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Human Capital Impact on Sustainable Economic Growth in India

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Abstract

The study investigates the sustainable development of the regional economy from the perspective of human capital. The current study analyses the interactive coupling mechanism between human capital and sustainable economic growth. The research revealed that Indian human capital and sustainable economic growth gradually increased. The principal axis factor analysis and stepwise regression analysis were carried out for the study. The sample of 375 respondents was drawn from male and female respondents from India and a structured questionnaire was developed consisting of 5 demographic questions and 12 questions related to the core of the study. Therefore, sustainable economic growth lagged in human capital development, and it should be prior to early enrichment. The study examines the proximity degree of coupling coordination of human capital and sustainable growth and concluded that a mild imbalance to slight coordination has a presence.

Keywords: Human Capital, Sustainable Economic Growth, **E**ducation, Innovation Capacity, Medical Health, and Cultural Environment.

Introduction

The fourth economic revolution's presence and the digital transformation have therefore raised a demand for eco-friendly economic growth, clean energy sources, growing the effects of financial development, and simplified trade on renewable resources (Nguyen, T. T., & Nguyen, V. C. 2021). China is progressively transitioning from an era of rapid expansion to a stage of excellent growth, enduring significant changes in its economic growth model. In addition to this progress, the "Lewis First Turning Point" is drawing near, the demographic dividend based on resources is decreasing, and the labor-intensive, low-level extensive economic expansion mode is no longer viable. Finding a new economic momentum and growth mode is important for the Chinese economy to develop sustainably and deeper (Li, L. 2018). In order to protect society against overproduction and under consumption crises and to improve social well-being, a sustainable economy must advance steadily and in multiple stages (Zhironkin, S., & Cehlár, M. 2022). Human capital has become increasingly significant in the quality change, efficiency change, and power change of economic growth as people's understanding of it has gradually deepened in recent years. Human capital has emerged as a key engine for releasing economic vitality and a significant contributor to endogenous economic growth. Therefore, it has become vital to find a solution to the problem of how to further raise the human capital stock and optimize the human capital structure to support high-quality and sustainable economic growth. At the same time, sustainable economic growth presents a new pattern that offers new opportunities for developing high-quality human capital, encouraging its accumulation, and raising its value. This is due to the continuous optimization of the industrial structure and the continuous promotion of reform and innovation.

Sustainable economic growth and human capital are interdependent. High-quality and sustainable economic growth provides an important assurance for the improvement of human capital quality and level, while human capital

prepares and supports such growth. They can only make coordinated efforts and achieve "win-win" development outcomes when the two complement and promote one another. Therefore, it is worthwhile to do additional research and exploration into whether human capital development is synchronized with high-quality and sustainable economic growth, whether sustainable economic growth is aligned with human capital demand, and how to create a win-win situation. The one-way impact of human capital stock on sustainable economic growth was the main emphasis of earlier studies on human capital and sustainable economic growth (Benhabib, J., & Spiegel, M. M. 1994). These studies primarily focused on the causal relationship between these two variables. Most studies have examined the coupling coordination degree from the standpoint of time and space, but research on the dynamic interaction between the two has increasingly gained interest and produced some results. A few examinations have looked into the two's coupling path, but they haven't yet uncovered the "black box" that connects them. Additionally, there is a dearth of study on the variables influencing coupling and coordination. As a result, understanding the coupling mechanism, researching the key variables that influence the coordination and efficiency of the two, and conducting an analysis of the relationship between human capital and sustainable economic growth have significant theoretical and practical implications for the enrichment and development of both.

Review of Literature

In the 1960s, the human capital hypothesis first appeared. Human capital is now commonly recognized as the total of laborers' knowledge, skills, and physical condition after decades of conjecture and ongoing improvement. Investments in health care, immigration, education and training, as well as market data gathered and acquired during the job search or trade process, can all be used to continuously increase the stock of human capital (Lepak, D. P., & Snell, S. A. 1999: Wang, S., Lin, X., Xiao, H., Bu, N., & Li, Y. 2022). The development of the theory of human capital is strongly tied to work in traditional economics. As a result, in recent years, a lot of research has been done on the effect of human capital on sustainable economic growth. Currently available research categorizes the effects of human capital on economic growth into two groups: One emphasizes the benefit of human capital on economic growth, which is generally seen as the mainstream perspective. According to researchers like Sghaier and Iman, building up human capital will boost economic growth in nations with high levels of foreign direct investment (Sghaier, I. M. 2021). In the face of increased economic possibilities and a high-quality legal system, human capital can contribute positively to the rise of per capita GDP, according to research using data from 132 nations over a 15-year period (Ali, M., Egbetokun, & Memon, 2018). Through the use of panel data from 30 provinces, Deng and Long further establish that inventive human capital is the primary force promoting economic growth in eastern China through technological innovation. Economic growth in the centre and western regions is encouraged by the efficient distribution of creative and competent human resources (DENG & LONG et al., 2022).

Other viewpoints contend that the impact on economic growth is negligible or even adverse. According to Vinod and Kaushik, the major driver of sustainable economic growth in the neoclassical growth model is technological advancement, and the primary driver of this advancement is the accumulation of human capital (Vinod, H. D., & Kaushik, S. K. 2007). Zhang, however, updated metrics for calculating China's human capital pool by reviewing data from 1978 to 2017. Additionally, Zhang discovered that factor contribution is the main source of economic growth in China and that the contribution of pure technology advancement to that growth is unremarkable (Zhang, Y. 2020). According to Benhabib and Spiegel, the relationship between the growth rate of production level and the increase in human capital is either irrelevant or bears a dismal relationship (Benhabib, J., & Spiegel, M. M. 1994). According to Filmer and Pritchett's research (Filmer, D., & Pritchett, L. 1999), average years of education did not significantly affect the rates of economic growth in various nations. Ma demonstrated that education, human capital, and the dependence ratio had a constraining influence on economic growth in the context of human capital dynamics by focusing on panel data of 31 Provinces in China from 1995 to 2018 (Shahbaz, Chaudhary, & Ozturk, 2017). Theoretically, according to Wang et al., economic servitization can encourage human capital consumption, speed up the accumulation of human capital, and eventually fuel economic growth. Due to lower domestic and tourist expenditure, Hong Kong's labour market was weakened (Ji, X., Wang, S., Xiao, H., Bu, N., & Lin, X. 2022). The human capital accumulation effect of human capital enhancement consumption in China is, however, inadequate and unable to counteract the detrimental effects brought on by the declining labor force (Wang, S., Lin, X., Xiao, H., Bu, N., & Li, Y. 2022).

The majority of current research focuses on the causal relationship between human capital and economic growth, specifically the one-way influence of human capital on economic growth, and uses traditional regression or production

function model derivation approaches. Rarely is the intrinsic relationship between economic growth and human capital explored. The driving influence of human capital on economic growth will be overstated and the engine function of human capital in economic growth cannot be accurately and objectively expressed if the reciprocal effects between human capital and economic growth are ignored (Zhihua 2017). In order to analyses the temporal and spatial changes of interaction between the two systems, investigations on the relationship between the two currently mostly adopt the coupling idea from physics. Existing research subdivides human capital and confirms that heterogeneous human capital with an increasing marginal effect plays a more pronounced role in driving economic growth than homogeneous human capital with a decreasing marginal effect (Wang, S., Lin, X., Xiao, H., Bu, N., & Li, Y. 2022). These changes in the coupled coordination between human capital and regional sustainable economic growth are shown from the time dimension (Wang, Lin, X.). It finds that the increase in healthy human capital stock promotes regional economic growth far more than the spillover effect of regional economic growth on the accumulation of healthy human capital, confirming the relationship between healthy human capital and the regional economic system (Le, R. 2014). Some academics have focused on regional variations, talked about variations in the relationship between economic growth and human capital among provinces, and measured and examined the coupling characteristics of the two. The findings indicate that there is still little mutual connection between economic growth and human capital in China's diverse provinces. Additionally, there is a growing trend from west to east with regional coupling and convergence (Jin, L., & Huimin, Z. 2013).

Therefore, more research is needed to determine the critical variables influencing the coordinated development of human capital and sustainable economic growth, as well as the extent to which the relationship between human capital and sustainable economic growth is the most important. In order to promote a balanced and sustainable development of human capital and sustainable economic growth, this research uses Shandong Province as an example to discuss the coordination relationship and coupling mechanism between human capital and sustainable economic growth and to explore the key factors affecting the coordination and efficient function of the two.

2.. Research Methodology

Research Hypothesis

- **Ho1:** There is no significant relationship between human capital determining factors on sustainable economic growth.

Objectives Of the Study:

1. To identify the determining factors of human capital.
2. To measure the impact of human capital determining factors on sustainable economic growth.

2. 2. Respondents and research approach

In the study, the targeted number of respondents are samples that had been used for the research. The precise results can be acquired with a greater size sample. Before initiating the survey, ample sets of pre-test samples have been distributed for the preliminary study. It is to make sure that authenticity of the inquiry form and made corrections before taking a formal step. A total of 467 questionnaires were distributed randomly to the selected male and females through google forms and hardcopy. However, only 375 copies ((Krejcie and Morgan, 1970) of testimonials were considered for the study. In any exploration, of the content legitimacy of the survey, it was ensured that the survey was comprised of straightforward, reasonable, and clear language. The confidentiality of the testimonials is assured. The response rate for the study was calculated to be 80.29% which is sufficient to conduct an analysis. The review paved the following moral considerations.

The reliability of the questionnaire was really looked at by working out Cronbach’s coefficient alpha value. This value depicts the reliability of a single uni-dimensional latent construct. The Cronbach’s coefficient alpha was calculated to 0.851 for the overall study. A Cronbach’s coefficient alpha work of 0.60 is proposed as a threshold for Cronbach’s alpha reliability and acceptability (Pallant, 2013).

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Data Synthesis

Principal Axis Factor Analysis of Human Capital

The entities considered to study the human capital have already been validated by other research as mentioned earlier. So, we have only conducted a principal axis factor analysis with varimax rotation for the perception of respondents toward human capital. To level off the analysis and a linear decreasing pattern, three major factors were elicited. Each factor contains factor loadings greater than 0.05. These three extracted factors explained a total cumulated variance of 64.950% for the opinion of respondents toward human capital. The first factor explains 24.844% of the variance followed by the second factor which described a variance of 20.670% and the third elicited from human capital has been labeled as education scale, innovation capacity, and medical health and cultural environment.

The primary entity of the first principal axis factor was the 'education scale' which explained the proportion of students in regular higher education institutions, number of patent applications accepted, technology market turnover, and proportion bearing cumulative variance of 24.844%, the next factor is 'innovative capacity which includes a total number of public libraries, museums, and R&D expenditure and the total number of newspaper prints bearing cumulative variance of 45.515%. The third entity of principal axis factor labeled as medical health and cultural environment includes life expectancy, number of medical beds per 10000 people, and number of doctors per 10000 people have a cumulative variance of 64.950%. The result of principal axis factor analysis of entities of human capital is displayed in table 4.

Table 1: Demographical Characteristic of the Respondents

Description		**Number of Respondents**	**Frequency**	**Percentage**
Gender	Male	375	235	62.7
	Female	375	140	37.3
Age	<25	375	60	16.0
	25-35	375	127	33.9
	36-45	375	98	26.1
	46-55	375	67	17.9
	56-65	375	23	6.1
Qualification	UG	375	76	20.3
	PG	375	158	42.1
	Others	375	141	37.6
Occupation	Student	375	44	11.7
	Self-Employed	375	102	27.2
	Salaried	375	173	46.1
	Others	375	56	14.9
Income	< 25000	375	65	17.3
	25000-50000	375	79	21.1
	50001-75000	375	80	21.3
	75001-100000	375	101	26.9
	> 100000	375	50	13.3
Source: Primary data through questionnaire				

2.3. Content Validity

In any research, content validity plays a vital role. To make certain the content validity of the questionnaire, it was made sure that the questionnaire consisted of simple, understandable and clear language. For the respondents who had a problem with the language, the questions were orally translated into the local language and then their responses were recorded. Before the survey, respondents were given clear instructions on how to fill the questionnaire. The anonymity of the respondents was ensured. Keeping in view the ethical considerations, the survey was conducted.

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3. Data Synthesis

3.1. KMO and Bartlett's Test

For determining whether the sampling was adequate, the KMO and Bartlett's test was run. A sphericity check is done using the Kaiser-Meyer-Olkin test. To assess the case to variables quantitative relationship for the analysis, it may be a measure of sampling adequacy. KMO and Bartlett's test is essential for determining whether a sample is adequate in the majority of business research and educational studies. The KMO index has a range of 0 to 1, although the recognized global value is 0.6. Sphericity must pass the Bartlett's test with a score of less than 0.05 (Peri, 2012). The reliability and validity of the study are demonstrated by the KMO Bartlett's test, which corresponds to the study's significance. The Bartlett's test of sphericity was determined to be 0.000 and the Kaiser-Meyer-Olkin measure of sample adequacy to be 0.832 (See Table 2). Because of this, the sample used in this study is suitable for factor analysis. So, it was suggested that more research be done on the device.

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.832
Bartlett's Test of Sphericity	Approx. Chi-Square	1391.673
	df	66
	Sig.	.000
Source: Primary data through questionnaire		

3.2. Factor Analysis – Principal Axis Factoring

The 12 questions relating to human capital were factor analyzed using principal axis factoring with Varimax rotation. As evident from the Scree plot (See Figure 2) which levels off to the analysis and a linear decreasing pattern, three major factors were elicited. Each factor contains factor loadings greater than 0.05. These three extracted factors explained a total cumulated variance of 64.950 % for perception of respondents towards human capital. The first factor explained 24.844% of variance followed by the second factor which described a variance of 20.670% and the third factor elucidated a variance of 19.435% (See Table 3).

Table 3: Factor Analysis

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.895	40.796	40.796	4.895	40.796	40.796	2.981	24.844	24.844
2	1.868	15.564	56.360	1.868	15.564	56.360	2.480	20.670	45.515
3	1.031	8.590	64.950	1.031	8.590	64.950	2.332	19.435	64.950
4	.852	7.101	72.051						
5	.704	5.863	77.914						
6	.561	4.674	82.587						

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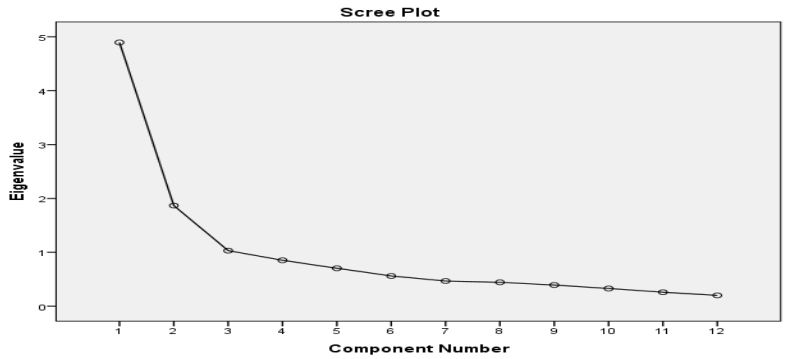
7	.467	3.891	86.478						
8	.443	3.692	90.170						
9	.393	3.271	93.441						
10	.328	2.734	96.174						
11	.259	2.161	98.336						
12	.200	1.664	100.000						
Extraction Method: Principal Axis Factoring.									
Source: Primary data through questionnaire									

Figure 1: Scree Plot



Source: Primary data through questionnaire

Table 4: Summary and Labelling the Factors

Rotated Component Matrix[a]

	Component		
	1	**2**	**3**
Proportion of students in regular higher education institutions	.775		
Number of patent applications accepted	.771		
Technology market turnover	.755		
Proportion of students in regular primary and secondary schools	.750		
Total number of public libraries and museums		.830	
Research and development (R&D) expenditure		.753	
Total number of newspaper prints		.685	
Life expectancy			.817
Number of medical beds per 10,000 people Number of doctors per 10,000 people			.793
Expenditure on education, culture, and entertainment per capita in urban areas			.723
Number of doctors per 10,000 people			.579

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Extraction Method: Principal Axis Factoring Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations.
Source: Primary data through questionnaire

3.3. Principal Axis Factoring Analysis

Principal axis factoring was performed with Varimax Kaiser Normalization. Three factors were extracted. The analyses were extracted with three factors which represented 64.950% of the total variance of the original variables which is acceptable for factor analysis. The three factors represented (See Table 4) the determining factors of human capital. Three factors elicited from respondents of human capital have been labeled as education scale, innovation capacity and medical health & cultural environment.

The first principal axis factor was education scale which explained the proportion of students in regular higher education institutions, number of patent applications accepted, technology market turnover and proportion. The cumulative variance found by this factor is 24.844%. Second principal component factor was labeled as innovation capacity which includes total number of public libraries and museums, research and development (R&D) expenditure and total number of newspaper prints. The second factor explained 45.515% variance. The third principal axis factor was labeled as medical health & cultural environment Life expectancy, number of medical beds per 10,000 people number of doctors per 10,000 people, expenditure on education, culture, and entertainment per capita in urban areas and number of doctors per 10,000 people. The explained cumulative variance by this factor is 64.950%.

Step-wise Regression Analysis

Regression analysis was applied to access the impact of these 3 factors on human capital. Here, stepwise regression is used to select the best grouping of predict variables of that account for the most variance in the outcome (R^2). It is useful in exploratory analysis. It is used to generate incremental validity evidence in psychometrics. The primary goal of this is to build best model. The results of stepwise regression are shown in table 5. It is evident from the table 5 that the first variable "education scale" to human capital is followed by Factor 1, Variable 4 "education scale" of the factor analysis evident from table 4. This exerts a significant impact on wide usage of human capital (*t*- stat of 6.277 with *p*- value of 0.000). The second variable "innovation capacity" is followed by factor 2, variable 3 of factor analysis. This explains the dependence of the overall satisfaction level of using human capital (*t*- stat of 4.301 with *p*- value of 0.000). Third variable "medical health & cultural environment" is followed by factor 3, variable 4 in the factor analysis table 4. This medical health & cultural environment variable on the human capital (*t*- stat of 2.501 with *p*- value of 0.000).

Table 5: Stepwise Regression

	Education Scale		Innovation Capacity		Medical Health & Cultural Environment	
Independent Variables	R^2	t- stat	R^2	t- stat	R^2	t- stat
Education Scale	**.132**	6.277	.161	7.431	.180	6.325
		.000		.000		.000
Innovation Capacity				**4.301**		2.623
				.000		.000
Medical Health & Cultural Environment						**2.501**
						.000
Source: Primary data through questionnaire						

Implications

The study makes the following recommendations to support India's steady and sustainable economic growth. The aforementioned empirical analysis demonstrates that while the current transformation efficiency of scientific and

technological achievements limits further sustainable economic growth, they play a significant role in promoting the coupling and coordination of human capital and sustainable economic growth. In order to effectively address the needs of India's economic and social development, scientific and technological innovation should concentrate on the national strategy and the cutting edge of science and technology, strengthen the regional characteristics of Shandong Province, deeply cultivate the needs of industrial structure adjustment, further improve service support capability for the industrial development, and actively meet these needs.

- There is a need to enhance the patent application acceptance and incentive system, including the patent R&D capabilities. Our findings indicate that the number of patent applications that are approved has a particularly large influence on the growth of human capital.
- The Indian government should give intellectual property work a high priority, concentrate on building a strong provincial project, implement the "Implementation Opinions on the National Intellectual Property Strategy Outline," enhance the patent award system, and actively encourage and support businesses to invent and create patents in order to stimulate the economy. A business environment for the harmonious development of science and technology, the economy, and society must be created. It must also foster a passion for innovation, promote the continuous growth of patent application, authorization, and ownership in India, promote enterprise transformation, and promote the optimizations of the industrial structure in that country.
- It should also strengthen the role of businesses in patent creation and application while accelerating the transformation of patent achievements, encouraging and promoting the transformation and application of patent achievements through patent licensing, technology transfer, technology investment, and other methods.

Limitations of the study

As every coin has two sides, the research study also has two sides. There are certain limitations, which deceive the objects of the study.

- Respondent’s refusal to coordinate at the time affected the accumulation of information.
- The study was restricted to India and hence cannot be generalized.
- Time constraints also put a limitation on the number of respondents surveyed.

Conclusion

In a world of rapid economic transaction, where global economic growth is increasingly dependent on technology, growth of human capital is crucial for stimulating local and national economies. Human capital is a measure of education and health levels is a powerful factor in influencing aggregate economic outcomes; however, despite several initiatives taken, human capital growth in India has been disappointing. In an international ranking of human capital compiled by the world bank. The study investigated the impact of determining factors of human capital on sustainable economic growth and concluded that education institutions had the highest impact on sustainable economic growth followed by innovation capacity and medical health & cultural environment.

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