

The Agriculture Production Growth : Brics

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ABSTRACT: Human security is a basic integral aspect of human development. Human development can be interpreted as a process of enlargement and expansion of choices and options that man uses in order to have a decent standard of living and quality of life, the right on education and economic security are the most critical elements in this process. Since 1990, the system of measurement of progress of human development in the world using the so-called Human Development Index (HDI) / Human Development Index has been applied/. It is a composite index that simultaneously expresses the life-span, duration of schooling, as well as revenues. Beside the HD index, in this paper indicators of GDP particularly real GDP expressed using constant prices method and GDP (PPP) expressed through parity of purchasing power. While a single, real GDP, provides a better indication of the international purchasing power of a country, other GDP (PPP) provides a better indication of the level of total national wealth. The main objective of this work is first to show the relationship between the growth rate of real GDP, GDP (PPP) and the value of HDI for the BRICS countries in the period from 2000 to 2013; and secondly, to show the trend of growth of agricultural production in the BRICS countries in the respective period. The paper points out that there is a positive correlation in the movement of HD indices and growth rates of GDP (PPP) in China and India in the observed period. On the other hand, for Brazil, Russia and South Africa, HD index increases while the rate of GDP (PPP) oscillates around 3%, 3.5% and 0.66% respectively. Also, agriculture production index (API) values in the observed period in all countries show positive growth trend, which also indicates the positive correlation between this indicator and the growth of HD indices and growth rates of GDP (PPP) .The significant fluctuations in the rate of real GDP for all countries BRICS has been noted, which is attributed to the impact of the global economic crisis.

Keywords: Agriculture, Real GDP, GDP (PPP), HD index, BRICS, Economic crisis, Standard of living

Date of Submission: 27-05-2019

Date of acceptance:10-06-2019

I. INTRODUCTION

BRICS the acronym for association of five major national economies: Brazil, Russia, India, China and South Africa. South Africa became the member of the association in 2010. All the members of the BRICS belong to the group of developed or industrial countries. According to the data of the IMF in 2014(www.imf.org), in five countries of BRICS there is a population of almost 3 billion, or totally 40% of the total world population. According to the same source, their mutual nominal GDP is \$16.039 billion, which represents the equivalent of 20% of the world's GDP.

The first formal summit of this group was held i Ekaterinburg (Russia) in 2009, when the issue of creating of modern international monetary system was raised, taking in consideration of world's economic crisis. The second summit was held the next year in Brazil, when the significance of cooperation in the field of energetics and food safety was emphasized. On the third summit held on China in April 2011, the group got its present title-BRICS. In April 2012, the fourth summit was held in New Delhi, where the establishing of alternative development bank was discussed. During the fifth summit, held in Durban (South Africa) 2013, the members of the group agreed to establish a global financial institutions by the end of 2014, which would parry the domination of Western institutions (IMF and World Bank). At the summit of BRICS July 2014, the agreement was signed to create a "New Development Bank" with \$ 100 billion in capital. `

The basic aims of this paper is: firstly, to present relation between Human development index (HDI), the gross domestic rate of growth and agriculture production indices in the BRICS countries, and secondly, to analyse the trend of agriculture production growth in the BRICS countries in the period 2000-2013.

II. METHODOLOGY

The remainder of this paper was presents the relationship HDI, GDP growth rates and API for BRICS countries (Brazil, Russia, India, China, South Africa) for the period from 2000 to 2013 according to data from the official report (Human Development Report 2014), which was conducted by UNDP, official data from the website of the International Monetary Fund (IMF) on growth rates, as well as data from the website FAO (www.fao.org) of the values of the API for the same period. Before focusing on the individual analysis of each BRICS member state, it is worth noting that, in addition to HDI, we used GDP values expressed in two ways. One unit of GDP is expressed using constant price at the current exchange rate valid at the international foreign

exchange market. This method is referred to as real GDP. This method also can offer a better indication of the international purchasing power of a country. Another value of GDP (PPP) is expressed using purchasing power parity, i.e. reflects the effective purchasing power of the average producer or consumer in an economy. The value of GDP based on purchasing power parity (PPP) which represents a comparative course in relation to the selected standard (usually in US dollars). This method better reflects the level of living standards especially in less developed countries because it compensates for the weakness of local currencies in international markets. Also, this method provides a better indication of the level of total national wealth. The official nominal value of API are taken from the tables classified by FAO, are for the needs of graphic representation and comparison with other indicators expressed as ratios of net agricultural production, i.e. they are shared by 100.

III. THE RESULTS AND DISCUSSIONS

Since 2012 Brazil is the seventh economy in the world and the largest country by surface and population in Latin America and the Caribbean. Based on the criteria for classification and value of HDI from 1980 Brazil belonged to the group with low levels of HD, but during the last decade of the last century HD value was increased up to medium level. In the period from 2000 until today, Brazil has poised for continued growth in the value of HD and is categorized as a high level. Although Brazil has had a steady increase in HDI, in the period from 2008 to 2013 it recorded a decrease of 4 places in the HDI ranking because it was overtaken by other countries so that it is currently ranked as the 80th.

In the last two decades of the last century, Brazil had had a lot of discrepancies when the growth rate was in question. Half of the period was negative or close to zero while the other half recorded positive rates in the range of 4-8 cyclically in order record the modest 1.3 in the beginning of the new millennium compared to previous highs. In the period from 2000 to 2013, growth rates had been being positive. In 2009 it recorded negative growth rates caused by the global economic crisis. The economy of Brazil has been significantly slowed since 2010 and in 2011 to the year 2012 where GDP growth of 7.5%, decreased to 2.7% in 2011 and reached 0.9% in 2012. Similarly the rate of GDP expressed in purchasing power parity (PPP) in the reporting period was approximately 3% with almost negligible deviations and even during the economic crisis of 2009. This indicates that the standard of living of the population in the reporting period was balanced and that short-term crisis has not significantly affected the same.

With over 65 million hectares of arable land in 2010 Brazil occupies third place on the list of the largest exporters of agricultural products in the world, just behind the USA and the European Union. [1] With a share of over 30% of the working population in agriculture Brazil eventually became the world's largest exporter of coffee, soybeans, beef, sugar cane and frozen chickens. [2] A large part of Brazil is covered by a very fertile soil, where they can get two or three harvests per year. Currently, only 4% of the total area is being utilized but no country of the world has such a possibility of such a large increase in farmland as Brazil. Half of Brazil is covered by forest and each year the vast areas are being cut that are converted to agricultural land.

During the last two decades of the 20th century, Brazil records a doubling of yields per hectare. This is a result of improved inputs (seeds, fertilizers, machinery), public policies that encourage exports, reducing the tax burden, low real exchange rate that allow price stability (in 1999), the increased demand of Asian countries, growth in productivity and reduction of trade barriers. [3]

Table 1: Human Development Index, BDP (%), BDP (PPP), API (2000-2013): Brazil

Indicator	Year 2000	2005	2008	2010	2011	2012	2013
HDI	0.682	0.705	0.731	0.739	0.740	0.742	0.744
GDP u %	4.31	3.16	5.17	7.53	2.73	1.03	2.49
GDP (PPP) u %	3.14	2.97	3.01	3.07	3.03	2.97	2.96
Index of growth of net agricultural production	0.765	0.993	1.163	1.227	1.285	1.267	1.350

Source: Human Development Report 2014; www.imf.org; www.fao.org

The following is a graphical representation of the data by age from the table that visually depicts the correlation between HDI growth, real GDP, GDP (PPP) and API for the reference period.

Figure 1. Human Development Index, BDP (%), BDP (PPP), API-NPIN (2000-2013): Brazil (HDI – Human Development Index; BDP u % - GDP, constant prices percent change; BDP (PPP) – GDP, based on PPP share of world total, percent; API-NPIN, Agriculture Production Indices – Nett Production Index Number)

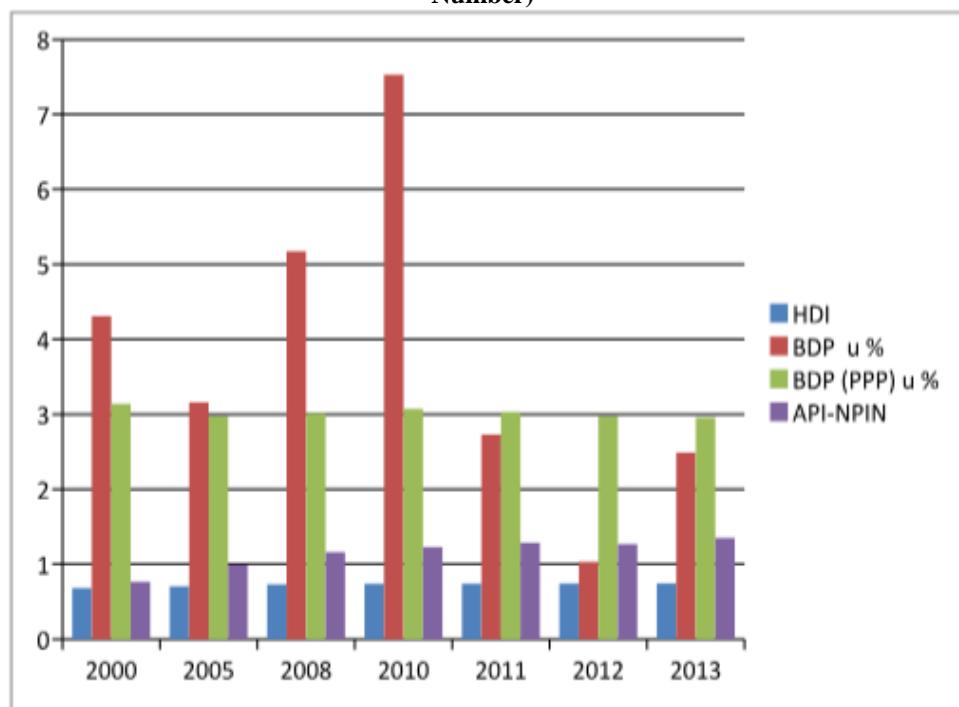
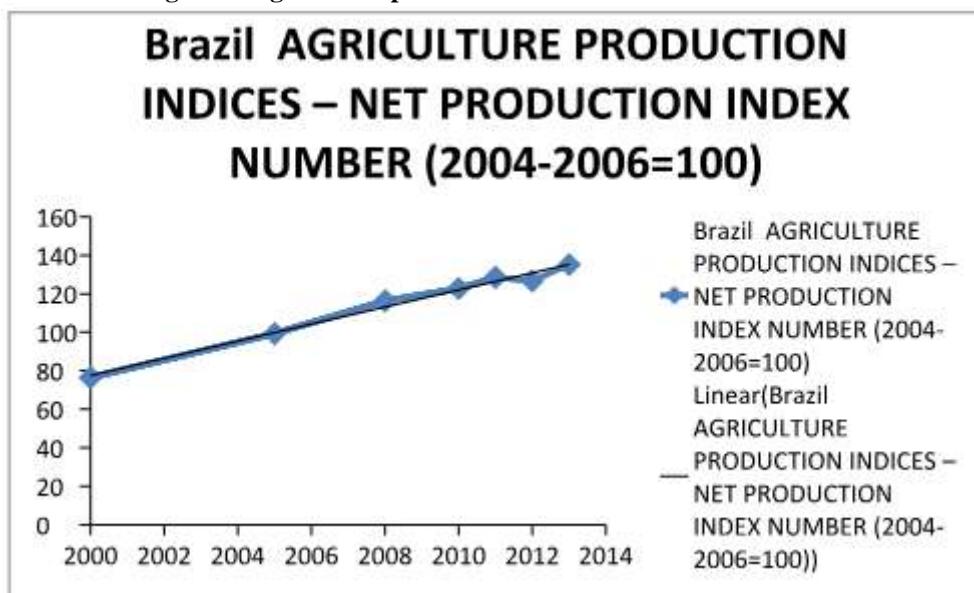


Figure 2. Agriculture production indices and trend line: Brazil



The Russian economy is in approximate stagnation, with a continued reduction in domestic demand it leads to an increase of only 0.8% in the first half of 2014, similar to that of 0.9% in 2013.

Based on the criteria for classification and value of HDI since 1990, Russia is in the group with high levels of HDI. In the reporting period to the present day Russia records an increase in the value of HD and is ranked near the border with a very high level of HD. Also Russia in the period from 2008 to 2013 had retained its place in the HDI rankings and is on the 57 place.

Until 1993 in Russia there had been no data on the rate of growth. From 1993 until 1998 the growth rate in Russia had been negative with the exception of 1997 when it had been positive and amounted to 1.4%. In the period from 2000 to 2013, the rate of growth in Russia had been consistently positive. However, what can be seen in the diagram is that the rate of nominal GDP had been steadily decreasing for the whole observed period.

In 2009 it recorded a negative rate, even significantly high (- 7.8%), probably caused by the global economic crisis. After the economic crisis, Russia's economy has slowed significantly since 2010 and 2012 to 2013 where GDP growth of 4.5%, decreased to 3.4% in 2012 and reached the minimum value of the positive during being measured, ie 1.3% in 2013. which is even less than the period of 1997. GDP values expressed on the basis of purchasing power parity (PPP) were also positive and had a balanced level. They moved an average of 3.5% and the economic crisis had not had a strong influence on the values.

With a total area of over 17 million square kilometres, Russia is the largest country in the world. Russia covers about 3/4 of the territory of the former Soviet Union. After its breakup in 1991, there were around 10 years of decline. After that, the Russian agriculture has been beginning to show signs of improvement, due to organizational and technological modernization. Northern areas concentrate mainly on livestock and the southern parts and western Siberia produce grain. Restructuring of former state farm was quite a slow process. Private farms and small farms make up about 50% of agricultural production. Bearing in mind that the non-agricultural sector grew faster after the collapse of the Soviet Union, the share of agriculture in total GDP in Russia has decreased from 14.3% in 1991 to 4% in 2011. The agricultural sector accounts for about 9% of total employment in 2010. [4]

After deciding on the one-year moratorium on food imports from the European Union, the USA and Canada (07.08.2014.) Russia has been busily preparing its agro complex –for the proclaimed goal - the production of sufficient quantities of food for their own needs - especially meat. [5]

Table 2: Human Development Index, BDP (%), BDP (PPP)i API (2000-2013): Russia

Indicator	Year	2000	2005	2008	2010	2011	2012	2013
HDI		0.717	0.750	0.770	0.773	0.775	0.777	0.778
GDP u %		10.05	6.39	5.25	4.50	4.30	3.40	1.30
GDP (PPP) u %		3.15	3.50	3.78	3.47	3.48	3.49	3.42
Index of growth of net agricultural production		0.888	0.993	1.113	1.022	1.176	1.141	1.221

Source: Human Development Report 2014; www.imf.org; www.fao.org

Figure 3: Human Development Index, BDP (%), BDP (PPP) i API-NPIN (2000-2013): Russia (HDI – Human Development Index; BDP u % - GDP, constant prices percent change; BDP (PPP) – GDP, based on PPP share of world total, percent; API-NPIN, Agriculture Production Indices – Nett Production Index Number)

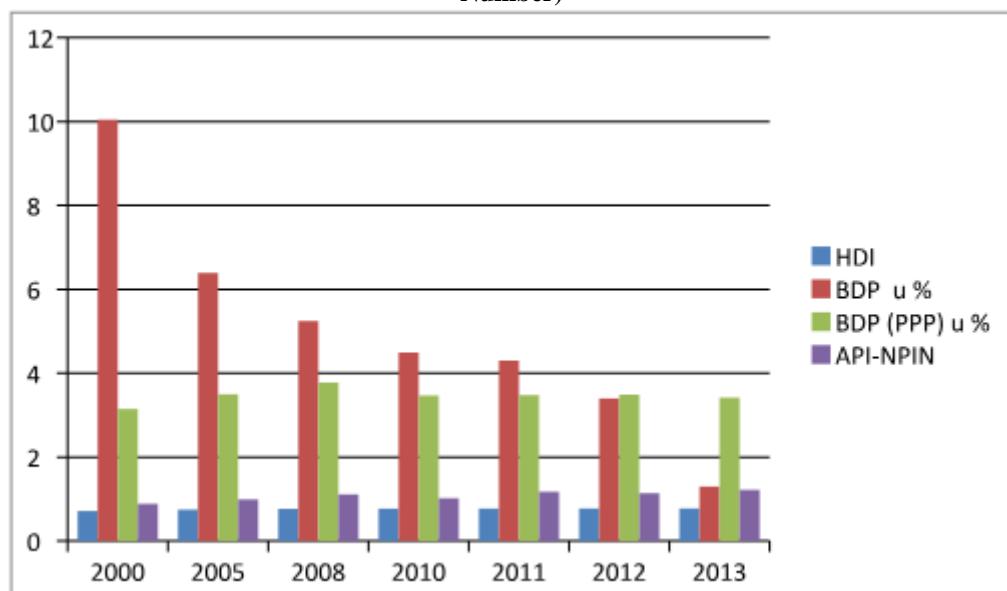
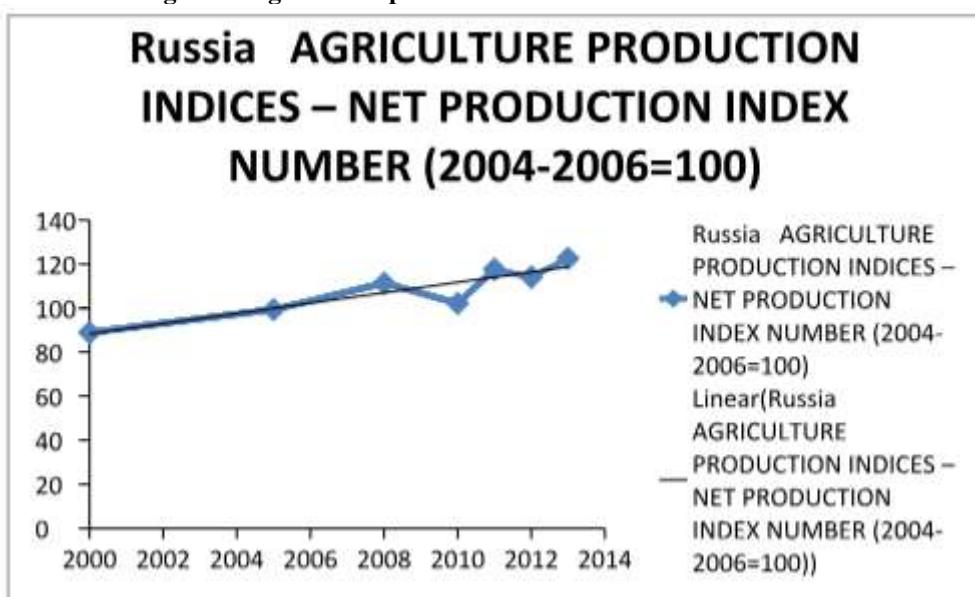


Figure 4. Agriculture production indices and trend line: Russia



With 1.2 billion people, India is the fourth largest world economy. Recent growth and development of India has been considered as one of the most significant achievements of our time.

Based on the criteria for classification and value of HDI almost until 2005, India was among the group with low HDI level, however in 2005 and later HD value had been increased up to the middle level. In the reporting period from 1980 until today, India has been poised for continued growth in the value of HD and it is likely to be expected that in the near future it will be in the category with a high level. Also, India is in the period from 2008 to 2013 had recorded an increase of one place in the HD rankings and is ranked as 135.

In the last two decades of the last century, India had had a permanent positive growth rate in the range of a minimum of 3.6% in 1980 to a maximum of 8.8% in 1999. With the exception of 1991 when the growth rate was "only" 1.1% it can be said that there had been no drastic deviations. At the beginning of the new millennium the trend of positive growth rate had been set in a range from a minimum of 3.8% in 2000 to a maximum of 10.3% in 2010. This suggests that the very average growth rate for this period is greater than the average from the period of the last two decades of the last century. In the period from 2000 to 2013, growth rates were positive and unbalanced with extreme deviations. In 2008 it recorded a growth rate of 3.9% which is likely caused by the global economic crisis. After the economic crisis, India's economy has been significantly accelerated to 2010 but from 2011 to the year 2012 GDP growth of 10.3%, decreased to 6.6% in 2011 and reached 4.7% in 2012. In contrast to the above-mentioned values of the nominal GDP and their imbalances, the value of GDP expressed in purchasing power parity (PPP) for the entire observed period showed growth even in times of economic crisis, when real GDP had a significant decline. This indicates that the standard of living has constantly been better every year.

While India has had impressive economic growth over the past decade, the rate of malnutrition has declined very little; In fact, the rate of malnutrition in India is two to seven times higher than those in other countries and BRICS. Consequently it may be important to consider some aspects of the agricultural sector, which would give a clearer picture of the reasons for high rates of malnutrition in India.

Today, India ranks as second worldwide in farm output. Agriculture and allied sectors like forestry and fishery make 13.7% of GDP in 2013, and even about 50% of the total workforce. [6] [7] The economic contribution of agriculture to the GDP of India is steadily declining despite the global economic growth of the country. Also agriculture is the widest demographic economic sector and plays a significant role in the overall socio - economic fabric of India.

Since 2011, India has a large and diverse agricultural sector, calculated on the average to 16% of GDP and about 10% of total exports. Arable land of India has an area of 159.7 million hectares (394.6 million acres), which is the second largest in the world after the United States. Its gross area of irrigated crops is 82.6 million hectares, the largest in the world. India is among the top three global producers of many crops, including wheat, rice, pulses, cotton, peanuts, fruits and vegetables. At the global level, in 2011, India had the largest herd of bison and livestock, was the greatest milk producer, and was one of the largest and fastest growing industries in poultry. [8]

India in 2010 ranked among the five largest manufacturers in the world for over 80% of agricultural products, including many so-called cash crops such as coffee and cotton. India in 2011 was also one of the five largest world producers of livestock and poultry meat, with one of the fastest growth rates. [9]

In a report in 2008 it is claimed that the population in India is growing faster than its ability to produce its needs in rice and wheat. [10] Other recent studies claim that India could easily feed its growing population, plus it could produce wheat and rice for the export to the global market only if it manages to reduce the degree of perishability of food, if it improves its infrastructure and raises the productivity of agricultural production at least to the level that the other developing countries such as Brazil and China have. [11]

In fiscal year ending June (2011), with the monsoon season, Indian agriculture achieved record production of all times by 85.9 million tonnes of wheat, which was an increase of 6.4% compared to 2010. It was also when rice yield in India reached a new record of 95.3 million tons, which is an increase of 7% compared to 2010. [12] The lens and many other food productions had also increased compared to the previous year. Farmers in India also produced about 71kg of wheat and 80 kg of rice per capita in 2011. Since then, the production of rice per capita each year in India has been higher than the consumption of rice per capita each year in Japan. [13]

In the last 60 years India has shown steady annual average increase in yield in kilograms per hectare for various agricultural products. This increase resulted mainly from the period of the so-called Indian Green Revolution, when the road infrastructure and electricity production were improved, new knowledge applied and reforms carried out. [14] Despite these recent developments, agriculture in India has the potential for even greater productivity and overall gains as yields in India are still only at 30% to 60% of the best sustainable yields, which are realized in field crops in both industrialized and in developing countries. In addition, post-harvest losses due to poor infrastructure and poorly organized retail network, are quite large and that India is among the countries with the largest losses of food in the world. [15]

Table 3: Human Development Index, BDP (%), BDP (PPP) i API (2000-2013): India

Indicator	Year	2000	2005	2008	2010	2011	2012	2013
HDI		0.483	0.527	0.554	0.570	0.581	0.583	0.586
GDP u %		3.84	9.28	3.89	10.26	6.64	4.74	5.02
GDP (PPP) u %		4.42	5.05	5.50	6.27	6.43	6.53	6.64
Index of growth of net agricultural production		0.906	0.999	1.168	1.245	1.325	1.131	1.398

Source: Human Development Report 2014; www.imf.org; www.fao.org

Figure 5: Human Development Index, BDP (%), BDP (PPP) i API-NPIN (2000-2013): India (HDI – Human Development Index; BDP u % - GDP, constant prices percent change; BDP (PPP) – GDP, based on PPP share of world total, percent; API-NPIN, Agriculture Production Indices – Nett Production Index Number)

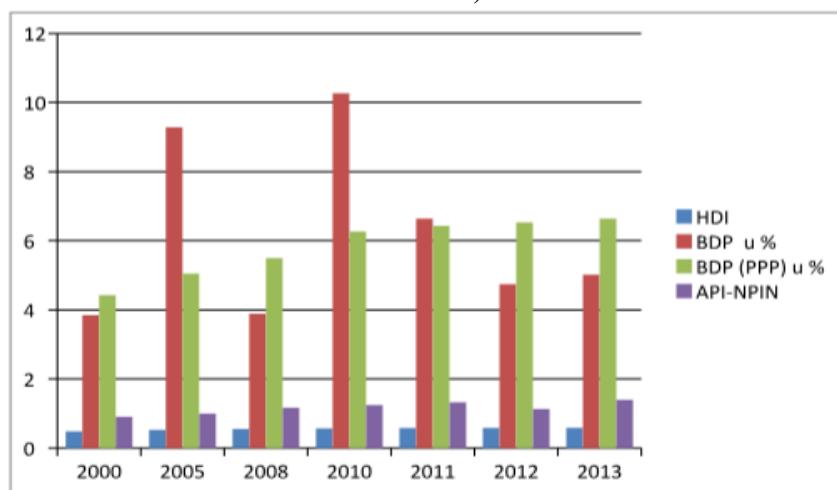
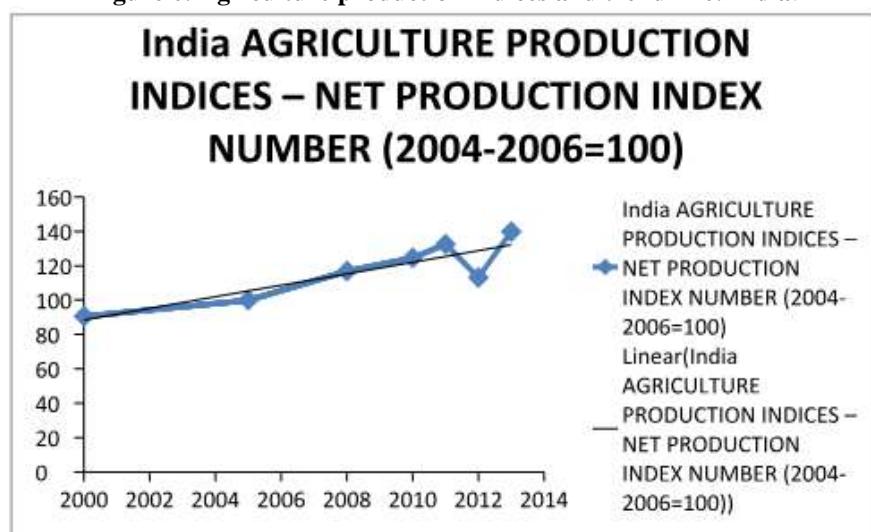


Figure 6. Agriculture production indices and trend line: India.



With a population of 1.3 billion people, China has recently become the second largest economy and is increasingly playing an important and influential role in the global economy.

Based on the criteria for classification and value of HDI until 1990, China was among the group with low values of HD, however, during the period from 2000 to 2008 HD value has been increased up to the middle level. In the period from 2010 until today, China has been poised for continued growth in the value of HD and is categorized as a high level. Also, China is in the period from 2008 to 2013 recorded progress for 10 places in the HD rankings and ranks 93rd.

In the last two decades of the last century, China had mostly double-digit growth rates up to the impressive 15% in 1984. On average for periods of 3-4 years growth rates were balanced and there were no drastic deviations. For the observed time period there were not recorded negative growth rates even during the global economic crisis. In the period from 2000 to 2007, the growth rate had been rising from 8.4% to 14.2% while in a period of economic crisis it reduced to 9.2% in 2009. After the economic crisis, China's economy has been experiencing an increase immediately in 2010 - 10.4% while in the last two years it has been stabilized to an average of 7.7%. What is striking in China and as can be seen in the chart is the increase in GDP based on purchasing power parity (PPP) and the level of the same that reached 15.85% in 2013. This clearly indicates that China is focusing more on improving the quality of human life and to increase of the living standards.

Agriculture in China is an important economic sector which employs over 300,000,000 farmers. China is the first country in agricultural production in the world, with the most important products as rice, wheat, potatoes, sorghum, peanuts, tea, millet, barley, cotton, linen, pork and fish.

Although China's agricultural production is the largest in the world, only 15% of its land is arable. China's arable land, which makes up 10% of the total arable land in the world, feeds 20% of the world population. Of these 1,400,000 km² of arable land, only about 1.2% (116.580 km²) can be continuously processed, and 525,800 sq. km is irrigated. The country is divided into approximately 200 households out of which each has an average of only 0.65 hectares (1.6 acres).

Limited agricultural areas in China have caused chronic food shortages. While the productivity of agricultural land has grown over time, attempts to be expanded to the west and north have had limited success because the local ground is exposed drier and colder climate than the east. Since the 50s the agricultural surfaces has been under the pressure of the need for the land to be used for industrial plants and urban settlements. [16]

Table 4: Human Development Index, BDP (%), BDP (PPP) i API (2000-2013): China

Indicator	Year 2000	2005	2008	2010	2011	2012	2013
HDI	0.591	0.645	0.682	0.701	0.710	0.715	0.719
GDP u %	8.40	11.30	9.63	10.41	9.30	7.65	7.70
GDP (PPP) u %	7.43	9.77	12.04	13.82	14.53	15.18	15.84
Index of growth of net agricultural production	0.831	1.002	1.139	1.193	1.229	1.271	1.288

Source: Human Development Report 2014; www.imf.org; www.fao.org

The following is a graphical representation of the data by age from the table that visually depicts the correlation between HDI growth, real GDP, GDP (PPP) and API for the reference period.

Figure 7: Human Development Index, BDP (%) , BDP (PPP) i API-NPIN (2000-2013): China (HDI – Human Development Index; BDP u % - GDP, constant prices percent change; BDP (PPP) – GDP, based on PPP share of world total, percent; API-NPIN, Agriculture Production Indices – Nett Production Index Number)

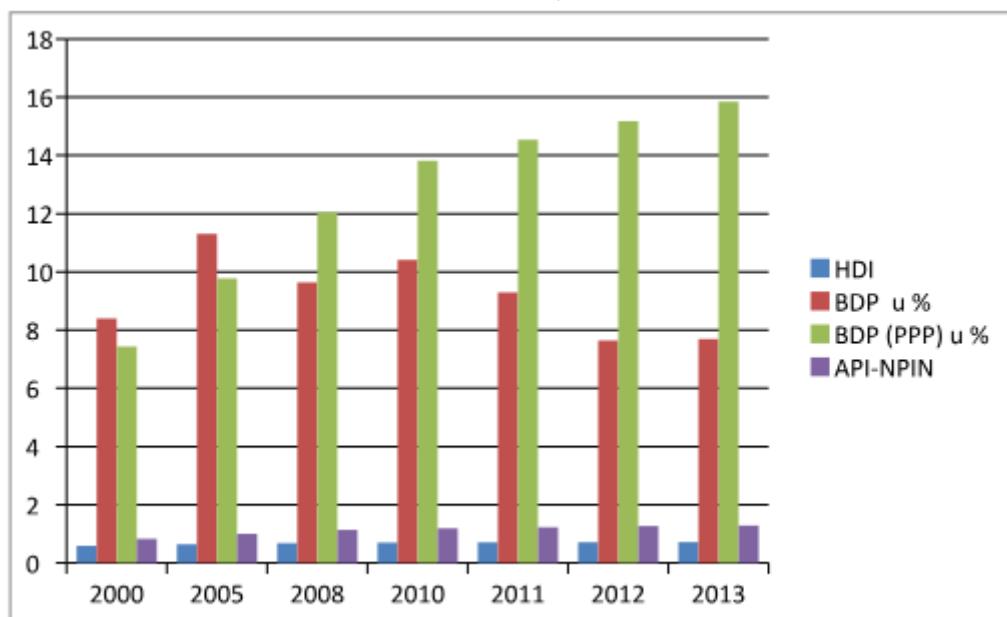
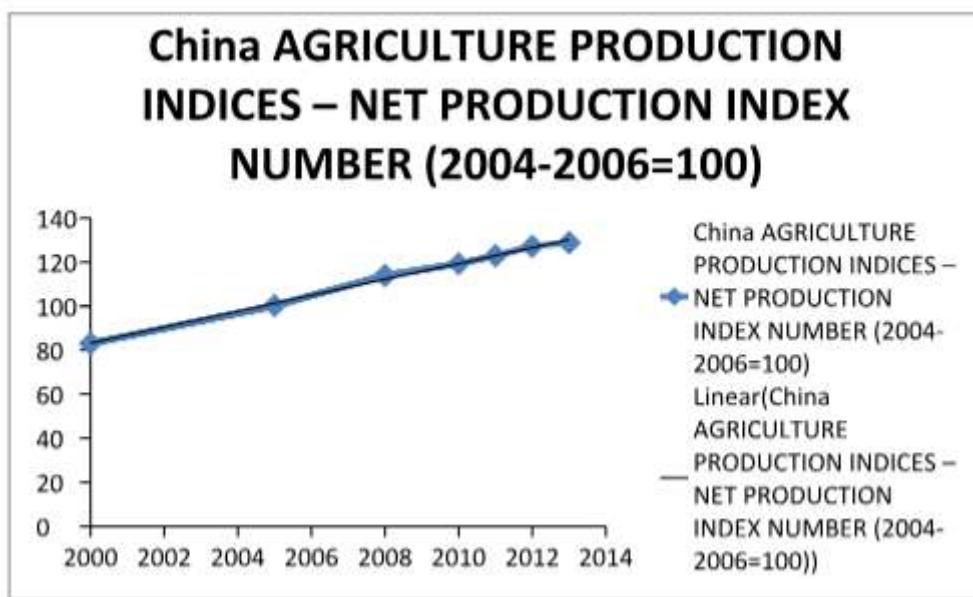


Figure 8. Agriculture production indices and trend line: China



South Africa continues to be particularly dual economy with one of the highest rates of inequality in the world. Moreover, it extends inequality and exclusion today also.

Based on the criteria for classification and value of HDI in the period under examination South Africa belongs to the group of countries with medium level of HD. In the reporting period from 1980 to the present day South Africa, there has been an increase in the value of HD and it is likely to be expected that in the near future it would be placed in the category with a high level. Also in South Africa during the period from 2008 to 2013 had recorded an increase of two places in the rankings HD and is ranked 119.

In the reporting period, South Africa had had an extremely variable rate with a lot of negative amounts up to 1993. From 1993 until today, the growth rate has been positive with the exception of 2009 when it recorded negative growth rates in the amount of -1.5% which was likely caused by the global economic crisis. After the economic crisis, the economy of South Africa has slowed significantly since 2010 and 2012 to 2013 where GDP growth of 3.1%, decreased to 2.5% in 2012 and reached 1.9% in 2013. Although economic growth is positive yet realistic GDP was experiencing declining values especially in 2012 and 2013. However, the values of GDP expressed in purchasing power parity (PPP), which are relatively low and range for the entire period observed below 1%, do not have any drastic deviations as is the case with the values of real GDP. Also, these values indicate a low standard of living.

GDP growth in South Africa has been in average 3.2% per year since 1995, or 1.6% per capita. The reason for this was insufficient power of absorption of the wave of new entrants in the labour market as a result of the dissolution of apartheid, and this has led to high rates of

unemployment. Potential for growth has been delayed due to industrial concentration and lack of skills, labour market rigidities, chronically low savings and low rates of investment, as well as physical barriers from the former system of apartheid. (World Bank 2014 overview).

Agriculture in South Africa is not the dominant branch. Agriculture employs about 10% of the population and contributes about 2.6% to the GDP of the country. [17] Due to the dry climate, the soil is infertile, so only 13.5% of the area can be used for growing crops, and only 3% of the land can be considered highly fertile. [18] Also, due to the different climate, different sorts of crops are grown. In Western Province grapes is grown and wine produced, and in recent years SAR by this production has broken through to fifth place in the world. Over the last few years, the state has carried out several reforms of the agricultural sector, such as agrarian reform and the deregulation of the market for agricultural products. South African government has set the redistribution of about 30% of arable land to the black farmers by 2014. [19]

Table 5: Human Development Index, BDP (%), BDP (PPP)i API (2000-2013): South Africa

Indicator	Year 2000	2005	2008	2010	2011	2012	2013
HDI	0.628	0.608	0.623	0.638	0.646	0.654	0.658
GDP u %	4.16	5.28	3.62	3.14	3.60	2.47	1.89
GDP (PPP) u %	0.68	0.68	0.69	0.66	0.66	0.66	0.65
Index of growth of net agricultural production	0.966	1.022	1.188	1.180	1.168	1.199	1.215

Source: Human Development Report 2014; www.imf.org; www.fao.org

Figure 9: Human Development Index, BDP (%), BDP (PPP) i API-NPIN (2000-2013): South Africa (HDI – Human Development Index; BDP u % - GDP, constant prices percent change; BDP (PPP) – GDP, based on PPP share of world total, percent; API-NPIN, Agriculture Production Indices – Nett Production Index Number)

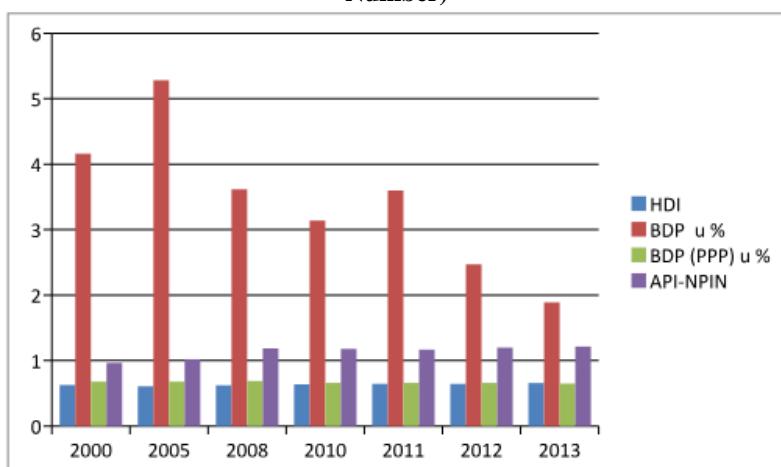
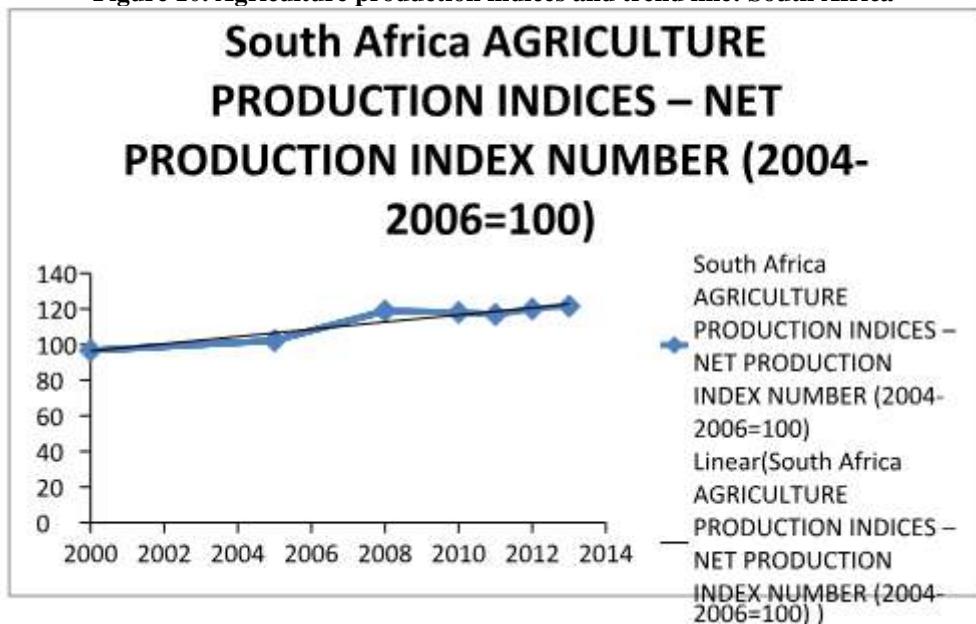


Figure 10. Agriculture production indices and trend line: South Africa

IV. CONCLUSION

The main objective of this paper is to show the relationship between the growth rate of real GDP, GDP (PPP) and the amount of HDI for the BRICS countries in the period from 2000 to 2013. In addition, the aim of this paper is the presentation of the trend of growth of agricultural production in the BRICS countries in that period.

In addition to the definition used in this paper indicators to GDP were used and real GDP is expressed using constant prices and GDP (PPP) is expressed by using purchasing power parity. While an individual, real GDP, provides a better indication of the international purchasing power of a country, other GDP (PPP) provides a better indication of the level of total national wealth.

The paper points out that there is a positive correlation in the movement of HD indices and growth rates of GDP (PPP) in China and India in the period. On the other hand, for Brazil, Russia and South Africa, HD index increases with the rate of GDP (PPP) oscillations around 3%, 3.5% and 0.66% respectively.

There were significant fluctuations noted in the rate of real GDP for all countries of BRICS, which is attributed to the impact of the global economic crisis. Global financial crisis of 2008 had a significant impact on the movement of the observed indicators.

For all the countries of BRICS analysis showed that GDP that is BDP expressed in percentage of GDP at constant prices showed certain fluctuations and had particularly significant reductions in the period of occurrence of the economic crisis. In contrast, the level of GDP which is expressed on the basis of purchasing power parity (PPP) had not shown drastic deviations, on the contrary, in most cases it had a balanced level and even during the period of the economic crisis, there were no significant reductions or deviations.

If we take into consideration the growth rate of GDP expressed on the basis of purchasing power parity (PPP) and HDI values, then we can say that there is a positive correlation between these two indicators for the reporting period. This observation leads to the conclusion that all members of the BRICS, direct their economic development more towards ensuring the quality of life of people and not at the pace of growth per se.

In addition, the result of this work is the determination of the trend of increasing growth of agricultural production in the BRICS countries in the observed period.

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Ahmet Halilagić" The Agriculture Production Growth : Brics" International Journal of Humanities and Social Science Invention (IJHSSI), vol. 08, no. 6, 2019, pp.19-29