

Beyond GDP: Measuring Well-Being and Sustainability in BRICS Nation through Happy Planet Index

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Abstract

This paper examines the growth in Happy Planet Index (HPI) and its factors and contribution of each of them in HPI by studying a sample of BRICS countries i.e. Brazil, Russia, India, China and South Africa for last ten years starting from 2010 to 2020. The paper focuses on examining the growth in HPI over the years. Regression analysis confirms the significant influence of life expectancy and experienced wellbeing on HPI, while ecological footprint exerts a negative impact. The study underscores the importance of balancing economic growth with environmental sustainability and social well-being to achieve a more equitable and sustainable future for the BRICS nations.

Keywords: *Happy Planet Index, life expectancy, experienced wellbeing, ecological footprint, BRICS countries, sustainable development.*

1. Introduction

The Happy Planet Index (HPI) is a measure of human well-being and environmental sustainability that was developed by the New Economics Foundation (NEF) in 2006. It seeks to answer the question: "How well can people live for now and in the future?" It is a measure of sustainable well-being that aims to assess how well nations are doing at achieving long, happy, and sustainable lives for their citizens. It is based on the premise that well-being is not just about wealth or material possessions, but also about factors such as good health, strong communities, and a clean environment. Here are the main components of the Happy Planet Index: Well-being: This component assesses the overall life satisfaction and happiness of the people living in a country. It is typically measured through surveys and self-reported well-being indicators. Life expectancy: Life expectancy at birth is an important factor in the HPI. It reflects the average number of years a person can expect to live in good health, considering mortality rates. Ecological footprint: The ecological footprint measures the environmental impact of a nation, including its resource consumption and carbon emissions. It is used to determine whether a country's ecological footprint is sustainable within the planet's capacity to regenerate resources and absorb waste. The term "BRICS" originally stood for Brazil, Russia, India, and China, coined by economist Jim O'Neill in 2001 due to their impressive economic growth. South Africa later joined in 2010, making it "BRICS." These countries hold annual summits to enhance economic conditions within their group, representing 42% of the world's

population and 31% of global GDP. In 2023, South Africa's chairing revealed interest from over 40 nations to join for development finance and increased trade. After the summit, Argentina, Egypt, Ethiopia, Iran, Saudi Arabia, and the United Arab Emirates were announced as new BRICS members starting in 2024. The BRICS countries, consisting of Brazil, Russia, India, China, and South Africa, represent a diverse group of emerging economies with significant global influence. Over the past few decades, these nations have witnessed remarkable economic and social transformations. This study aims to investigate the trends in the Happy Planet Index (HPI) BRICS countries to gain insights into the well-being, environmental sustainability, and quality of life.

2. Literature Review

Gross Domestic Product (GDP) is widely critiqued for its narrow focus on economic output, failing to capture the multidimensional nature of well-being. Campus and Porcu (2010) provide a foundational critique by introducing the Happy Planet Index (HPI) as an alternative to GDP, evaluated across 178 countries. They argue that GDP fails to account for subjective well-being, such as life satisfaction, and disregards environmental sustainability. Their analysis reveals a significant disconnect: GDP does not correlate with HPI scores, indicating that high economic output does not necessarily translate to improved well-being or ecological health. For instance, countries with high GDP may prioritize resource-intensive growth at the expense of social cohesion or environmental preservation, which the HPI seeks to address by integrating life expectancy, life satisfaction, and ecological footprint. This work emphasizes that GDP counts money but ignores human happiness such as leisure, community engagement, and mental health. Abdallah (2020) takes this further, saying the HPI really challenges why rich countries are so obsessed with just growing their economies. He points out that the HPI was designed not to guide development in lower-income nations but to question developed high income nations that equate economic growth with progress. He also highlights that GDP totally ignores the environmental damage that comes with growth, such as carbon emissions, resource depletion, and biodiversity loss. For example, a country may boost GDP through fossil fuel extraction or mass manufacturing, but these activities inflate ecological footprints, undermining long-term sustainability. The HPI, on the other hand, looks at how good people's lives are while also checking how much the environment is being impacted. This shows that GDP can hide the fact that sometimes being economically successful comes at the cost of an environment health. He even mentioned that while the HPI has made people think and talk, most countries still stick to using GDP, which makes it hard to shift to a way of measuring progress that cares about both people's well-being and the future of the Earth. Switching focus to India, Biswas-Diener et al. (2012) point out that GDP really struggles to capture happiness in a country so rich in culture and community, but with big economic differences. He argues that just looking at how much money India has as a whole misses key things that make people happy, like strong family bonds, community support, and cultural values. They found that while some economic growth helps, it's really about everyone having fair access to things like healthcare, education, and opportunities that boosts well-being. Things like close family ties and festivals create a sense of belonging that GDP can't measure. The study shows that GDP's focus on national wealth hides how differently people live and ignores important feelings like gratitude, trust and pride. By suggesting policies that focus on connecting people and making sure everyone has access to basic services, they're basically saying GDP isn't enough and we need a better way to understand well-being that fits India's strong community spirit. Prajapati (2018) takes a more spiritual and cultural angle on happiness in India, moving even further away from just looking at money like GDP does. Drawing on old texts, Prajapati says true happiness comes from inside – finding balance, understanding yourself, and not being so

caught up in wanting things. Ideas like "khushi" (joy) and the focus on community show that being connected and wanting everyone to be happy is key. Giannetti et al. (2022) shift the focus to a micro-level analysis, illustrating GDP's limitations through a case study of the low-income Felicidade community in São Paulo, Brazil. Despite modest economic resources, the community achieves a high life satisfaction score (Gross Domestic Happiness index = 0.86), driven by non-income factors such as health, effective time use, psychological well-being, education, good governance, and community vitality. Happiness in Felicidade comes from health and friends, not money. Helping each other creates belonging despite poverty. This study highlights that GDP can't measure how important relationships and community are, especially in places where money is tight but people are connected. Ribeiro and Marinho (2017) provide a national-level analysis in Brazil, further exposing GDP's shortcomings through their validation of the Easterlin paradox. Using World Values Survey and IPEA data, they confirm that a positive correlation between income and happiness but also validate the Easterlin paradox: beyond a certain income threshold, additional wealth has diminishing returns on happiness. Employment and marital status were found to be even more influential than income, highlighting the complex interplay between economic and social factors in shaping well-being. They suggest we should use measures like Gross National Happiness (GNH) or HPI instead, because they look at more than just money and can help governments make better decisions that actually improve people's lives. Kats and Marenkova (2016) offer a comparative perspective, examining HPI in Russia and Austria. They find that while monetary factors like Gross Regional Product positively affect HPI, education also plays a significant role, particularly in Austria (with a correlation coefficient of 0.79 in Russia). This suggests that GDP, which primarily tracks economic output, cannot fully account for well-being drivers like knowledge, skills, or intellectual empowerment. The study also reveals that better education could make HPI scores higher, pointing out something important for well-being that GDP ignores. By showing how education matters, they highlight that GDP doesn't see the bigger picture of what makes life fulfilling. Alekseeva, Arshinova, and Bancheva (2018) provide further context by examining Russia's position in international environmental ratings. They highlight that while Russia performs well in some indices, like Environmental Efficiency, it lags in climate-related indices and the transition to a green economy. These findings emphasize the importance of integrating environmental performance into well-being measures, aligning with the HPI's focus on sustainability. Rothmann and Veenhoven (2012) looked at South Africa and found that its low HPI score isn't just about happiness, but also about how much environmental damage it causes to achieve that happiness. Even though many South Africans report being reasonably happy, the country's big environmental footprint drags down its HPI. This shows that GDP, which might see South Africa as doing well economically, misses the environmental cost and the mixed levels of happiness. The fact that South Africans remain somewhat happy despite big challenges like AIDS also shows that GDP's inability to capture the complexity of human experiences.

From the literature review we find the lack of a focused analysis on the trends of the HPI specifically within the BRICS economic bloc over a defined period (2010-2020)

3. Objective of the Study

- To analyse the trends in the Human Planet Index (HPI) values for BRICS countries from (2010-2020).
- To analyse the individual trends of HPI components- life expectancy, well-being, and ecological footprint from (2010-2020).
- To investigate the correlations between HPI and its components over the period of 2010 to 2020

4. Methodology of the Study and Data Sources:

This study employs a quantitative research approach using secondary data to assess the Happy Planet Index (HPI) and its components (life expectancy, experienced well-being, and ecological footprint) for BRICS countries over the period 2010-2020. Data were sourced from HappyPlanetIndex.org (Abdallah, S., Abrar, R. & Marks, N. 2021), while data for life expectancy, experienced well-being (as measured by the Ladder-of-life), and ecological footprint were obtained from the UNDP Human Development Reports, the Gallup World Poll (as presented in the World Happiness Reports), and the Global Footprint Network National Accounts, respectively. Descriptive statistical analysis as well as statistical tools are used, such as Spearman rank correlation coefficients and multiple regression analysis is conducted to assess the impact of each HPI component (life expectancy, well-being, and ecological footprint) on the overall HPI within the BRICS countries during the specified timeframe, providing insights into the overall happiness and sustainability of BRICS nations. The findings indicate that life expectancy and experienced well-being are positively correlated with HPI, while ecological footprint negatively influences HPI. China and Russia showed a strong positive relationship between life expectancy and well-being but face significant environmental challenges. Brazil, in contrast, demonstrated balance these components more effectively, while India and South Africa face unique challenges in improving life expectancy and well-being.

5. Data Analysis & Findings

Calculation of HPI: The HPI is calculated by multiplying the life expectancy and experienced well-being and dividing the result by the ecological footprint.

The formula can be represented as follows:

$$\text{HPI} = (\text{Life expectancy} * \text{Experienced wellbeing}) / \text{Ecological footprint}$$

The HPI score provides a measure of how efficiently a country is achieving well-being and happiness while considering its environmental impact. The HPI range is from 0 to 100. A higher HPI score indicates that a country is achieving a high level of well-being with a relatively low environmental impact. The HPI is designed to promote sustainable well-being and happiness by encouraging countries to maximize the well-being of their citizens while minimizing their ecological footprint. This methodology allows for a holistic assessment of a country's progress and can serve as a valuable tool for policymakers and researchers interested in the intersection of well-being, environmental sustainability, and quality of life.

Table 5.A : HPI VALUE FOR BRICS COUNTRY FROM 2010-2020

HPI VALUE FOR BRICS COUNTRY FROM 2010-2020											
COUNTRY/YEAR	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
BRAZIL	54.91	55.49	53.45	56.62	55.71	54.2	53.78	52.99	52.44	54.57	51.33
RUSSIA	33.43	32.3	34.33	34.1	37.02	38.07	37.48	35.45	35.13	34.93	35.15
INDIA	48.06	45.65	46.28	44.56	44.5	44.1	43.03	42.03	40.3	36.37	43.76
CHINA	39.71	41.4	41.51	42.22	42.23	42.99	43.48	41.68	41.76	41.89	45.63
SOUTH AFRICA	28.68	31.26	32.22	26.41	32.36	33.47	33.86	32.58	34.95	36.21	34.29

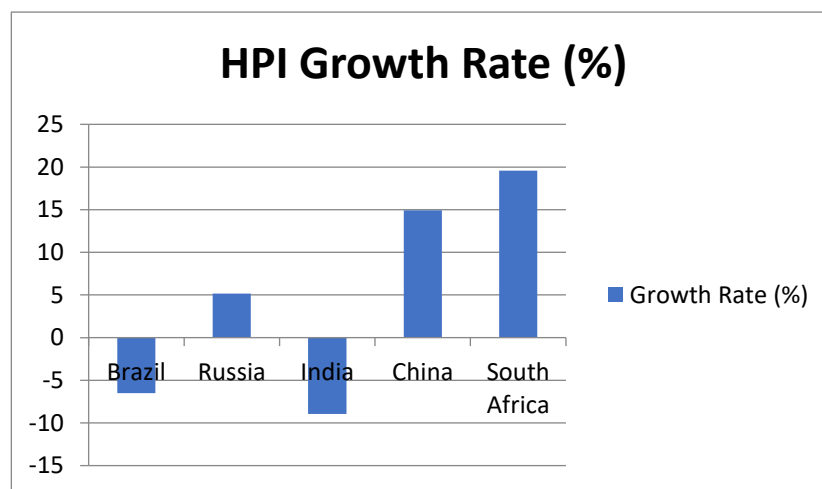
happyplanetindex.org (Abdallah, S., Abrar, R. & Marks, N. (2021) author compilation

Table 5.B Happy Planet Index Comparison (2010 vs. 2020)

Countries	2010 Happy Planet Index	2020 Happy Planet Index	Change (Absolute)	Growth Rate (%)
Brazil	54.91	51.33	-3.58	-6.52
Russia	33.43	35.15	1.72	5.15
India	48.06	43.76	-4.3	-8.95
China	39.71	45.63	5.92	14.9
South Africa	28.68	34.29	5.61	19.58

happyplanetindex.org (Abdallah, S., Abrar, R. & Marks, N. (2021) author compilation

Chart 1



The table 5.B shows happy planet index growth rate for the BRICS countries from 2010 to 2020. South Africa experienced a significant increase in HPI, with an absolute change of +5.61 points and a growth rate of 19.58%. but HPI value remains lower than that of other BRICS countries, highlighting the need for continued focus on sustainable development. China showed the largest absolute increase in HPI (+5.92) and a growth rate of 14.90%, indicating significant

improvements in sustainable well-being. Russia experienced a small increase in absolute value of 1.72 points, with a growth rate of 5.15%. Brazil saw a decline in absolute value of 3.58 with negative growth rate of -6.52%. Among BRICS countries India saw a significant decline in absolute value of 4.30 points with a negative growth rate of -8.95%. Overall, among BRICS countries China and South Africa had the highest HPI growth reflecting significant improvements in well-being. Russia saw a modest growth, indicating steady but slower progress. In contrast, Brazil and India experienced negative HPI growth highlighting the challenges in managing well-being and the need for strong policies to reverse this trend.

5.1 Life Expectancy

Life expectancy is the average number of years a new-born in a particular country is expected to live if the current age-specific mortality rates remain constant throughout their life. It is a commonly used indicator of the overall health and quality of life in a country.

Table 5.1 A: LIFE EXPECTANCY VALUE FOR BRICS COUNTRY FROM 2010-2020

Country/Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Brazil	73.60	73.90	74.20	74.50	74.70	75.00	75.20	75.50	75.70	75.90	74.02
Russia	68.70	69.30	69.90	70.50	71.00	71.50	71.80	72.10	72.40	72.60	70.40
India	66.70	67.10	67.50	67.90	68.30	68.60	68.90	69.20	69.40	69.70	69.77
China	74.40	74.70	75.00	75.30	75.60	75.90	76.20	76.50	76.70	76.90	77.10
South Africa	57.70	58.90	60.10	61.10	62.00	62.60	63.20	63.50	63.90	64.10	60.60

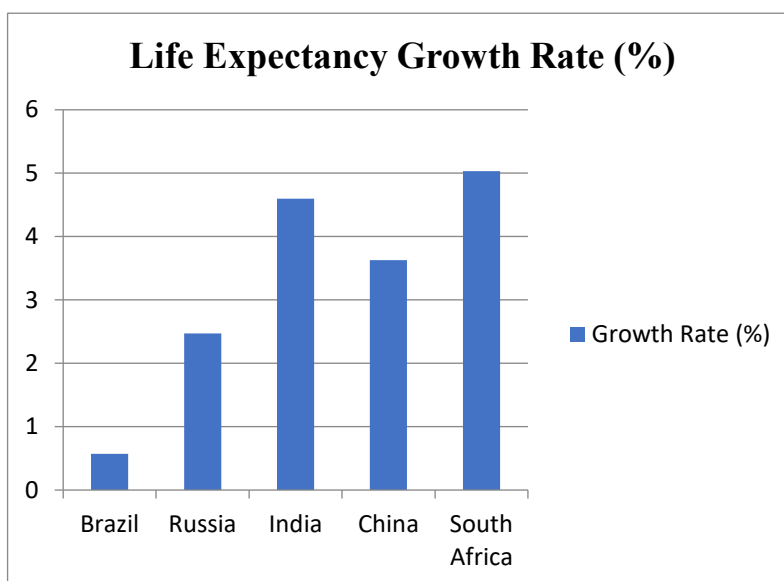
happyplanetindex.org (Abdallah, S., Abrar, R. & Marks, N. (2021) author compilation

Table 5.1B Life Expectancy Comparison (2010 vs. 2020)

Countries	2010 Life Expectancy	2020 Life Expectancy	Change (Absolute)	Growth Rate (%)
Brazil	73.60	74.02	+0.42	0.57
Russia	68.70	70.40	+1.70	2.47
India	66.70	69.77	+3.07	4.60
China	74.40	77.10	+2.70	3.63
South Africa	57.70	60.60	+2.90	5.03

happyplanetindex.org (Abdallah, S., Abrar, R. & Marks, N. (2021) author compilation

Chart 2



The table 5.1B depicts the growth rate of life expectancy of BRICS countries from 2010 to 2020. It can be seen that in all the BRICS countries life expectancy has improved over the past decade. The most significant improvement was seen in South Africa with an absolute change of 2.90 and a 5.03 % growth rate followed by India's absolute rise in life expectancy by 3.70 with a growth rate of 4.60%, then comes China with a 2.70 absolute increase, shows a positive growth rate of 3.63%. Russia's absolute rise in life expectancy 1.70 with a 2.4% moderate growth rate among all BRICS countries Brazil experienced the lowest increase in life expectancy with an absolute increase of 0.42 with a growth rate of 0.57%. Overall BRICS countries experience positive growth in life expectancy from 2010 to 2020 but improvement strength varies among these countries.

5.2 Experienced Wellbeing

Experienced well-being is determined through a survey in which people are asked to rate their own life satisfaction on a scale from 0 to 10. Respondents are asked to imagine a ladder, with 0 representing the worst possible life and 10 representing the best possible life. They are then asked to indicate which step on the ladder best represents how they feel about their life. The average of all responses within the population is calculated to gauge the overall well-being of the country.

Table 5.2A: LADDER OF LIFE VALUE FOR BRICS COUNTRY FROM 2010-2020

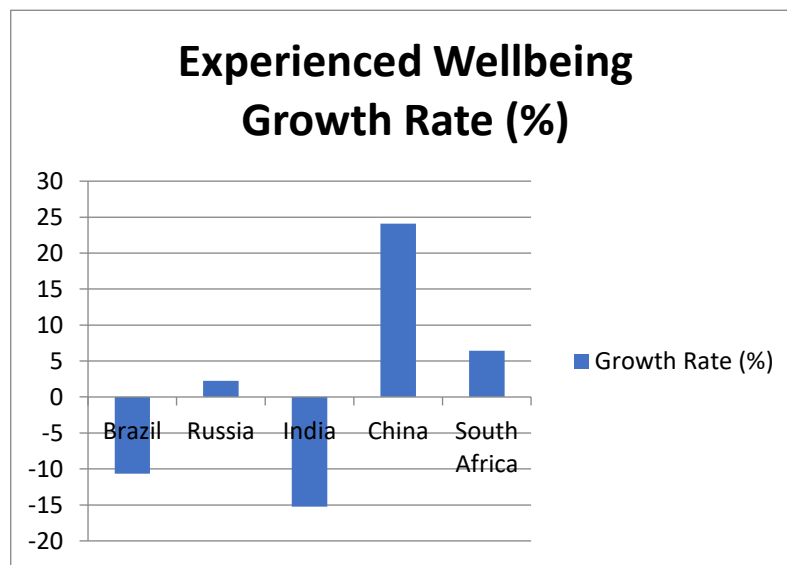
Country/Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Brazil	6.84	7.04	6.66	7.14	6.98	6.55	6.37	6.33	6.19	6.45	6.11
Russia	5.38	5.39	5.62	5.54	6.04	6.00	5.85	5.58	5.51	5.44	5.50
India	4.99	4.63	4.72	4.43	4.42	4.34	4.18	4.05	3.82	3.25	4.23
China	4.65	5.04	5.09	5.24	5.20	5.30	5.32	5.10	5.13	5.14	5.77
South Africa	4.65	4.93	5.13	3.66	4.83	4.89	4.77	4.51	4.88	5.03	4.95

happyplanetindex.org (Abdallah, S., Abrar, R. & Marks, N. (2021) author compilation

Table 5.2B Experienced Well-being Comparison (2010 vs. 2020)

Countries	2010 Experienced Wellbeing	2020 Experienced Wellbeing	Change (Absolute)	Growth Rate (%)
Brazil	6.84	6.11	-0.73	-10.67
Russia	5.38	5.50	+0.12	2.23
India	4.99	4.23	-0.76	-15.23
China	4.65	5.77	+1.12	24.09
South Africa	4.65	4.95	+0.30	6.45

happyplanetindex.org (Abdallah, S., Abrar, R. & Marks, N. (2021) author compilation

Chart 3

The table 5.2B depicts the growth rate of experience well-being for BRICS Countries from 2010 to 2020. The ladder of life is a measure of subjective wellbeing in which people are asked to rank their level of life satisfaction on a 10-point scale, where 10 represents the best possible life and 0 represents the worst. China experiences the largest improvement with an absolute change of 1.12 and records the highest increasing growth rate of 24.09%. South Africa follows a slightly higher absolute value of 0.30 and a growth rate of 6.4%, and Russia has a mild increase in absolute value of 0.12 with a growth rate of 2.23%. Conversely, life satisfaction declines in India and Brazil by the absolute value of 0.76 and 0.73 respectively reflecting a decline in the growth rate of - 15.23 and - 10.67 respectively. Overall, China has been seen with the most improved well-being, while Brazil and India experienced declines, reflecting a diverse path in quality of life across the BRICS nations between 2010 and 2020

5.3 Ecological Footprint

The ecological footprint measures the environmental impact of a country's consumption patterns. It calculates the average amount of land (measured in global hectares) needed per person to sustain the country's typical consumption habits. This includes the land required for renewable resources (such as food and wood products), infrastructure, and the absorption of CO₂ emissions. Importantly, it assesses consumption rather than production. For instance, if a product is manufactured in one country but consumed in another, the ecological footprint is attributed to the consuming country.

Table 5.3A : ECOLOGICAL FOOTPRINT VALUE FOR BRICS COUNTRY FROM 2010-2020

COUNTRY	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
BRAZIL	2.86	2.99	2.94	2.97	2.97	2.78	2.68	2.81	2.74	2.68	2.59
RUSSIA	5.32	5.83	5.55	5.63	5.50	5.18	5.19	5.48	5.49	5.46	5.05
INDIA	1.06	1.07	1.09	1.10	1.14	1.13	1.15	1.19	1.21	1.22	1.14
CHINA	3.33	3.50	3.56	3.65	3.62	3.61	3.56	3.71	3.73	3.74	3.74
SOUTH AFRICA	3.60	3.39	3.59	3.37	3.46	3.30	3.12	3.16	3.06	2.97	2.73

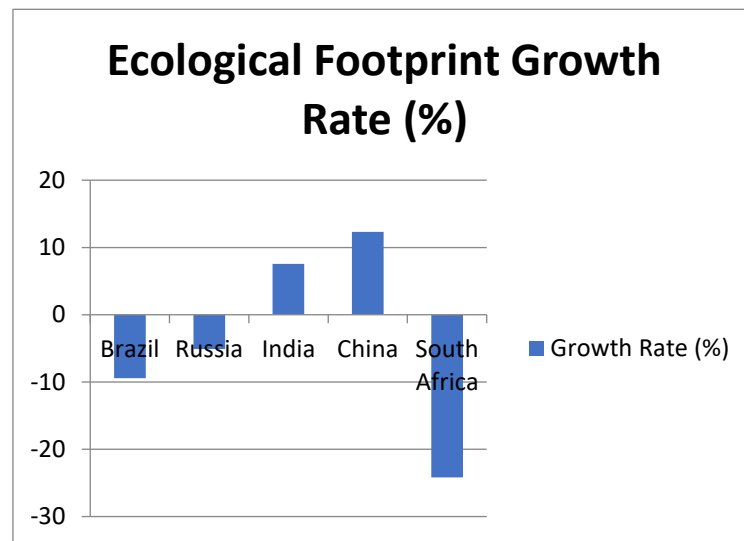
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Table 5.3B Ecological Footprint Comparison (2010 vs. 2020)

Countries	2010 Ecological Footprint	2020 Ecological Footprint	Change (Absolute)	Growth Rate (%)
Brazil	2.86	2.59	-0.27	-9.44
Russia	5.32	5.05	-0.27	-5.08
India	1.06	1.14	+0.08	7.55
China	3.33	3.74	+0.41	12.31
South Africa	3.60	2.73	-0.87	-24.17

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Chart 4



The table 5.3B show ecological footprint growth rate for the BRICS countries from 2010 to 2020. South Africa exhibits a noteworthy decrease in absolute value of 0.87 and a negative growth rate of -24.17%, indicating their ability to mitigate environmental effect. Brazil and Russia experience is right reduction of absolute value of 0.27 with a decline growth rate of -9.44% and -5.08% respectively. India saw a mild gain in the absolute value of 0.88 and a 7.5% increase in growth rate. Among BRICS countries China shows most notable increase in absolute value of 0.41 and 12.3% increase in growth rate, highlighting significant environmental challenges. Overall, among BRICS countries Brazil, Russia and South Africa shows negative growth rate which reflect a major shift toward reducing environmental impact, whereas India and China reflect positive growth shows increased environmental pressure driven by rapid economic growth, industrialization, and a rising population

6. Happy Planet Index Components Ranking (2020)

China- The results show that there is a strong positive correlation (0.8) between life expectancy and experience well-being, indicating that longer life expectancy among Chinese people is closely related with better well-being. However, there is a weakly negative correlation (-0.25) between life expectancy and ecological footprint. Experience well-being and ecological footprint, suggesting a tendency toward a smaller ecological footprint. Despite this, the country has the fourth-highest ecological footprint among BRICS countries, indicating significant environmental impact.

Brazil - There is strong positive correlation (0.8) between life expectancy and experience well-being, and countries rank high in both categories. Brazil has a smaller ecological footprint and ranks second, but it also experiences a weakly association between life expectancy and ecological footprint, as well as well-being and ecological footprint. Overall Brazil is able to maintain great balance between these three components.

Russia- There is a positive relation between life expectancy and experience well-being, and the country's third-place ranking indicates a moderate balance between the two variables. There is a negative relationship between life expectancy and ecological footprint, experience well-being and ecological footprint among BRICS countries it has the highest ecological footprint. This shows Russia's development is more resource intensive as a result it led to large environmental impact.

India- There is a positive correlation but has lower ranking in both life expectancy and experience well-being, which suggests that well-being can be improved by being in excellent health. India's well-being has a negative correlation, which means lower longevity and well-being related with lower rank of ecological footprint.

South Africa- There is a positive correlation between life expectancy and experience well-being but among BRICS countries, it has a last rank in life expectancy and second last in well-being. While South Africa does not represent exactly a weak negative correlation pattern, but it does show low longevity, well-being and ecological footprint ranking. It may be due to use of natural resources or the structure of the economy.

Overall, we can say that among BRICS countries China, Brazil, and Russia are able to maintain a strong relationship between life expectancy and experience well-being but China and Russia also have the largest ecological footprint, indicating development at the cost of environmental degradation. Where Brazil is able to make a balance between all the three indicators, India shows low longevity, well-being with minimum effect on environment and South Africa shows low life expectancy, well-being with high environmental impact.

Simple Regression depicts the relationship between dependent variable and various independent variables. R^2 is the coefficient of determination that gives us the strength of association between 2 variables.

Table 6.1: Happy Planet Index Components

COUNTRIES	LIFE EXPECTANCY		EXPERIENCE WELL BEING		ECOLOGICAL FOOTPRINT	
	VALUE	RANK	VALUE	RANK	VALUE	RANK
CHINA	77.1	1	5.77	2	3.74	4
BRAZIL	74.02	2	6.11	1	2.59	2
RUSSIA	70.4	3	5.5	3	5.05	5
INDIA	69.77	4	4.23	5	1.14	1
SOUTH AFRICA	60.6	5	4.95	4	2.73	3

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Table 6.2 RANK CORRELATION

Variables Compared	Rank Correlation	Strength Of the Relationship
	Coefficient(r)	
Life Expectancy and Experienced Wellbeing	(r=0.8)	Strong positive
Life Expectancy and Ecological Footprint	(r=-0.25)	Negative
Ecological Footprint and Experienced Wellbeing	(r=-0.25)	Negative

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7. Happy Planet Index and Its Component

When we compare HPI with life expectancy and experienced wellbeing, we get R^2 0.42 and 0.36 respectively which show that they both have moderate effect on HPI respectively. But when we compare with ecological footprint it indicates weak explanatory power compare to other components. from the above analysis, we can conclude that since the life expectancy has the highest correlation with HPI it is the largest contributed to HPI followed by experience well-being be which is moderately correlated and then ecological footprint which is negatively correlated with the HPI for all BRICS Nation.

Table 7.1

Regression statistics	life expectancy	experienced wellbeing	ecological footprint
Multiple R	0.65227	0.605163	-0.431586
R Square	0.425459	0.362333	0.186266
Adjusted R square	0.414619	0.354264	0.170913
Standard error	6.109995	6.417251	7.271461
Observation	55	55	55

Author own estimation

8. Multiple Regression Analysis

Regression analysis shows a high degree of model fit ($R^2 = 0.993$) with high significance ($p < 1.0E-55$). Life expectancy and experienced well-being significantly increase HPI (coefficients of 0.614 and 6.156, respectively), while an increase in ecological footprint decreases HPI (coefficient of -4.226). This indicates that higher life expectancy and well-being improve HPI, whereas a larger ecological footprint has a negative effect, underscoring the need for sustainable development.

Multiple R = (0.9965) this is the strong correlation between the observed and predicted values of the dependent variable (happy planet Index).

The R-Square = (0.993) Indicates that 99.3% of the variation in the Happy Planet Index can be explained by independent variable (Life Expectancy, Experienced Wellbeing, and Ecological Footprint).

Standard error = (0.6834) Indicates the average deviation of the observed data points from the regression line.

Significance F = (-4.75354E-55) This value is extremely small, indicating that the overall regression model is statistically significant.

<i>Regression Statistics</i>	
Multiple R	0.996535958
R Square	0.993083916
Adjusted R Square	0.992677087
Standard Error	0.683382018
Observations	55

<i>ANOVA</i>								
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>			
Regression	3	3419.975011	1139.992	2441.038	4.75354E-55			
Residual	51	23.81756012	0.4677					
Total	54	3443.792571						

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	-20.4503098	1.243892847	-16.4406	5E-22	-22.94752886	-17.9530907	-22.94752886	-17.95309068
LE	0.613573719	0.020586975	29.80398	6.23E-34	0.572243642	0.654903796	0.572243642	0.654903796
EW	6.156310924	0.133453979	46.13059	2.94E-43	5.888390882	6.424230966	5.888390882	6.424230966
EF	-4.22615737	0.071765107	-58.8887	1.44E-48	-4.370231832	-4.0820829	-4.370231832	-4.082082902

Intercept (-20.4503): This intercept represents the value of the Happy Planet Index (HPI) when all independent variables (Life Expectancy, Experienced Wellbeing, and Ecological Footprint) are zero. Life Expectancy (LE, 0.6136): For every one unit increase in Life Expectancy, the HPI is increase by 0.614 units, keeping other variables constant. The p-value (6.23E-34) is extremely low, indicating that this coefficient is statistically significant. The p value is extremely small i.e. it is below 0.01, indicating the longer life expectancy contribute positively impact on happy planet index for BRICS nation. This means that in BRICS countries, improvement in health and life expectancy is very important for making people happier. Good

health is the foundation of happiness for happy life. When people are healthy, they have the ability to pursue what make them happy, leading to a more satisfied life

Experienced Wellbeing (EW, 6.1563): For every one unit increase in Experienced Wellbeing, the HPI is will increase by 6.156 units, keeping other variables constant. The p-value (2.94E-43) is also extremely low, indicating a significant effect. High coefficient and low p value, Experienced Wellbeing is the most impactful variable on HPI among all other the predictors, reflecting the importance of well-being on the HPI in BRICS countries. Improving people's life quality, mental well-being, and overall happiness can reliably increase the Happy Planet Index.

Ecological Footprint (EF, -4.2262): For every one unit increase in Ecological Footprint, the HPI is expected to decrease by 4.226 units, keeping other variables constant. The p-value (1.44E-48) which is below 0.05, indicating statistically significant. The study found a strong link between a larger ecological footprint and lower happiness levels. This suggests that harming the environment make people less happy, so to keep people happy in BRICS countries, sustainable practices are crucial for improving well-being in BRICS nations.

Low p-value (4.75354E-55) mean the p-values for Life Expectancy, Experienced Wellbeing, and Ecological Footprint are all significantly below 0.001, indicating that each predictor has a statistically significant impact on the Happy Planet Index for BRICS countries.

9. Correlation Coefficient

Happy planet index and Life expectancy; - (0.652) positive correlation states that life expectancy increase, HPI also tends to increase. This means that in BRICS countries, improving life expectancy is directly link with higher overall happiness and sustainability. Happy planet index and Experience wellbeing; - (0.605) positive correlation indicates that high level of subjective Wellbeing or happiness is associated with higher HPI. BRICS nation have experienced economic growth which also improve the living standard of people. However there is a lot more potential for improvement. Addressing social economic inequality, stable employment opportunity, mental health support, social safety etc. can further improve subjective wellbeing which leads to improvement in HPI. Happy planet index and Ecological footprint; - (- 0.432) negative correlation suggest that as ecological footprint increase (environmental impact) the HPI tends to decrease. Rapid industrialization increase ecological foot print as a result it also increases fast energy consumption, pollution and resource exploitation. Environmental pollution not only impacts the public health it also reduce happiness and quality of life of people of BRICS nation. Life expectancy and Ecological wellbeing; - (0.519) shows that positive correlation means long life contributes to better subjective wellbeing. In BRICS nation there is a clear link between health improvement and subjective wellbeing, good healthcare safe environment do contribute to happy and satisfying life. Life expectancy and Ecological footprint; - (0.1 04) There is a weak correlation implies that life expectancy does not significantly impact on environment ecological footprint. This suggests that BRICS countries can improve life span without damaging environment or increase ecological footprint. Expected wellbeing and Ecological footprint; - (0.376) There is a positive correlation indicate that country with high level of ecological welding tends to have higher ecological footprint. This may be due to the fact that there able to consume more natural resource. This shows that increase in consumption pattern of goods, energy & natural resource is related with high ecological footprint. BRICS country can balance between happiness and environment by focusing on health, wellbeing and environmental conservation

Table 9.1 The Matrix shows correlation Coefficient between happy planet index and its component.

	Happy planet index	Life expectancy	Experienced wellbeing	Ecological footprint
Happy planet index	1			
Life expectancy	0.652273	1		
Experienced wellbeing	0.605163	0.518872	1	
Ecological footprint	-0.43159	0.140191	0.376306159	1

Author own estimation

• Descriptive Statistics Analysis

	HAPPYPL...	LIFEEXPE...	EXPERIEN...	ECOLOGI...
Mean	41.49655	70.31800	5.279273	3.248909
Median	41.68000	71.00000	5.140000	3.300000
Maximum	56.62000	77.10000	7.140000	5.830000
Minimum	26.41000	57.70000	3.250000	1.060000
Std. Dev.	7.944278	5.297067	0.880736	1.403062
Skewness	0.360384	-0.699151	0.191369	0.083197
Kurtosis	2.154455	2.464459	2.695219	2.346178
Jarque-Bera Probability	2.828950 0.243053	5.138032 0.076611	0.548578 0.760112	1.043098 0.593600
Sum	2282.310	3867.490	290.3600	178.6900
Sum Sq. Dev.	3408.024	1515.181	41.88757	106.3035
Observations	55	55	55	55

The analysis of data indicates that the average HPI score is 41.5 shows a moderate level of well-being across BRICS country. The data is roughly systematic with median 41.68 being close to the mean 41.50 this suggest that scores are evenly distributed without significant skew. The standard deviation of 7.94 score indicates moderate variable in HPI there are some differences in well-being among the BRICS countries. The Jarque Bera probability is 0.24 which is greater than 0.05 mean there is no significant deviation from normality. Regarding the mean of life expectancy 70.32 indicate high degree of longevity across BRICS countries, the median 71.00 which is close to mean 70.32 indicate life expectancy is balanced distributed and does not exhibit significant skew. The standard deviation of 5.30 shows moderate variability suggest some difference in life span among the BRICS Nation. The Jarque-Bera probability is 0.08 which is close but not below 0.05, which show slight deviation from normality. In terms of subjective wellbeing, the BRICS countries reveal a moderate level, with an average score of 5.28. The median 5.14 Close to Mean 5.28 suggest evenly distributed without significant skew. Standard deviation of 0.88 Shows Low variability, which mean BRICS countries have similar level of experience Well-being. The Jarque-Bera probability shows of 0.76 which is above 0.05 means there is no deviation from normality. Finally, the average of ecological footprint of 3.25 suggest moderate level of environmental impact across BRICS countries, The median of 3.30 Close to mean 3.2 shows balanced distributed significant skew. The standard deviation of 1.40

indicate mild variability which means BRICS countries have difference in environmental impact. The Jarque-Bera probability of 0.59 is greater than 0.05 which mean no significant deviation from normality.

10. Conclusion & Suggestion:

The study concludes that Happy Planet Index (HPI) and its components across BRICS countries from 2010 to 2020 reveals significant insights into the well-being, life expectancy, and environmental impact in these nations. Overall, BRICS countries experienced growth in life expectancy from 2010 to 2020, with South Africa and India showing the most significant improvements. China had the largest increase in experienced well-being, with South Africa coming second while India and Brazil recorded a decline. Of the discussed countries, India, Brazil, and South Africa were able to reduce ecological footprints, indicating efforts to minimize environmental impacts. On the other hand, China and Russia showed increases in ecological footprint which reflect the adverse effect on the environment. However, the relationship between these components, vary significantly amongst the nations, indicating diverse development paths and challenges. Based on the regression results, Life expectancy and experienced well-being are positively correlated with HPI, while ecological footprint has a negative impact, which stresses the importance of sustainable practices. China and Russia show a strong positive relationship between life expectancy and well-being but also face significant environmental challenges. Brazil able to balances these components more effectively, while India and South Africa face unique challenges in achieving life expectancy and well-being. Adapting policies based on each BRICS nation specific challenges. Such as, focusing on emission cuts for high-footprint countries like China and Russia, and investments in health, education, and social welfare for India and South Africa. Governments should Adopt green growth strategies that prioritize resource efficiency, reduce emissions, and support the circular economy through investments in renewables, sustainable agriculture, and green technology. Policymakers should integrate sustainability indicators like the HPI into national development plan to ensure that economic progress aligns with environmental goals.

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