# Investment in Human Capital and Export Expansion in Indian Economy

**S.A.Saiyed[6] and Rajni Pathania[7]**

**Abstract:** This study empirically    investigates the impact of human capital investment on export expansion in Indian economy over the period of 2000 to 2011. To examine the cause and effect relationship among selected dependent and independent variable, this study uses multivariable regression models. These models are estimated with the help of ordinary least square (OLS) technique. This study uses time series data from the period 2000-01 to 2011-12. The variables used in this study are primary product export, manufactured product export, total export, petroleum product export, investment on health and education. Investment on health and education are used as a proxy of human capital. The result indicates that Investment on human capital has positive effect on the export expansion of Indian economy.

**Keywords:  Export Expansion, Ordinary Least Square, Manufactured Product Export, Total Export, Petroleum Product Export, Investment, Education.**

Human capital is one of the principal intangible assets of every developing and developed economy. To say, countries across the world vary due to the potentials and endowments of the quality of human resource. Investments on public education and health have positive effects on economic growth and it provides long term benefits for society. These positive results are in terms of long and healthy life, access to knowledge, decent standard of living, empowerment of women as well as the neglected

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[6] Department of Business Economics, The M.S. University of Baroda, India

[7] Department of Business Economics,  The M.S. University of Baroda, India. Email: rajnipathani@gmail.com

poorer sections of the society etc. Though investments on education contributed indirectly to economic growth by reducing fertility, improving health and life expectancy, its positive outcome has major contribution in the path of sustainable growth of the economy. Low human capital is main obstacle for technology transfer and learning higher skills in developing countries. A higher educated and skilled workforce will able to adapt more quickly to the sophisticated technology which can bring rapid production changes and thereby higher exports of the country. It other words, higher capital stock is positively associated with the export capacity of domestic economy.

| Human Capital Investment | ⟹ | Productivity<br>Exports<br>Foreign Investment<br>Gross Domestic Product | ⟹ | Economic Development |
|---|---|---|---|---|

Investment on human capital increases the productivity, exports, foreign investment and gross domestic product. All these are significantly linked with economic development and it stimulate the future growth of an economy.

According to human development report prepared by UNDP the HDI value of India's was 0. 344  in 1980, it was increased to 0.547 in 2011 and a rank of 136 among 187 countries (Table 1).   India lies in the medium Human development category.

**Table 1: Human development Indicators of India (2011)**

| | |
|---|---|
| Human Development Index Value (HDI) | 0.344 (1980),   0.547 (2011) |
| Literacy Rate (%) |  74.04% (male 82.14%, female 65.46%) |
| Life Expectancy at Birth (in Years) | 65.4 |

Source: Economic Survey

**Table 2: Trends in social services expenditure by central and state government
(As Percentage to GDP & Total Expenditure)**

| Expenditure | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 |
|---|---|---|---|---|---|---|
| Total expenditure | 26.37 | 28.41 | 28.59 | 27.52 | 28.07 | 28.28 |
| **Expenditure on social services** | **5.91*** <br> **22.4** | **6.76*** <br> 23.8 | **6.89*** <br> 24.1 | **6.79*** <br> 24.7 | **6.89*** <br> 24.5 | **7.09*** <br> 25.1 |
| i). Education | 2.59* <br> 9.8 | 2.88* <br> 10.1 | 3.04* <br> 10.6 | 3.13* <br> 11.4 | 3.25* <br> 11.6 | 3.31* <br> 11.7 |
| ii). Health | 1.27* <br> 4.8 | 1.32* <br> 4.6 | 1.36* <br> 4.8 | 1.29* <br> 4.7 | 1.29* <br> 4.6 | 1.36* <br> 4.8 |
| iii). Other | 2.05* <br> 7.8 | 2.56* <br> 9.0 | 2.49* <br> 8.7 | 2.37* <br> 8.6 | 2.35* <br> 8.4 | 2.42* <br> 8.6 |

*Source: Economic survey 2012-13*
*\* As Percentage to GDP*

Above table shows that expenditure on social services as proportion of total expenditure has increased from 22.4% in 2007-08 to 25.1% in 2012-13. Expenditure on education as a percentage of GDP has increased from 2.59% in 2007-08 to 3.31% in 2012-13. Health expenditure as percentage of GDP increased from 1.27% in 2007-08 to 1.36% in 2012-13. Total expenditure on social services as percentage of GDP increased from 26.37% in 2007-08 to 28.28% in 2012-13. Apart from this introduction, this paper is divided into four    sections. Section two discusses the previous studies related to relationship between human capital and export growth, source of data and methodology, while section three analyzes the impact of human capital and export expansion,   section four discusses the conclusion and suggestions.

**Review of Literature, Objectives, Hypothesis, Data Sources, Model Specification and Estimate Technique**

**Review of Literature**

A lot of studies have been done on the different areas of human capital and export expansion at national and international level. A few studies have been taken for review:

Tuomas (1993) examined the dynamic effects of trade on human capital accumulation in developing countries. This study found that a favorable change in the terms of trade, the rate of growth may still rise as compared to the autarky level.  Trade has adverse effects on the production structure in the LDC. Trade changes the production structure toward low-tech goods and lowers the factor price of human capital. This, in turn, lowers the rate of investment in education which, over time, shows up in a decreasing level of human capital relative to the rest of the world.

Gould and Ruffin (1995) studied the impact of human capital into its role as an input to production and relationship between growth and the external effects of human capital. This study found that when literacy rates were relatively high, open economies experience growth rates about 0.65 to 1.72 percentage points higher than closed economies.

Chuang (2000), studied the direction of causality among human capital accumulation, exports and economic growth in Taiwan during the period 1952 to 1995. This study found that there was positive relationship between human capital accumulation and exports. There was unidirectional causality between these two variables and its run from human capital accumulation to exports growth.

Brempong, K. (2004), investigated the impact of health human capital on the growth rate of per capita income in African and OECD countries. This study used solow growth mode, panel data and dynamic panel estimator. The result revealed that the growth rate of per capita income was strongly and positively influenced by the investment in health human capital.

Narayan and Smyth (2004), examined the causality among exports, human capital and real income in china during 1960 to 1999.the result revealed that there was bidirectional causal relation between human capital and real exports of country.

Farok and Mudambi (2008) examined the performance of human capital and export performance. This study analyzed how the export performance of 25 nations, in services and manufactures, over a 14 year period, was affected by: Human capital indicators, IT infrastructure, business environment indicators, and wage levels. Testing the effect of human capital on exports led to a number of key insights. First, human capital investment has a significant effect on both services and goods exports. Secondly, contrary to conventional wisdom, human capital investment is not significantly more important for services exports than for goods exports. The argument about the relative effect of human capital on services exports and goods exports may be better addressed by examining regional differences and differences in the level of development.

Afzal et al. (2009), examine both the short-run and long-run dynamic relationships among economic growth, human development and exports in Pakistan. This study employed annual time series of real gross domestic product (RGDP), real exports (RX), physical capital (PC) and human development (HD) in Pakistan for the period 1970-71 to 2008-09. The statistical results and their analysis supported the 'growth-driven exports hypothesis'.

Tsai and Harriott (2010), analyzed how the various compositions of human capital affect the economic growth during the periods 1999-2006 in 24 classified as developed and 36 as developing countries. Human capital measured in terms of percentage of tertiary graduates in agriculture human capital (AGR); high-tech human capital (TECH); the business and service human capital (SERVICE); the humanities human capital (HUMAN); and health and welfare human capital (HEALTH). The empirical results indicated that high-tech human capital was significantly positively correlated with economic

growth. This study also found that the tertiary education significantly influence economic growth in developed and developing countries.

**Objective of the Paper**:

The main objective of this paper is to investigate relationship between Human capital and export growth in India. We want to empirically investigate the effect of human capital on exports of primary products, manufactured products, petroleum products and total exports of Indian economy during the period 2000-01 to 2011-12.

**Hypothesis**

We have proposed the following hypothesis for this study:

H0: There is no significant effect of human capital on export growth.

**Data Sources**

This study employs investigative and empirical methods to analyze the relationship between human capital and export growth in India in the last 12 years. We use education expenditure and health expenditure as a proxy of human capital. The data from 2000 -2011 has been collected from Economic Survey and Handbook of Statistics on the Indian Economy publication of the RBI.

**Model Specification**

The model for the study is specified as:

$$LOG\ (TOX) = \alpha_0 + \alpha_1 EDU + \alpha_2 HL + \mu_1$$

$$LOG\ (PRP) = \alpha_0 + \alpha_1 EDU + \alpha_2 HL + \mu_1$$

$$LOG\ (MANP) = \alpha_0 + \alpha_1 EDU + \alpha_2 HL + \mu_1$$

$$LOG\ (PEPT) = \alpha_0 + \alpha_1 EDU + \alpha_2 HL + \mu_1$$

**TOX :** TOTAL EXPORTS

**EDU:** EDUCATION EXPENDITURE

HL: HEALTH EXPENDITURE

MANP: MANUFACTURED PRODUCT EXPORTS

PEPT: PETROLEUM PRODUCT EXPORTS

PRP: PRIMARY PRODUCT EXPORTS

$\alpha$ and $\beta$ are the parameters of the intercept and slopes of the coefficients, while $\mu$ represents other variables that could have lent further explanation to explained variables but not included in the model.

**Estimation Technique**

The modern econometric approach for analyzing the relationship is employed. We adopted ordinary least square regression (OLS) for analyzing above models.

### REGRESSION RESULTS

The computation of the model parameter is based on the data shown in the table 3 to 7.

**Table: 3 Descriptive Analyses of Data**

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|  | PRP | MANP | PEPT | OTH | TOX | EDU | HL |
|---|---|---|---|---|---|---|---|
| **Mean** | 89563.77 | 404536.2 | 86671.58 | 26409.50 | 609083.0 | 79.18 | 469.05 |
| **Median** | 80793.00 | 352761.0 | 68026.50 | 12518.00 | 514098.5 | 58.07 | 135.08 |
| **Maximum** | 218404.0 | 895125.0 | 265819.0 | 84633.00 | 1459281.0 | 166.97 | 2110.29 |
| **Minimum** | 19322.19 | 156858.0 | 8542.000 | 5600.00 | 203571.0 | 41.86 | 53.07 |
| **Std. Dev.** | 57975.73 | 235451.9 | 81724.40 | 28439.05 | 398677.50 | 44.70 | 631.31 |

*Source: Researcher's own calculation*

Table 3 presents the descriptive statistics of the data used in the empirical analysis. This table shows the mean, maximum, minimum and standard deviation of PRP (primary product exports), (MANP) manufactured product exports, PEPT (petroleum product exports), OTH (other exports) , TOX (total exports), EDU(education expenditure) and HL(health expenditure). The value of PRP averaged 89563.77 crores between 2000-01 to 2011-12. It varied from a minimum of 19322.19 crores in 2002 to a maximum of  218404.0 in 2011-12. The value of MANP averaged 404536.2 between 2000 to 2011-12 and varied from a minimum of 156858.0 crores in 2000 to a maximum of  895125.0 crores in 2011-12. The value of PEPT averaged 86671.58 crores between 2000-01 to 2011-12. It varied from a minimum of 8542 crores in 2000 to a maximum of 265819 crores in 2011-12. The value of OTH averaged 26409.50 crores between 2000 to 2011-12 and varied from a minimum of 5600.0 crores in 2001 to a maximum of 84633.0 crores in 2010-11. The value of TOX    averaged   609083.0 crores between 2000  to 2011-12. It varied from a minimum of 203571.0 crores in 2000 to a maximum of 1459281.crores  in 2011-12.

The value of EDU averaged 79.18167 crores between 2000 to 2011-12 and varied from a minimum of 41.86000 crores in 2000 to a maximum of   166.9700   crores in 2009-10. The value of HL averaged 469.0583 crores between 2000-01 to 2011-12. It varied from a minimum of 53.07000 crores in 2000 to a maximum of  2110.290  crores  in 2011-12.

*Model : 1*

**$LOG (TOX) = \alpha_0 + \alpha_1 EDU + \alpha_2 HL + \mu_1$**

**Dependent variable:** TOTAL EXPORTS

**Independent variable:**  EDUCATION EXPENDITURE(EDU), HEALTH EXPENDITURE(HL)

The regression results are presented in tables 4 to 7 respectively. All selected parameters of this study are in logarithms form. The result reported in table 2 indicates that education and health expenditure have positive association with total exports of country.  The regression coefficient of

**Table 4: Regression Result**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| Dependent Variable: LOG(TOX) | | | | |
| **C** | 9.689738 | 1.010661 | 9.587526 | 0.0000 |
| **LOG(EDU)** | 0.313429 | 0.414694 | 0.755809 | 0.4691 |
| **LOG(HL)** | 0.386752 | 0.170394 | 2.269749 | 0.0494 |
| R-squared | 0.842125 | F-statistic | | 24.00353 |
| Adjusted R-squared | 0.807041 | Prob(F-statistic) | | 0.000247 |

*Source: Researcher's own calculation.*

education shows that a 10% increase in education expenditure leads to 3.13 % increase in total exports. On another side 10% increase in health expenditure leads to 3.86 % increase in total exports, the positive impact of health expenditure is more than education expenditure on total exports. The t-value of independent variables shows that the observed relationship between dependent and independent variables is significant at 5% significance level in case of health expenditure and insignificant in case of education expenditure. The F- test for the model also indicates it is highly significant, F = 24.00 at sig F= .0002. The $R^2$ value is 0.84 which shows that 84% of the variation in total exports is explained by the independent variables education and health expenditure.

*Model : 2*

**LOG (PRP) = $\alpha_0$ + $\alpha_1$EDU+ $\alpha_2$HL + $\mu_1$**

**Dependent variable:** PRIMARY PRODUCTS EXPORTS

**Independent variable:** EDUCATION EXPENDITURE (EDU), HEALTH EXPENDITURE (HL)

**Table 5 Regression Result**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| Dependent Variable: LOG(PRP) | | | | |
| C | 7.419545 | 1.492303 | 4.971875 | 0.0008 |
| LOG(EDU) | 0.486838 | 0.612321 | 0.795070 | 0.4470 |
| LOG(HL) | 0.313106 | 0.251598 | 1.244469 | 0.02448 |
| R-squared | 0.705831 | F-statistic | | 10.79731 |
| Adjusted R-squared | 0.640460 | Prob(F-statistic) | | 0.004062 |

*Source: Researcher's own calculation.*

Table 5 shows the results of relationship among primary product exports and human capital in India. The regression coefficients of education and health expenditure both shows that there are positive impacts of these two independent variables (health and education) on primary product exports. The regression coefficient of education shows that a 10% increase in education expenditure leads to 4.86% increase in primary product exports. The regression coefficient of health expenditure indicates that a 10% increase in health expenditure leads 3.31% increase in primary product exports. The results of t-statistics show that only one independent variable is significant at 5% significance level. The value of coefficient of determination is 0.70, it implies that 70% variation in dependent variable occur due to independent variables.

*Model : 3*

**LOG (MANP) = $\alpha_0$ + $\alpha_1$EDU+ $\alpha_2$HL + $\mu_1$**

**Dependent variable:** MANUFACTURED PRODUCTS EXPORTS

**Independent variable:** EDUCATION EXPENDITURE (EDU), HEALTH EXPENDITURE(HL)

**Table 6: Regression Result**

| Dependent Variable: LOG(MANP) | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| C | 9.766996 | 0.839109 | 11.63972 | 0.0000 |
| LOG(EDU) | 0.252527 | 0.344303 | 0.733444 | 0.4820 |
| LOG(HL) | 0.352856 | 0.141471 | 2.494194 | 0.0342 |
| R-squared | 0.858853 | F-statistic | | 27.38165 |
| Adjusted R-squared | 0.827487 | Prob(F-statistic) | | 0.000149 |

*Source: Researcher's own calculation.*

From regression coefficients of independent variables it is clear that there are minimum positive relationship between manufacturing product exports and human capital. According to the result, a 10% change in education expenditure led to 2.52% increases in manufacturing product exports while a 10% change in health expenditure led to 3.52% increases in manufacturing product exports. The positive effect is high and significant in case of health expenditure. The F- test for the model also indicates it is significant, F = 27.38 at sig F= .000. This result of the t- test for the significance of individual independent indicates that the t- test for the significance of individual independent variable indicates that only one independent variable is statistically significant at 5% significance level in the model. From the above regression result, it is found that coefficient of determination is about 0.85. This implies that about 85% of the total variation in manufacturing product exports is explained independent variables. The remaining 15% left unaccounted for by the model is attributed to the error term.

*Model : 4*

**LOG (PEPT) = $\alpha_0$ + $\alpha_1$EDU+ $\alpha_2$HL + $\mu_1$**

**Dependent variable:** PETROLEUM PRODUCTS EXPORTS

**Independent variable:** EDUCATION EXPENDITURE (EDU), HEALTH EXPENDITURE (HL)

**Table 7: Regression Result**

| Dependent Variable: LOG(PETP) | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| C | 4.670794 | 2.423956 | 1.926930 | 0.0861 |
| LOG(EDU) | 0.669512 | 0.994596 | 0.673150 | 0.5178 |
| LOG(HL) | 0.607330 | 0.408671 | 1.486108 | 0.1714 |
| R-squared | 0.729878 | F-statistic | | 12.15916 |
| Adjusted R-squared | 0.669851 | Prob(F-statistic) | | 0.002767 |

*Source: Researcher's own calculation.*

The regression coefficient of independent variables are positive. This show that a 10% increases in health and education expenditure leads to 6.69% and 6.07% respectively, increase in petroleum product exports in India The F- test for the model also indicates it is significant, F = 12.15 at sig F= .002. The $R^2$ value is 0.72 which shows that 72% of the variation in petroleum product exports is explained by the independent variables.

## CONCLUSION AND SUGGESTIONS

The purpose of this study was to examine the impact of human capital on the export growth in India for the period 2000-01 to 2011-12. From the above results and analysis it is found that Exports of all three selected products has increased with increased in human capital (education and health expenditure). From regression results it was clear that there was high, positive and significant impact of health expenditure on total exports and manufactured exports of Indian economy. Education expenditure has highly positive impact on Primary product exports and petroleum product exports during the study period. On the basis of above analysis, it is suggested that government should give more raise the amount of health and education expenditure. It should be range between 7 % to 8 % of GDP. It will generate more skilled, more efficient and more productive workforce in the economy. By this they can able to certainly handled productive assets in better way and enhance productivity, exports and growth of economy.

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