Economics of human resources development under globalization era: a study of BRICS countries

Samir Ul Hassan
Department of Economics, University of Science and Technology, Meghalaya, India
Motika Sinha Rymbai
Department of Economics, North Eastern Hill University, Shillong, India, and
Aasif Ali Bhat
Department of Economics, Shri Mata Vaishno Devi University, Katra, India

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Abstract

Purpose – The study aims to explore the extent to which human resources development quantifies the economic growth of BRICS countries under the globalization era by controlling country differences.

Design/methodology/approach – The study used the Generalized Method of Moments (GMM) and Scheffe pairwise comparison tests to quantify the impact of the variables and the level of difference among the BRICS countries onto human Resources development.

Findings – The study observes that the impact of human resources development on economic growth of BRICS counties is significant but limited to few countries. The study reveals that countries such as India and South Africa are unable to utilize their human resources efficiently to promote economic growth, as compared with Russia, China and Brazil. The study further argues that there is urgent need of amalgam of various economic development theories keeping in mind the regional needs to extract the positive impact from human resource on economic development.

Research limitations/implications – The single limitation of this research is that it was not possible to compare the results with other developing countries to unleash the capabilities of human resources development with regard to economic growth at the universal level.

Originality/value – To the best of the authors' knowledge, this paper is the first of its kind to analyze human resources development at a much deeper level. The paper has chosen variables which are important from the policy perspective of government rather than the working perspective, which is a great contribution. Further, for human index the variables chose covering major aspects of human development from spending perspective.

Keywords China, Human resources, Economic development, Globalization, BRICS

Paper type Research paper

Introduction

Human resources development refers to the development of human skill and knowledge of the labor force. It is the process of raising and inflating value addition capabilities of the population through education, skills, and knowledge which are requisites for the economic development of any nation (Abramowitz, 1981). According to Adelakun (2011), human resources are the knacks and skills possessed by a person. Therefore, human resources development is the progress of transforming humans by shaping and reshaping them according to the needs and ambition of the nation. Human resources are indispensable for economic growth and development (Pelinescu, 2015; Ahmad and Schroeder, 2003). Various

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researchers are in favor of the view that human resources are the foundation that ought to be handled judiciously (Ahmad and Schroeder, 2003).

Therefore, human resource development in any form is effective in quantifying and shaping the developmental goals of any country. Further, during the era of globalization where everything has become well-connected, open and competitive, different countries have altered their economies significantly by managing their human resources. The exchange of communication, skills, and technology in a globalized world has become easier and we may evaluate our achievements against the backdrop of those in the rest of the world. Keeping this in mind the paper evaluates human resources and their effect in BRICS countries in the ongoing era of globalization specifically over the period 1990-2017.

BRIC is a term coined in 2001, for the union of countries comprising of Brazil, Russia, India, and China, which were all held to be at a similar stage of advanced economic development. However, after the BRIC countries shaped a political union among themselves, the union was extended to include South Africa, hence the acronym BRICS. The objective of BRICS is to improve major economic goals of the present century – which takes into account infrastructural development, consumption levels, the development of available human resources, and trade. These economies face severe constraints in the form of poor capital equipment, burgeoning levels of public debt, environmental issues, income inequality, high unemployment rates, rising labor costs, and high-interest rates which restrict their ability to achieve their chosen goals. Hence, the urgent need to put in place policies for human development to unleash the required skills and understanding that would enable them to confront the challenges ahead, Aregbesola (2014).

Background of the study

The BRICS countries are in the centre of severe economic and political upheaval. Apart from the rate increase by the US Fed that has added to the debt overhang for these economies; declining global prices have affected these emerging economies because of their reliance on export-led growth. In addition, the structural reforms in China, from an export-oriented economy to one relying on domestic consumption, has added to the woes of BRICS nations. Among BRICS, India is the only country which has exhibited prospects of robust growth. India mainly benefited from being a net importer of crude, the prices of which have shown a declining trend, as also the fact that she has benefitted by being insulated to market instability because of a lesser reliance on exports for growth.

As far as social development in BRICS countries is concerned, the experience is mixed. According to the social progress index (SPI) among BRICS, Brazil outshines all the other member countries with an index of (70.89), followed by South Africa (65.64), Russia (63.64), China (59.07) and India (53.06). However, Russia leads in Basic Human Needs such as air, water and sanitation, shelter and personal safety, nutrition and basic medical care. Whereas Brazil is a star performer in the group on Foundations of Well-being such as health and wellness, access to basic knowledge, access to information and communication, ecosystem sustainability and opportunity (personal freedom, personal rights, access to higher education and choice and tolerance and inclusion) which are dimensions of the SPI. India, on the other hand, belongs to the group of low social progressive countries, lagging behind other BRICS nations in basic human needs as well as foundations of well-being. She is however ahead in the "opportunity" measurement when compared to China.

On human resource development through education, India lagged behind with 71.2 per cent, while Russia has the highest adult literacy rate of 99.7 per cent. In inequality in education, India stands at the top among the BRICS nations. Further, for India, the average year of schooling for women between the age group of 25-35 years is as low as 5.6 compared to Russia's (13.8) and South Africa's (10.4). Another important aspect for a nation to prosper

is "tolerance and inclusion". On this front, India displays a poor performance compared to other BRICS countries. However, India is far ahead of Russia and China on personal rights such as private property rights and political rights.

A cross-country appraisal for the BRICS during the globalization era reveals that economic prosperity alone may not automatically translate to a superior quality of life for these countries. The economies of Brazil and South Africa, which are far away from Russia in per capita GDP terms, are socially more progressive. From data relating to 2015, Russia with GDP per capita of $23,564 had an SPI score of 63.64, while Brazil with GDP per capita of $14,555 and South Africa with GDP per capita of $12,106 had SPI scores of 70.89 and 65.64, respectively. A similar association has been witnessed between GDP per capita and SPI outside of the BRICS union, where the USA, has been ranked 16 for social progress in spite of its high score on GDP per capita. Also the economies of Saudi Arabia, UAE and Kuwait are conditioned by a low social-progress score in contrast to their level of GDP per capita.

Research question

Considering the state of economic development and the quality of human resources in BRICS countries our study intends to answer the question "What is the relationship between human resources development and economic development in the BRICS?" Our research question tries to unravel the impact of alternate forms of human resources development on the economic development in the BRICS union.

Therefore, keeping in mind the multidimensional effect of human resources development on the economic outcomes of a country this paper proposes the following objectives:

- to assess the impact of human resources development on economic development in each BRICS country; and
- to study the differential of impact of human resources across the BRICS

With these objectives, we further propose our hypotheses that:

H1. Different dimensions of human resources development have no significant impact on the economic development of each BRICS nation.

H2. There is no significant difference in human resources development across BRICS countries.

To answer the research question this study has been divided into the following sections: review of literature, methodology, results, discussion and results and conclusion.

Review of literature

In our opinion, human resources is constituted of the size of the population of a country with its attendant efficiency, educational attainments, productivity, organizational capacities, and farsightedness. By human resource, we mean human capital. Human capital is comprised of the abilities, skills and technical know-how amongst the population of the country. A modern view of development diverges from the conformist approaches to economic growth, as it includes human capital formation, human resource development, and human welfare. It is necessary to specify this difference unequivocally to avoid any confusion. In our study development is economic growth measured by the gross domestic product of a country. In other words, the monetary value of all goods and services produced in a given region in a given period of time.

In the literature, the importance of human resources for the economy is not a matter of contention among researchers. Becker (1964) in his human capital theory suggested that

education or training raises the productivity of workers by revealing useful knowledge and skills, therefore raising workers' future income by increasing their lifetime earnings . The key signs of human resource development are longevity – life expectancy at birth, literacy and purchasing power. The importance of life expectancy lies in the common belief that a long life is valuable in itself and in the fact that various indirect benefits are closely associated with higher life expectancy. For the second key component – knowledge – literacy figures are only the crude reflection of access to education. The third key unit of human development is the command over resources needed for a decent living UNDP (1990).

There exist a number of studies which shows that human resources are an efficient guide in quantifying the economic development of any country (Pelinescu, 2015; Ahmad and Schroeder, 2003). Ke and Bergman (1995), Heraud *et al.* (2003) stated that the ability to provide financial resources to education and the building up of knowledge with diffusion effects, enabled many economies to enjoy fast and robust economic growth rates in China and Russia. Thus, the progress and use of human resources are important in a nation's quest for economic growth and poverty reduction (Adelakun, 2011). On the other hand, trends in the GDP serve as a proxy for economic growth. Several appealing studies on the character of human resources in motivating economic expansion have emerged in the past three decades. Bhagwati (1978) was the first to expound a theory on the influence of Human Resources and FDI on growth in a given host country. An extension of the theory (popularly referred to as "Bhagwati hypothesis") highlighted the role of cheap human resources (labor) as a catalyst to increased competitive and export-oriented products in a free environment. In addition, economic growth can also be accelerated by means of employment, and through sharing of knowledge and management skills' integration in the host country (Frenkel *et al.*, 2004). Government investment in innovation, R&D and learning may also generate productivity spillovers for the crowd economy (Blomstrom and Kokko, 1998).

Regardless of physical capital, the importance of human resource development (HRD) in economic growth has been theoretically illustrated in a couple of leading versions of the neoclassical theory of growth: Lucas (1988) and Romer (1986, 1990a, 1990b). These models point to the importance of human capital and intangible capital as the source of technological progress leading to economic growth. Gary (1962) first explained "human capital" under a theoretical framework and suggested treating education as an investment to increase production capacity and earnings potential of the labor force (Machin and Vignoles, 2005). In a similar fashion, Uzawa (1965) defined "human capital" by the purposive education and training of workers. Virmani and Rao (1999) found that India's spending on education, health, advance in technology and R&D and patents increased the productivity of human capital and thus had a positive impact on long-term economic growth.

Over the past decade, the impact of human resources development practices on economic development has earned extensive attention. Most studies on human resources has revealed the influence of human resources on economic development (Riley, 2012; Serena and Freire, 2001); which highlighted the effect of human resources development on various economic developmental aspects such as; on production through labor productivity (Romer, 1990a, 1990b; Mankiw *et al.*, 1992); the rate outcome by causative to amplified competitive advantage through innovation and dispersion of technology (Pistorius, 2004; Horwitz, 2005). Hanushek and Woessmann (2007) argued that the positive influence of the quality of education more than the quantity has a significant impact on economic development in Asian countries. Similarly, Hanushek and Shultz (2012) argued that a 100 point divergence in PISA test results would lead to a 2 per cent difference in the growth rate of GDP per capita. Other studies also show the positive influence of human resources development on economic growth in most of the BRICS countries (Odusola, 1998; Barro and Sala-i-Martin,

1995). However, in a deviation from previous studies, Filmer and Pritchett (2001) specifically show lack of significant relationships between higher educational attainments and the speed of increase of output per worker.

Much of the recent work on economic growth and HRD in BRICS countries is centered on refining the basic economic insights of classical economists. For instance, the study of Kolachi, and Shah (2013), on the BRICS countries and their strategic HRD agenda in 2020 stated that the BRICS nations could confront whatever problems they may face in the future. Democracy in India, autocracy in China, centralization in Brazil and Russia, and decentralization in South Africa are all moving in the right direction while setting up the best HRD practices. Ardichvili *et al.* (2012) suggest that with their present human capital Russia and Brazil are ahead of China and India. However, during the past decade the investment in primary and secondary education, vocational education and training, and higher education, especially in science and technology fields has led to a greater impact on the economies of these countries. Tomé and Goyal (2015) revealed India's human capital, human resources development, and vocational education and training have been growing and will have to grow even more, for her to become a front runner among BRICS nations. Marten *et al.* (2014) highlighted that although the BRICS countries have devoted increased resources to health, the biggest increase has been in China, which resulted in that country's rapid economic growth. However, the BRICS nation with the second highest rate of economic growth, India, has had the least improvement in public funding for health.

Therefore from the above review of the literature, we assumed that human resources development is multidimensional in nature. It includes skill, the number of schooling years, spending on education, health status, health spending and movement of people in search of employment to other parts of the world. Thus in our study, we focus on the majority of these dimensions to understand their impact on economic development in the case of BRICS countries.

Methodology

The study is primarily based on secondary data collected from the World Bank, IMF and Asian Development Bank over a period of 27 years (1990-2017). The study develops a model based on Pelinescu (2015) and Adelakun (2011). The time series data were analyzed using ordinary least squares (OLS) and the generalized method of moments (GMM). First, to control for country differences, we use Scheffe pairwise comparison tests to realize how human resources management varies between pairs of countries. Second, we used an OLS with time-fixed effects. In addition, because of endogeneity and serial correlation of the error term (Coe and Helpman, 1995; Keller, 2002), the second stage was complemented with the GMM technique to provide consistent estimates.

Specification of variables

PPP is an attempt at a relative measure, taking factors of each country into consideration to put a number on a person's standard of living within that country. GDP at PPP applies exchange rates to standardise the sum of the value of all goods and services produced in a country to value the aggregate at prices prevailing in US dollars. This provides a frame for comparisons across countries (Pelinescu, 2015; Adelakun, 2011). Measurement of human resources development in our study is based on the human resources index, based on four groups of matters (investment in education, the use of human resources stock, the productivity of human resources, and employment of human resources). This is more or less similar to the human capital index framed by the World Economic Forum (includes four aspects such as education, workforce, wealth, and wellness, and employment along with enabling environment – includes infrastructure, legal and other features that guarantee the value of value of human resources). Keeping this in mind the variables used in our study are:

- GE – the total government expenditure on education in each country which represents the level of investment in education;
- GH – the total expenditure on health sector in each country which represents the productivity of human capital and level of wellness;
- ESC – the number of employees involved at the level of secondary education which represents the level of education and stock of human resources;
- PRC – the population registered in primary, secondary and territory sectors which represents the use of human resources stock and the workforce;
- PR – the number of registered patents and intellectual capital represents the infrastructure, legal and other wealth in human resources; and
- RD – the expenditure on R&D represents the opportunities for innovation and productivity of human resources.

However, in our model log values for the variables has been used to aid the use of the OLS method (Agarwal and Khan, 2011).

Specification of econometric models

As mentioned, we are using the three steps methods to reach our final analysis to get efficient, consistent and unbiased results. The three steps are as follows.

Unit root test

Non-stationary data lead to spurious regression because of non-constant mean and variance (Dimitrova, 2005). If a series is stationary without any differencing, it is said to be I(0) or integrated of order 0. However, if a series is stationary after first difference, it is said to be I (1) or integrated of order 1. To this end to avoid spurious regression which gives biased results, the augmented Dickey–Fuller (ADF) (Dickey and Fuller, 1979 tests have been used to examine the stationarity of the time-series data).

One way ANOVA

The one-way ANOVA is a method to find out whether there are any statistically significant differences between the means of two or more independent (unrelated) groups. To understand the dissimilarities in human resources development practices among the five BRICS countries the one way ANOVA method has been used.

Ordinary least squares and generalized method of moments models

The model is based on the work of Pelinescu (2015), and Adelakun (2011). The model is as follows:

$$lngdp_t = \alpha_0 + \alpha_1 lnt_t + \alpha_2 lnem_t + \alpha_3 lnhr_t + \mu_t \quad (1)$$

Where, α_0, α_1, α_2 $\alpha_3 > 0$, GDP is the growth of the real gross domestic product, I is the ratio of investment to GDP, Em is the rate of employment, hr is total capital expenditure on health and education taken as a proxy for human resources and In stands for natural log.

However, the source model is framed from the basic production function below:

$$Y_t = f(K, L) \quad (2)$$

where:

Y = production level (i.e. GDP);

K= capital (capital formation [GCF] as a percentage of GDP); and

L = labor (country's labor force).

Equation (2) is based on the postulate that K and L determine the level of output in an economy (Taube, 2002). Therefore, given the technology, a rise in labor and/or capital will raise the production level in the economy.

However, basing their study on the new theory of growth, to examine the effect of human resources on economic development, (Barro and Sala-i-Martin, 1995), extended the theory to incorporate the level of human resources using the Coub–Douglas production function [equation (2)] and specified the augmented production function as:

$$Y_t = f(K, L, H) \tag{3}$$

Alternatively, equation (3) can be stated as:

$$lngdp_t = \alpha lnhr_t + \beta lnX_t + \delta_i + \vartheta_t + \mu_t \tag{4}$$

In the modified equation, equation (4), the dependent variable is the natural log of real per capita GDP in PPP terms and is a direct function of human resources (H) and new relevant factors (X). δ_i and ϑ_t are variables estimating the time and country-specific fixed effects, and ε is the error term.

With regard to BRICS countries our model as given in equation (4) can be translated into the regression model as:

$$Y_{it} = \alpha_0 + \gamma_1 ge_{it} + \gamma_2 gh_{it} + \gamma_3 prs_{it} + \gamma_4 ese_{it} + \gamma_5 ex_{it} + \gamma_6 pr_{it} + \gamma_7 rd_{it} + \mu_{it} + e_{it}$$

where:

Y = real per capita GDP (GDP_PPP);
ge = total government expenditure on education;
gh = total government expenditure on health;
prs = average of the population registered in primary, secondary and tertiary education;
ese = number of employees in secondary education;
pr = number of registered patents and intellectual capital;
rd = expenditure on R&D;
μ_i = country specific effects; and
$e_{i,t}$ = the error term.

Results

The empirical estimation begins with an analysis of unit root test to detect whether the variables have trended or not to avoid spurious regression which would entail biased results. Table I shows the results of the tests on the variables and their level of stationarity.

Unit root test

Table I Shows that the variables follow a particular trend and were thus found to be stationary at different levels. At level all the variables were found to be non- stationary and after detrending them, the variables become stationary at after two differences. The results of the unit root test simply assumed stationarity of the series for all the variables at I(2).

One-way ANOVA and Scheffe pairwise comparison test

The main intent of this study was to examine the impact of human resources development practices on economic growth across countries. The study used one-way ANOVA to analyze

Variables	ADF test: 2nd diff statistics	PP test: 2nd diff statistics	Order of integration
China			
Lnge	−4.56	−5.76	1(2)
Lngh	−7.64	−5.76	1(2)
Lnprs	−5.75	−3.69	1(2)
Lnese	−3.76	−4.57	1(2)
Lnex	−2.67	−3.66	1(2)
Lnpr	−3.84	−5.34	1(2)
Lnrd	−4.35	−5.35	1(2)
Russia			
Lnge	−5.67	−4.94	1(2)
Lngh	−4.45	−4.94	1(2)
Lnprs	−3.64	−6.79	1(2)
Lnese	−3.45	−4.56	1(2)
Lnex	−3.54	−5.19	1(2)
Lnpr	−4.56	−2.23	1(2)
Lnrd	−4.67	−5.35	1(2)
Brazil			
Lnge	−5.86	−5.33	1(2)
Lngh	−5.77	−5.33	1(2)
Lnprs	−3.55	−1.45	1(2)
Lnese	−4.76	−6.74	1(2)
Lnex	−4.56	−3.35	1(2)
Lnpr	−4.45	−5.73	1(2)
Lnrd	−2.56	−5.35	1(2)
South Africa			
Lnge	−2.65	−3.84	1(2)
Lngh	−3.65	−3.84	1(2)
Lnprs	−4.77	−2.84	1(2)
Lnese	−3.75	−2.77	1(2)
Lnex	−4.76	−4.84	1(2)
Lnpr	−3.45	−5.46	1(2)
Lnrd D	−4.65	−5.35	1(2)
India			
Lnge	−4.45	−4.34	1(2)
Lngh	−4.56	−4.34	1(2)
Lnprs	−3.55	−3.89	1(2)
Lnese	−4.98	−3.23	1(2)
Lnex	−3.78	−4.23	1(2)
Lnpr	−5.75	−2.39	1(2)
Lnrd	−4.65	−5.35	1(2)

Source: Calculated by author

Table I.
Estimated results of unit root test

the similarities in human resources development practices among the five BRICS countries. The output of this test is shown in Table II.

Table II shows that in all the BRICS countries there is a significant difference between the countries as per alternate human resources development indicators. The table reveals that across the BRICS countries human resources development varies considerably. The coefficient of the mean difference between the countries explained in pairwise differences

Table II. Human resources development practices across countries

Human resources	Countries RUS (1)	BRA (2)	SA (3)	IND (4)	CH (5)	Pairwise differences	F-value	Significance
Lnge	8.22	7.23	5.34	5.67	12.42	(1, 2)** (1, 4)** (2, 4)** (5, 3)**	6.23	0.0
Lngh	6.45	2.34	9.21	3.29	8.76	(1, 2)** (1, 3)** (3, 4)** (5, 3)**	12.25	0.01
Lnprs	23.43	6.31	5.12	6.01	18.21	(1, 3)** (3, 1)** (3, 4)** (4, 5)**	18.01	0.00
Lnese	20.31	13.38	4.38	5.38	17.38	(1, 2)** (1, 4)** (3, 2)** (4, 2)*	7.23	0.00
Lnex	23.52	13.11	3.11	4.15	33.11	(1, 2)* (3, 4)** (4, 2)*	11.22	0.00
Lnpr	3.75	8.34	6.58	6.56	13.37	(1, 2)* (3, 2)** (3, 5) **	6.34	0.01
Lnrd	4.52	7.16	6.15	5.33	8.65	(1, 4) ** (2, 3)** (3, 2) ** (4, 2)*	12.44	0.00

Notes: The level of significance is as: *at 1% level of significance; **at 5% level of significance; ***at 10% level of significance
Source: Calculated by author

shows that the difference is huge in countries such as Russia, Brazil and China. However, the difference is low in India and South Africa. The *F*-statistics for all the human resources development forms is found to be significant. This simply inferred difference in the mean efforts paid in all the human resources development in all the BRICS countries. It may be concluded from this that human resources development practices differ in all the countries, because of the statistical significance of the *F*-statistics (Ahmad and Schroeder, 2003).

The difference may be because of varying human resources practices in these countries. The organized and internally dependable human resources are assumed to provide synergistic impacts and strengthen the process of economic growth (Adelakun, 2011; Ahmad and Schroeder, 2003) although this result was earlier obscured (Pelinescu, 2015; Ahmad and Schroeder, 2003). The evaluation of an inclusive list of human resources development practices among countries was missing in earlier studies. This is a unique finding of this study because it empirically confirms an ideal-type of human resources development strategy in a number of developing countries.

Also, to control for country differences, the Scheffe pairwise comparison tests of mean differences was conducted to better recognize how human resources practices vary between pairs of countries (Pelinescu, 2015; Ahmad and Schroeder, 2003). Based on the output in Table II, the assessment threw up key differences in aspects of human resources development practices across countries. The table shows that South Africa and India are laggards in facets related to human resources development practices. Although South Africa performed better in the health sector, the country recorded the least effort on the variables *ge, pr* and *ese*. India too performed poorly on *gh, pr* and *rd,* as compared to South Africa. Government expenditure on education was given highest priority in China and the lowest in South Africa. In addition, China performed better than other countries on the variables related to *gh, ex, pr* and *rd*. Surprisingly, government attention to the health sector was highest in South Africa and lowest in Brazil. Another surprising result was the attitude of government expenditure and management on practices related to R&D, and patent and intellectual capital, despite huge government expenditure on education in Russia. This supports the findings of Awan (2013), who found that Russia, earlier gifted with human resources since the beginning, has not been able to use her human resources potential during the transitional period from a planned economy to a market economy since the 1990s. In summary, this study found that human resources practices vary widely by country. The differences may not be unconnected with the level of natural resources, national culture, location variables, and institutional capabilities.

Ordinary least squares and generalized method of moments results

As far as the measurement of human resources development is concerned the hypothesis of a correlation between independent error means tested by using Durbin–Watson statistics comply with the assumption of no independent errors. Table III shows the estimated results of the GMM and OLS models.

The results of the OLS and GMM estimates are provided in Table III. The table reveals that Human development has played an essential role in the swift economic growth of the BRICS countries – especially China, Russia and Brazil. All the variables were found to be significant except for the influence of total government expenditure on education and the part of the population registered in the primary, secondary and tertiary education. In general, the impact of human resources development on economic growth in BRICS countries is restricted and sometimes negligible for both OLS and GMM estimators.

For China, the human development practices in terms of alternative variables were found to be positive and significant for OLS and GMM, at varying levels of significance. In fact,

		OLS		*GMM*		
China	Variable	Coefficient	*t*-Statistic	coefficient	*t*-Statistic	Probability
	Lnge	0.14	3.67	0.22	3.76	0.07*
	Lngh	0.10	3.17	0.21	4.98	0.08**
	Lnprs	7.56	7.30	8.45	7.44	0.05*
	Lnese	6.57	9.19	3.34	2.75	0.00*
	Lnpr	9.34	9.78	7.23	4.67	0.09**
	Lnrd	7.33	9.42	4.33	3.62	0.06**
	Constant	145.61	23.11	111.27	12.28	0.00*
	$r = 0.62$ $R^2 = 0.69$ Adjusted $R^2 = 0.61$ Durbin–Watson = 1.99					
Russia	Variable	OLS		GMM		
		β-Coefficient	*t*-Statistic	β-Coefficient	*t*-Statistic	Probability
	Lnge	0.07	1.33	0.02	4.91	0.03*
	Lngh	0.08	3.34	1.66	3.97	0.07**
	Lnprs	9.21	6.51	9.94	3.87	0.00*
	Lnese	14.18	6.51	13.04	2.98	0.00*
	Lnpr	5.85	5.34	−4.26	2.64	0.01*
	Lnrd	−1.35	7.31	2.21	3.22	0.06**
	Constant	110.29	22.81	129.29	19.20	0.02*
	$r = 0.56$ $R^2 = 0.57$ Adjusted $R^2 = 0.51$ Durbin–Watson = 2.03					
Brazil	Variable	OLS		GMM		
		β-Coefficient	*t*-Statistic	β-Coefficient	*t*-Statistic	Probability
	Lnge	0.08	4.63	0.10	3.98	0.09**
	Lngh	0.05	3.63	0.06	7.99	0.00*
	Lnprs	5.41	10.51	8.34	3.28	0.03*
	Lnese	6.76	9.66	5.56	2.77	0.01*
	Lnpr	12.76	5.06	5.26	1.69	0.00*
	Lnrd	9.71	6.01	7.23	2.34	0.06**
	Constant	83.22	15.42	42.21	20.72	0.00*
	$r = 0.51$ $R^2 = 0.71$ Adjusted $R^2 = 0.66$ Durbin–Watson = 1.98					
South Africa	Variable	OLS		GMM		
		β-Coefficient	*t*-Statistic	β-Coefficient	*t*-Statistic	Probability
	Lnge	0.05	1.33	0.05	2.44	0.08**
	Lngh	0.10	3.45	0.12	3.91	0.07**
	Lnprs	3.33	3.18	4.9	3.19	0.10
	Lnese	5.44	4.38	5.94	5.94	0.00*
	Lnpr	6.32	4.88	5.23	1.63	0.01*
	Lnrd	5.62	5.11	4.21	3.64	0.03*
	Constant	91.33	23.33	55.44	18.31	0.00*
	$r = 0.45$ $R^2 = 0.56$ Adjusted $R^2 = 0.49$ Durbin–Watson = 2.03					
India	Variable	OLS		GMM		
		β-Coefficient	*t*-Statistic	β-Coefficient	*t*-Statistic	Probability
	Lnge	0.01	1.32	0.05	0.21	0.00*
	Lngh	0.06	4.31	2.11	3.25	0.08**
	Lnprs	−1.33	−0.13	−3.55	−5.28	0.00*
	Lnese	2.44	5.37	2.3	1.22	0.04*
	Lnpr	4.39	2.77	4.23	−1.66	0.09**
	Lnrd	2.33	2.77	−4.23	−1.66	0.10
	Constant	91.23	14.99	105.21	19.21	0.00
	$r = 0.29$ $R^2 = 0.35$ Adjusted $R^2 = 0.29$ Durbin–Watson = 2.10					

Note: *, ** denote significance at 5, 10% levels, respectively
Source: Calculated by author

Table III.
OLS and GMM estimation regression results for human resources development

China had the best results among the BRICS countries during the period of study. The correlation coefficient (r) at 0.62 denotes a positive nexus between economic growth and human resources development. The adjusted R^2 at 0.61 entails that about 61 per cent change in economic growth is because of human development practices, while the remaining 39 per cent might be because of other variables. Although China recorded the best results in our study, the estimate of human resources development variables was limited, especially *ge* and *gh,* for both OLS and GMM. We may make the inference here that human development has a considerably lesser contribution to economic growth in China during the period of study. For instance, a coefficient of 0.14 indicates that a 1 per cent increase in total government expenditure on education will lead to a 0.14 per cent increase in GDP for China. For other practices the table shows that 1 per cent increase in the population registered in primary secondary and tertiary education (prs), number of employees in secondary education (ese), number of registered patents and intellectual capital (*pr)* and expenditure on R&D (rd) leads to increase economic growth by 7.56 per cent, 6.57 per cent, 9.34 per cent and 7.33 per cent respectively in China. However, the GMM model also shows the same direction of relationship which though is of a lower magnitude when compared to the OLS estimates.

Russia also positive and significant results in our study. Although the correlation coefficient (r) at 0.56 implied a positive association between economic growth and human development, the adjusted R^2 of 0.51 implied explanation for about 51 per cent variations in economic growth. The estimates of human resources variables were also limited (especially *ge* and *gh*) for both OLS and GMM estimators for Russia. Specifically, the coefficient of 0.07 for government expenditure on education implied that a 1 per cent increase in total government expenditure on education led to a 0.07 per cent increase in GDP. In fact, the influence lessened to 0.02 over the years, judging by the result of the GMM estimator. Another surprising result was the inability of Russia to improve the contribution of *rd* and *pr* to economic growth – despite the country's human resources endowments from the initial period through its transition, period from a planned economy to a market economy, since the 1990s. With an increase in population registered in primary secondary and tertiary education (prs), numbers of employees in secondary education (ese), numbers of registered patents and intellectual capital (*pr)* and expenditure on R&D (rd) economic growth leads to increase by 9.21 per cent, 14.18 per cent. 5.85 per cent and minus (−)1.35 per cent respectively by the OLS model. However, the GMM model also reflects the same results with the positive impact of expenditure on R&D. According to Awan (2013), this was attributed to policy failure to capitalize on the value of human resources in speeding up economic growth. This also led Russia to be relegated to the level of middle-income economies.

The estimated results for Brazil are better than the results for Russia, South Africa, and India. The human resources estimates were all positive and significant at varying levels for OLS and GMM. This was also corroborated by a correlation coefficient (r) of 0.51. The adjusted R^2 was also high at 0.66 which implies that about 66 per cent deviation in economic growth is explained by human development during the period of the study, while the remaining 34 per cent may be attributed to other variables. The coefficients of government expenditure on education and health were also small at 0.08 and 0.05, respectively. For instance, 0.08 implies that a 1 per cent increase in total government expenditure on education had led to a 0.08 per cent increase in GDP for Brazil during the study period. However, the coefficient of population registered in primary, secondary and tertiary education (prs), number of employees in secondary education (ese), number of registered patents and intellectual capital (*pr)* and expenditure on R&D (rd) were relatively high in the OLS model as than in the GMM model by 5.41 per cent, 6.76 per cent, 12.46 per cent and 9.71 per cent, respectively.

The results for South Africa are not as remarkable as those of China, Russia, and Brazil. While all the variables were found to be positive and significant, at varying levels, for OLS and GMM estimators, the impact of government expenditure on education in terms of economic growth, was low. Specifically, the value of 0.05 for the coefficient implied that a 1 per cent increase in total government expenditure on education had led to a 0.05 per cent increase in GDP for South Africa. Another disturbing trend was the stagnation in the contribution of *ge* to economic growth, judging by the GMM estimate of 0.05.

For India, the results suggested that both *ge* and *pr* were not statistically significant in influencing economic growth. Although total government spending on education significantly improved over the years (GMM = 0.05) by stimulating economic growth, the result at the first stage was low. For instance, the coefficient value of 0.01 showed that a 1 per cent increase in total government expenditure on education had led to a 0.01 per cent increase in GDP for India during the study period. Another disturbing trend was the inability to improve the contributions of *pr* to growth, judging by the second lag which was insignificant at the GMM and was negative. *The correlation coefficient (r) which was low at 0.29, and the adjusted R2, again low at 0.29 implied* that a 29 per cent change in economic growth is explained by human development, with the remaining 71 per cent attributable to other variables. The table also shows the absence of autocorrelation as denoted by Durbin Watson test.

Discussion and results

The results of the three-stage model suggest the impact of human resources development on economic growth, though significant were limited in the BRICS countries over the past two decades. The study reveals that countries such as India and South Africa were unable to use their human resources efficiently to promote economic growth compared to Russia, China, and Brazil. The theoretical implication of our study is that human development has not been viewed in traditional manner as being likened to the totality of a nation's human population. Rather, human development has been viewed in terms of value addition to the nation's population which a state can affect upon its consttuent population. Human resource development as analyzed in our study with value addition in any form is effective in quantifying and shaping the developmental goals of any country. Further, during the era of globalization where everything is well-connected, open and cutthroat, different countries have shaped their economics significantly by managing their human resources. The transfer of skills and technology has been instrumental in human value addition and in the evaluation of a country's progress relative to the rest of the world. Holding this to be our theoretical base our paper studied the impact of alternate avenues of value addition to the existing human resources on the economies of BRICS countries in the era of globalization. We treat investment in education, health, R&D, primary and secondary schooling and patents as value additions in human resources which go to increase productive capacity and the earning potential of the labor force which are reflect in a higher growth trajectory of a country.

Our study, therefore, presents a reasonable justification for China's efficient use of human resources. It provides experiences of the BRICS countries which other developing countries could learn from. This study has added value to the literature of human resources development by providing an approach for restructuring human development practices with new variables designed to measure the human resources efficiently. The theoretical insight of our study explores the fact that effective spending on human resource creates

skills and training amongst people which results in increased production, employment and income and thus results in higher economic growth. Our study is not unique in putting forward a strong theoretical base rather it is on the methodological front as we made our results more logical, scientific and universal. The econometric models used in our study can be used to simplify the complex nexus between human resource and economic development in various developing countries and to understand the commonalities or differences between countries in human resources practices.

The policy implications arising from the study are wide and suitable for most economies. Given the level of spending of a country, if a country wants growth to be sustainable then it needs to spend sizeable funds on activities related to the creation of human resources and value additions to existing human resources. The country needs to direct a large share of its investment towards education and health for creating skilled and trained human capital. Further, sizable investments on primary and secondary schooling, R&D and patents would ensure satisfactory value addition and the creation of soft infrastructure which in turn would improve the employment opportunities in the country while raising the employability of the country's population. However, the study is not free from limitations. A shortcoming of this study is that we couldn't compare our results with other developing country in unleashing their human resources development potential in fostering growth. However, a potent research questions which emerges from the foregoing analysis relates to how much spending must be undertaken on human resources for it to be effective. Further, which are the main areas of thrust amongst education, health, roads, transport and skill building institutions that a country should focus on given the limitations of resources? The study has unraveled the vast scope for future research on the economics of human resource development across countries. In this contest variables related to health infrastructure, education infrastructure and transport and value addition in human resources gain in importance. Indicators such as the number of hospitals, doctors, beds, per thousand populations, number of schools, colleges and universities per thousand population and may be used to analyze the efficiency of human resources development.

Conclusion

The study observes the link between human resources development and economic development of BRICS countries and reveals that human resources development has an impact on development though this impact was found to be limited to a few countries. The results of our study are indicative for developing countries and human resources managers placed therein. It provides a perspective on four areas related to human development. These four elements may provide the bedrock upon which to redesign and reshape the strategy related to human resources development in the interest of fostering the growth impetus. The study through its results and estimates confirms an ideal-type of human resources development strategy that may be followed by developing countries. To gain more insight into the impact of human resources development on economic growth in BRICS or other countries certain other variables such as those related to health infrastructure, education infrastructure, and transport and communication must be considered. In this regard the variables such as the number of hospitals per lakh population, number of doctors per thousand population, number of beds per thousand population, number of schools, colleges, and universities per thousand population and other related variables could be taken up for further research in this line.

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Corresponding author
Samir Ul Hassan can be contacted at: samirul.hassan@yahoo.com