic growth, economists prefer to consider HDI to assess the nation's performance. Thus, HDI calculation consists of three parameters to assess the quality of life:

1. Life expectancy: Life Index calculation has come out with changing its goalposts (minimum and maximum of the life expectancy). Thus, minimum value for life expectancy is fixed at 20 years and maximum value for life index is kept at 83.2 years using a formula developed to calculate as follows: Life Expectancy Index (LEI) = (Life Expectancy of a country - 20) / (83.2 - 20).

2. Education or Knowledge availability: Education Index (EI) assessment is composed of two indices such as Mean Years of Schooling Index (MYSI) and Expected Years of Schooling Index (EYSI). Here, Mean Years of Schooling means the spent years by a 25 years or older person in school. The low value was fixed at 0 and the maximum value for mean years of schooling is fixed at 13.2. However, Expected Years of Schooling means years that is to be spent by a 5 year old boy in school in a particular country. Low value for expected years of schooling is fixed at 0 and high value is fixed at 20.6. Regarding the calculation, Mean Years of Schooling Index (MYSI) = (Mean years of schooling - 0) / (13.2 - 0). Similarly, Expected Years of Schooling Index (EYSI) = (Expected Years of Schooling - 0) / (20.6 - 0). Thus, the Education Index is given by the formula:
Education Index = ((MYSI x EYSI)^{1/2} - 0) / (0.951 - 0).

3. Per capita income of the concerned people of a country: The Purchasing Power

Parity in USD (PPP) is calculated as $\text{Income Index} = \frac{\text{Log}(\text{Country's GNIpc}) - \text{Log}(\$163)}{\text{Log}(\$108,211) - \text{Log}(\$163)}$.

Thus, considering the aforementioned three parameters, the Human Development Index is given as: $\text{HDI} = (\text{Life Expectancy Index} \times \text{Education Index} \times \text{Income Index})^{1/3}$. After this calculation, the total value will be between 0 and 1. As per the values gained, countries will be placed in the list of division of countries according to their value of the HDI. They are divided into very high, high, medium high and low high human development countries. Accordingly, the HDI grouped Ethiopia in the low human development ranking as 157th country in its achievement on education, health, gender inequality, and unemployment (17.0%). Focusing on education as a factor of HDI, gross adult literacy rate accounted for 35.9 (2005-2008), gross education access of primary, secondary and tertiary enrollment ratios amounted as 97.8 %, 33.4% and 3.6% respectively during the years 2001-2009. In a similar manner, the Ethiopian achievement on decent employment improved from 71.3 % (1991) to 80.6 % (2008) regarding employment to population ratio (ages 15-64). Among the total employment, formal and vulnerable employment accounted for 47.0% and 51.8% respectively during the period of 2000-2008. Further, out of the total employment, employed people who are living on less than USD 1.25 a day accounted as 45.8% during the same period.

Data Source, Methodology and Estimation

Types of Data /Information Used

The success of any econometric analysis ultimately depends on the availability of appropriate data. Accordingly, this research used annually collected time series data type from 1991/92 to 2010/11 to observe the values that a variable takes at different times. The data used in this analysis were collected from the Ministry of Education, the Ethiopian Investment Authority, the Ministry of Labour and Social Affairs, the Ethiopian Economics Association and the Central Statistics Authority websites.

Research Methodology

As this study was conducted at macro level, nation wide, the data collected were processed and analyzed using descriptive statistical analysis to produce outputs in the forms of percentage, graphs, and others. In addition, the study employed categorizing qualitative data and qualitative descriptive techniques.

Ordinary Least Square (OLS) Model

According to Francis Galton, regression analysis is concerned with the study of the dependence of one variable (i.e. the dependent variable) on one or more other explanatory variables with a view to estimate the population mean of the dependent variable in terms of the fixed value of the independent variables. Here, when the researcher considered OLS model, it should be noted that models linear in the parameters may or may not be linear in the variables. To investigate the effects of all explanatory variables on the Total Human Capital Employment (THCE), the OLS linear regressions are run on Statistical Package of Social Science Version 17 (SPSS 17.0).

Human Capital Employment (HCEMP)

Generalizing the two-variable population regression function, the multiple linear regression function may be presented as follows:

$$\text{HCEMP} = \beta_0 + \beta_1 \text{THEIE} + \beta_2 \text{THEIG} + \beta_3 \text{TKINV} + \beta_4 \text{KR} + \beta_5 \text{RGDP} + \beta_6 \text{InfR} + u_i \dots (1)$$

Where,

. HCEMP stands for the human capital employment (permanent and temporary);

. THEIE = total higher educational institution students enrollment;

. THEIG= total higher educational institution graduated students;

. TKINV= total capital investment (public and FDI);

. RGDP = real GDP;

. InfR = inflation rate in %; and

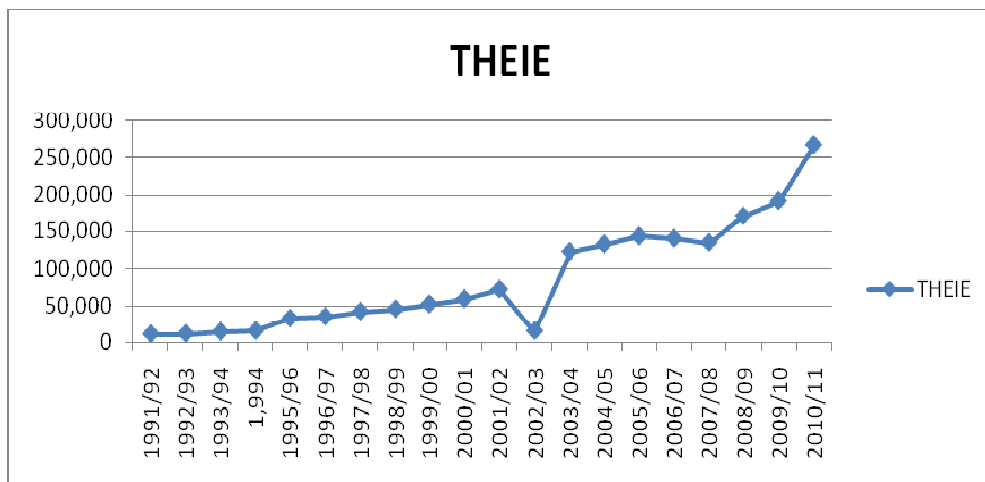
. KR = capital interest rate in %.

Data Analysis and Interpretation of Findings

Descriptive Analysis

Number of enrollment to HEIs

Graph 3 – Distribution of Higher Education Enrollment of Students (1991/92 – 2010/11)



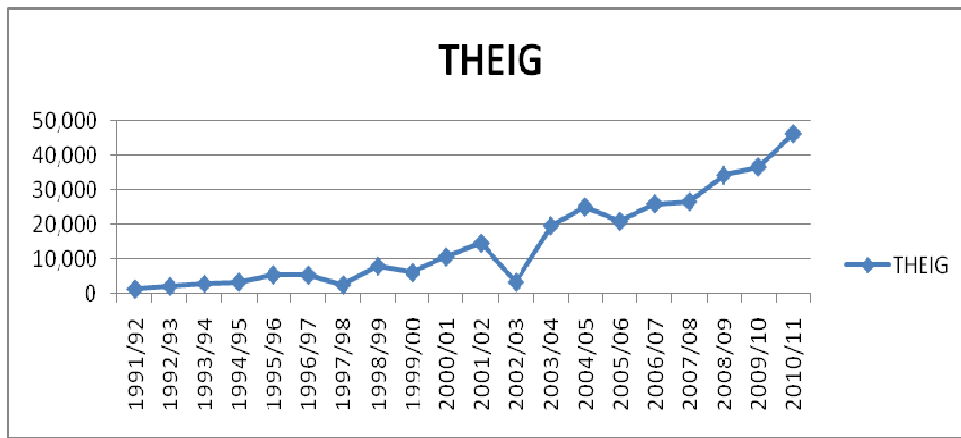
Source: Adopted from MoE, 2011, *Education Statistics Annual Abstracts (1991/92 – 2010/11)*.

The number of higher education enrollment has significantly increased from 15.438 thousand (1994/95) to 267.668 thousand (2010/11) in both governmental and non-governmental higher institutions which is accounting to raise female enrollment from 2.148 thousand (13.913 percent) to 89.851 thousand (33.568 percent) in those respective years.

Number of Graduates from HEIs

Taking the Cobb Douglas production function equation which assumes that the quantity produced in a country is determined by the interplay of labour (L) and capital (K) though there are other factors which affect the calculation as $Q = AK^\beta L^{1-\beta}$; Where contribution of capital is constant β and contribution of labour is $1 - \beta$ with constant A. Expanding the Cobb Douglas production function by breaking up rate of increase in labour quality, Edward F. Denison (1962), who was cited by the editor of the Block entitled “Economics of Social Sector and Environment, particularly in Economics of Education, MEC-008” (Upadhyay, 2009, p.32), measures labour quality in terms of health, fitness and experience. Thus, Denison and Schultz (1961) indicated that expenditure on education is a form of investment and is not just consumption.

Graph 4 – Distribution of the Number of Higher Education Graduate Human Capital



Source: Computed by the author from the Ministry of Education Database, 2011.

As Graph 4 illustrated, the number of higher education graduate human capital highly increased from 3.369 thousand in 1994/95 to 46.261 thousand in 2010/11 from both governmental and non-governmental institutions in different levels of qualification (diploma, undergraduate, postgraduate and PhD); of which the number of female graduates raised from 381 to 12.262 thousand accounting from 11.308 to 26.506 percent in these years. Here, it is well-noticed that the private higher institutions have been

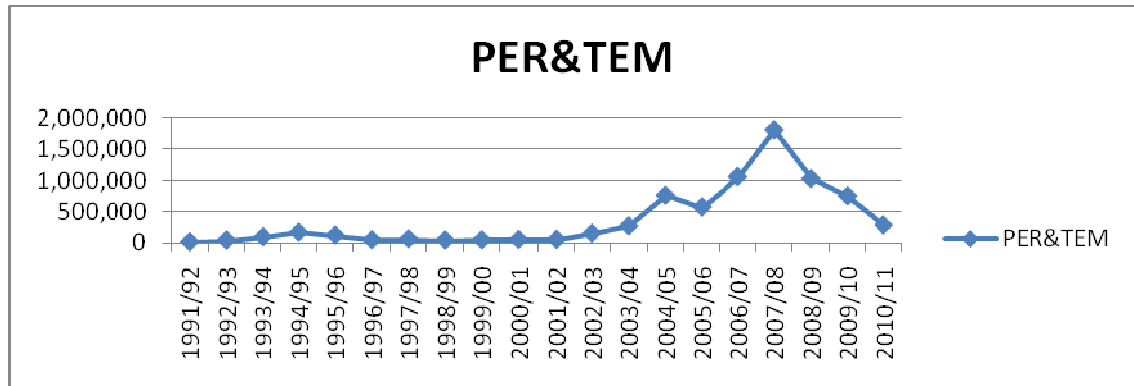
playing great role in contributing to supply skilled human capital which is accounting 19.958 percent (2010/11).

Investment Capital

According to Robinson's Golden Age, in addition to the growth rate of capital ($\Delta K/K$), growth rate of population ($\Delta N/N$) determines the growth rate of an economy. Thus, when the growth rate of population equals to growth rate of capital as $\Delta N/N = \Delta K/K$, the economy is in full employment equilibrium called Golden Age to describe smooth steady growth. However, if $\Delta N/N > \Delta K/K$, underemployment exists and if $\Delta N/N < \Delta K/K$, depreciation of capital occurs in the economy. Thus, the Ethiopian economy is in the condition of $\Delta N/N > \Delta K/K$ which has indicated that additional capital is needed to employ the skilled HC labor surplus to achieve sustainable economic development.

It is to be recalled that skilled human resources or human capital has had paramount importance in the achievement of sustainable development in Ethiopia. In Ethiopia, the employed human capital by investment of the economy is depicted in Graph 5. The total number of employed human capital raised from 42.807 thousand (1997/98) to 7.416463 million (2010/11) which accounted 2.460862 million and 4.955601 million permanent and temporary employment respectively. These figures, in turn, show that the investment economy has employed more temporary (66.818 percent) human resources than permanent (33.181 percent) skilled human capital (HC). In this case, though it needs its own research, following high increase in the costs of HC labour, raw materials, energy and supply, poor weather (agricultural sector), technological retardation and expected inflation; most firms (particularly services sector) prefer to employ diploma holders and below qualified HC with high work experience to avoid high salary payment. However, the government has been relatively good to employ high skilled professionals (i.e. those hold first degree and above) in public and governmental institutions.

Graph 5 - Employed Human Capital by the Investment of Economy



Source: Computed by the author from the Ethiopian Investment Agency Database (1991/92 – 2010/11).

Inflation Rate

Inflation refers to a continuous increase in the aggregate macro price level rather than just a one time increase in it. Among others, the Ethiopian economy is experienced by demand-pull inflation-triggered by an increase in aggregate demand, cost-push inflation (due to cost increase), and/or administered inflation-price revision by the government where few prices are fixed by the government and few others are subject to demand and supply regulation. During the years 2006/07, 2007/08 and 2008/09, the general annual inflation was 15.8%, 25.3% and 36.4% respectively. Currently, the general annual inflation has dropped to 7.7%. These were largely driven by the trend of the food component of price which had showed 21 percent annual growth during those fiscal years. The budget deficit as a percent of the GDP was only 1 percent in 2009. Thus, to summarize, the sequence of AD shocks: \uparrow in dd \rightarrow \uparrow in AD \rightarrow \uparrow price wage \rightarrow \uparrow cost of production \rightarrow \downarrow in AS \rightarrow \uparrow unemployment. Among the main consequences of inflation, money illusion- salary increment is directly taken by the price increment, foreign exchange rate- causes to appreciate home currency in real term in relation to the foreign currency unless there is equal inflation rate abroad, uncertainty and unemployment.

Brain Drain (BD)

Brain drain can be considered from different perspectives. Regarding its types, BD can be oversea BD and BD from rural to urban areas which may also include: internal BD - professionals do not stay in the profession where they are trained but change to other type of work, like taxi driving and other private business for higher earning.

Africa is a continent with small aggregate outflows of highly educated HC but with high as a percentage of existing stocks of HC. According to William Easterly and Yaw Nyarko (2005), in their topic of “Is the Brain Drain good for Africa?” though contrary to media and other comments, poor countries possibly obtain positive return from the BD looking at the migration decision both individual and state government at macro level within the source country, but not the receiving countries.

According to the 2004 Report on Human Development of the UN, Ethiopia spent 9.4% of the total government expenditure; of which 12.1% was for tertiary education. Thus, the BD highly affects negatively the state’s educational expenditure spent for its citizens if there are no any social returns from the individual skilled HC.

Econometric Analysis

To investigate the effects of the explanatory variables (i.e. THEIE, THEIG, TKINV, LKR, IFR and RGDP) on the human capital employment (permanent and temporary) (HCEMP), Ordinary Least Square (OLS) Model was run on SPSS (Statistical Package for Social Science) Version 17.0 software. This Model is used to predict the outcome on the human capital employment using those six explanatory or predictor variables in the above-stated multiple regression model.

Estimation Results and Analysis

Though it is a matter of degree, multi-collinearity almost exists in most economic analysis. Multicollinearity refers to the situation in which the explanatory variables (independent variables) are highly correlated. When the explanatory variables are

multicollinear, there is “overlap” or sharing of predictive power – they share essentially the same information. Thus, together, they may explain a great detail of the outcome (dependent variable) but may not individually contribute significantly to the model. Therefore, in this research, after the researcher has checked the multi-collinearity problem among those explanatory variables, the estimated equation of the model is:

$$HCEMP = 1757479.599 - 0.262THEIE + 13.468THEIG + 0.008TKINV - 7582.814KR - 9.674RGDP - 10830.264 InfR + ui \dots\dots(2)$$

Test for the Coefficient of Determination

Table 1 presents the model summary of the data analysis using multiple linear regression statistical technique. It shows that there is strong relationship between the correlation coefficient in the model and the dependent variable (R=.846). To test the significance of R2 (i.e. R2 is not different from zero) and that the dependent variable is not explained by the explanatory variable(s) in the model.

Table 1 - Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.846(a)	.716	.585	310254.055

a Predictors: (Constant), inflation rate, capital interest rate, investment capital, total higher education graduated, total higher education enrollment, real GDP

b Dependent Variable: total employment

Source: Own data analysis output, 2011.

R (the multiple correlation coefficients) is the linear correlation between the observed and model-predicted values of the Total Human Capital Employment (THCEMP) variable. Its large value (0.846) indicates a strong relationship between the THCEMP and its explanatory variables.

R-Square (the coefficient of determination) is the squared value of the multiple correlation coefficients. This coefficient tells us how much of the variability in the outcome is accounted for or explained by the explanatory variables or predictors. As illustrated in the model summary, the value of R-square is found to be 0.716 which means that the explanatory variables account for about 72 percent of the variation or change outcome of dependent variable. In other words, the output of the multiple linear regression statistical analysis shows that all those explanatory variables specified in the model account for or explain 71.6% of the change in the Ethiopian total human capital employment about its mean.

In what follows, there is a need for assessing the multiple linear regression model for generalizing or cross-validation, that is, how well the above-stated model can predict the outcome in a different sample or assessing the accuracy of the model across different samples – external validity. For this purpose, we use the adjusted R-square. Its value indicates that the loss of predictive power. Thus, the value of the adjusted r-square shows that about 60% (Adjusted R-square=.585) of the variation in time is explained by the model.

Table 2 - ANOVA (b)

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	3153734928830.817	6	525622488138.470	5.461	.005(a)
Residual	1251348524080.934	13	96257578775.456		
Total	4405083452911.751	19			

a Predictors: (Constant), inflation rate, capital interest rate, investment capital, total higher education graduate, total higher education enrollment , real GDP

b Dependent Variable: total employment

Source: Own data analysis output, 2011.

The ANOVA table presented above is a useful test of the model's ability to explain any variation in the THCEMP variable. The significance value of the F-statistic is less than

0.005, which means that the variation explained by the model, to show the effect of explanatory variables on the Total Human Capital Employment (THCEMP), is not due to chance. Further, according to the findings of the study (see annex); total investment, higher education enrollment and higher education graduates have very strong correlation with the real GDP of the economy. However, the findings also show that there is no significant relationship between capital interest rate and real GDP and higher education graduates.

Tests of Regression Coefficients

The statistical test for rejecting H_0 associated with a regression coefficient is normally based on the T- value. The T- value is relevant because for statistical testing we need to utilize a sample estimate of the error variance rather than its true value. For a given the level of significance, the absolute value of T should be greater than or equal to 1.96 (or $> \alpha = 1.96$). Putting differently, it gives the direct net effect of a unit change on mean of the THCEMP.

Table 3 - Coefficients (a)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	1757479.599	1376051.488		1.277	.224	-1215298.906	4730258.104
Real GDP	-9.674	9.659	-.559	1.002	.335	-30.541	11.193
Capital interest rate	-7582.814	34281.020	-.041	.221	.828	-81642.454	66476.826
Investment capital	.008	.002	1.121	3.417	.005	.003	.012
Total higher education enrollment	-.262	3.610	-.040	.073	.943	-8.060	7.536
Total higher edu. graduate	13.468	21.444	.379	.628	.541	-32.858	59.794
Inflation rate	-10830.264	10134.746	-.252	1.069	.305	-32725.051	11064.524

a Dependent Variable: total employment, no. of observations 20, no. of parameters are 7 and Level of significance at 0.95 %.

Source: Own output from data analysis, 2011.

Thus, the calculated T- value for total investment capital (TKINV) is found to 3.417 at 95% confidence interval (0.05 level of significance), meaning that we fail to accept the null hypothesis (Ho). Therefore, it may possible to say that total capital investment is highly statistically significant and it is also a positive variable to explain the total employment for both temporary and permanent employment in the economy. Thus, the coefficient of total capital investment (B= .008) affects the total employment by about 0.8 % with a unit change of total capital investment keeping others zero. Similarly, the coefficient of higher education graduates (B=13.468) indicates that 1 % increase in THEIG results 1346.8% increase for the total employment on the assumption that the remaining explanatory variables are held constant. However, the rest explanatory variables are found to be statistically less (no) significance to the dependent variable.

Summary, Conclusion and Recommendations

This research project tried to analyze the role of HEIs to supply human capital and investment employment opportunity demand to meet the Five Years Ethiopian Growth and Transformation Plan. The study considered observation time-series data collected from the websites of the Ministry of Education, the Ethiopian Investment Agency, the Ethiopian Economic Association, the Ministry of Labour and Social Affairs and the Central Statistics Authority for the past 20 years (i.e. 1991/92 to 2010/11).The research used Ordinary Least Square (OLS) analysis using SPSS 17.0 and tried to evaluate which factors are statistically significant for the dependent variable (total employment). The analysis presented mixed signals for various explanatory determinants of which total investment capital (TKINV) and total higher education graduates have positive effect on the total employment.

Conclusion

By way of conclusion, the state's economic growth mainly depends on labor intensity agricultural sector economy. Thus, trained HC significantly helps the state to promote its economic growth as instrument and goal of economic development. In addition, according to the source dataset generated from the Ministry of Education, the number of higher education graduated human capital has highly increased from 3.369 thousand in 1994/95 to 46.261 thousand in 2010/11 from both governmental and non-governmental institutions in different levels of qualification (diploma, undergraduate degree, postgraduate degree and PhD); of which the number of female graduates raised from 381 to 12.262 thousand accounting from 11.308 to 26.506 percent in those years. Correspondingly, the investment (FDI and public) capital has increased from Eth. Birr 1.088165 million in 1994/95 to above Eth. Birr 1.075 billion in 2010/11. This indicates that there is an encouraging investment commencement in the country. Thus, from the findings of the data analysis, total investment capital (TKINV) is found to be highly statistically significant and positive variable to explain the total employment for both temporary and permanent employment in the economy. Further, total higher education graduate is also found positive but with less statistically significant variable though all the rest of independent variables has negative effect and not statistically significant to explain the total employment. However, the sequence of economic aggregate demand shocks results to increase unemployment rate caused by increased cost of production in firms in the present Ethiopian economy which further leads to the Brain Drain (BD) in both over seas and internal (to be employed in jobs which is not trained) so as to decrease production quality and HC efficiency in the macro economy.

Recommendations

Based on the above-stated major findings, some macro-policy recommendations are stated:

1. Though there is high skilled human capital supply from both governmental and non governmental higher educational institutions, the corresponding investment

capital is not enough to absorb the skilled human capital supply which, in turn, leads to high unemployment. Thus,

- a. Micro- and small-enterprises should be encouraged to the maximum possible by providing them with an appropriate initial capital and free land for work.
- b. Grouping voluntarily graduated skilled human capital in less capital intensive sector should be implemented more.
- c. Exporting (extra) skilled human capital legally via special agreement with the destination country can be a short run solution to reduce unemployment problem for main reasons: to get returns at least to cover the education expenditure and it helps the government which type of professionals should be made exported so that it can adjust the supply and demand of employment. And as well, they could generate income and knowledge transfer to their home land in the long run as the Diaspora.
- d. Great attention should also be given to rural-urban BD for the main reason that it highly encourages the over-sea BD due to high unemployment rate in urban areas along with high living cost.
- e. Public borrowing is a means of solving initial capital shortage provided that it will be implemented properly for economic growth so that the economy can bring its income return to repay its debit and its interest other wise it will be a burden to the society.
- f. Training enrollment should be diversified based on the employment market demand especially new study areas should be open to bring new technology to the society to feed the economy demand.
- g. Finally, training quota should not be limited for the fear of unemployment problem in both governmental and non-governmental higher institutions. Because of being unemployed is better than being ignorant for the best reason that at least the citizen will know in which type of economic level s/he is living so that s/he can fight against poverty by creating her/his own job so as to employ herself or himself.

All of those above-stated recommendations may help the country to facilitate for the industry sector to take the lead in the overall development activities such as in expanding and ensuring quality health and education services towards meeting MDGs targets and to eradicate poverty at large from the country.

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Annex A - Descriptive Statistics

Variable	Mean	Std. Deviation	N
Total employment	370823.25	481504.411	20
Real GDP	72737.1148	27830.20113	20
Capital interest rate	11.4280	2.60227	20
Investment capital	53778105.69	71463220.299	20
TOT higher edu enrollment	80161.65	74226.415	20
Tot higher edu graduate	15061.55	13550.409	20
inflation rate	109.3705	11.22068	20

Annex B- Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.846(a)	.716	.585	310254.055

a Predictors: (Constant), inflation rate, capital interest rate, investment capital, TOT higher edu. graduate, TOT higher edu enrollment , real GDP

b Dependent Variable: total employment

Annex C – ANOVA (b)

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	3153734928830.817	6	525622488138.470	5.461	.005(a)
Residual	1251348524080.934	13	96257578775.456		
Total	4405083452911.751	19			

a Predictors: (Constant), inflation rate, capital interest rate, investment capital, TOT higher edu. graduate, TOT higher edu. enrollment , real GDP

b Dependent Variable: total employment

Annex D - Residuals Statistics (a)

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	22446.16	1491869.00	370823.25	407413.855	20
Residual	-464470.031	628135.313	.000	256632.906	20
Std. Predicted Value	-.855	2.752	.000	1.000	20
Std. Residual	-1.497	2.025	.000	.827	20

a Dependent Variable: total employment

Annex E – Coefficients (a)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	1757479.599	1376051.488		1.277	.224	-1215298.906	4730258.104
Real GDP	-9.674	9.659	-.559	-1.002	.335	-30.541	11.193
Capital interest rate	-7582.814	34281.020	-.041	-.221	.828	-81642.454	66476.826
Investment capital	.008	.002	1.121	3.417	.005	.003	.012
TOT higher education enrollment	-.262	3.610	-.040	-.073	.943	-8.060	7.536
TOT higher education graduate	13.468	21.444	.379	.628	.541	-32.858	59.794
Inflation rate	-10830.264	10134.746	-.252	-1.069	.305	-32725.051	11064.524

a Dependent Variable: total employment

Histogram

Dependent Variable: total employment

