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THE ROLE OF AGRICULTURE IN THE NATIONAL ECONOMY OF CHINA AND INDIA – A LONGTERM ANALYSIS

Key words: agriculture, developing countries, development economics

ABSTRACT. The purpose of the article is to determine the position of agriculture in the economy of India and China and verify the extent to which the downward trend in agriculture is noticeable in these countries over 25 years (1990-2015). Developing countries represent a significant group among all countries in the world. India and China are especially important in this context for they are the biggest world developing economies which have made huge progress in the field of social and economic transition since the beginning of the 90s. Based on collected material, models of regression were developed, showing dependencies between the dependent variable (GDP per capita) and significant independent variables, including the contribution of agriculture to GDP. It results, from the conducted analyses, that the greatest positive effect on GDP per capita is exerted by an influx and outflow of foreign direct investment and share of services in GDP. With progressing economic growth, a marked downward trend is also evident for the share of agriculture in the generation of GDP. Nevertheless, the rate and scale of this phenomenon varies greatly in the investigated countries. In the case of China, stable per capita GDP growth can be observed with around a 10% share of agriculture in GDP, while, in the case of India, a 20% share. This may mean that such a share of agriculture is already weakening GDP growth to a small extent, which is more dependent on this level than on other factors.

INTRODUCTION

Developing countries continue to constitute an important group worldwide. It is in these countries that we observe the largest number of barriers for socio-economic development; as a result, their populations experience limited opportunities to reach a higher standard of living [Klima 2016, Sapa 2012]. In terms of dynamic economic development recorded in recent years, two countries are particularly focused on: China and India, as leaders among the greatest developing economies worldwide¹. Although they are still facing huge challenges

¹ According to the UN World Economic Situation and Prospects report (WESP) countries are grouped into three categories: developed economies, economies in the period of transformation and developing economies. China and India were included in the group of developing countries.

– both social and economic² [Deszczyński 2010, Oziewicz 2006], these countries have recently made considerable progress in the process of their transformation [Nawrot 2014].

In the economies of developing countries, a special role is played by agriculture, typically accounting for a relatively high share in the employment structure and generating a high percentage of GDP in comparison to developed economies [Khalid et al. 2018]. Along with progressing economic development, we may observe a downward trend in the importance of agriculture in the national economy [Kamińska-Mrówczyńska 2008, Tomczak 2000, Kiryluk-Dryjska 2014]. The rate of changes, in this respect, varies and depends on structural and historical conditions as well as the adopted economic policy.

The aim of this paper is to identify factors determining economic growth in India and China, as well as verify to what extent the downward trend in the importance of agriculture is manifested in the economies of these countries. Analysis of factors influencing economic growth of these countries may provide certain indications for other developing countries having similar structural characteristics, in which the economic growth rate is nevertheless much lower.

MATERIAL AND METHODS

Linear regression was the main research method adopted in this study. For each of the two analyzed countries, several regression models were developed, indicating factors determining GDP per capita in the years 1990-2015. Using regression equations, the direction and strength of regression dependencies were analyzed. Factors determining an increase in GDP were identified using correlation analysis. Regression models were developed for standardized variables, whereby correlation coefficients with GDP index per capita were greater than 0.5. Only statistically significant correlations at $p < 0.05$ were included in the analyses. The standardization of variables in regression models made it possible to compare the strength of their effect on GDP per capita in both countries.

Regression equations were constructed both for China and India in relation to the following variables: foreign direct investment (FDI) influx, foreign direct investment (FDI) outflow³, the contribution of services to GDP, the contribution of agriculture to GDP⁴, export/GDP, import/GDP and the foreign trade balance (FT/GDP ratio)⁵. Additionally,

² A major problem in both countries is connected with the dynamically increasing population, in both cases being comparable and amounting to approx. 1.3 billion people, which is also directly connected with a high percentage of individuals experiencing poverty.

³ Foreign Direct Investments – Theory J.H. Dunning – research on the impact of FDI on the state of the country's economy. Based on their propensity to export or receive FDI, the author has identified five stages of development [Pach 2001].

⁴ The contribution of services to GDP – currently there is a process of growing importance of services in production. The contribution of agriculture to GDP – agriculture forms the basis of the economic structure of most developing countries [Kłosiński 2008].

⁵ Export/GDP, import/GDP, foreign trade balance (FT/GDP ratio), imports of telecommunication services/ total imports of services, the CR index, Terms of Trade index – Adam Smith was one of the first to present the thesis about the importance of trade in economic growth. He expressed his views in the work "Research on the nature and causes of the wealth of nations" (1776) [Godłów-Legiędz 2016].

in the case of India, the correlation coefficient was greater than 0.5 at the variable share of imports of telecommunication services/ total imports of services, unemployment⁶ and CR⁷, while, in the case of China, it was the Terms of Trade index.

Material for analyses primarily comprised data available at the World Bank, UNCTAD and FAO websites. Moreover, information contained in official documents, legal acts and on Internet websites of respective ministries of both analyzed countries was also included in the analyses.

RESULTS

The analysis showed that China has made greater progress than India in terms of increase in GDP per capita. At present, in the case of the former country, a high 25-fold increase in GDP per capita over the years of analysis may be observed, at a relatively stable growth rate. In turn, in the case of India, a 3-fold increase in GDP per capita was recorded, with its value in 2015 amounting to USD 1,709 per capita (Figure 1).

Correlation analysis showed that a greater number of factors analyzed in this study influenced GDP per capita in India (Table 2 and 3). In the case of China, the increase in GDP per capita was most strongly positively correlated with the influx and outflow of foreign direct investments. In recent years, for China, a growing share not only in the acquisition of FDI, but also in the investment of capital abroad may be observed. China makes foreign investments, since it provides the country with an opportunity to purchase various natural

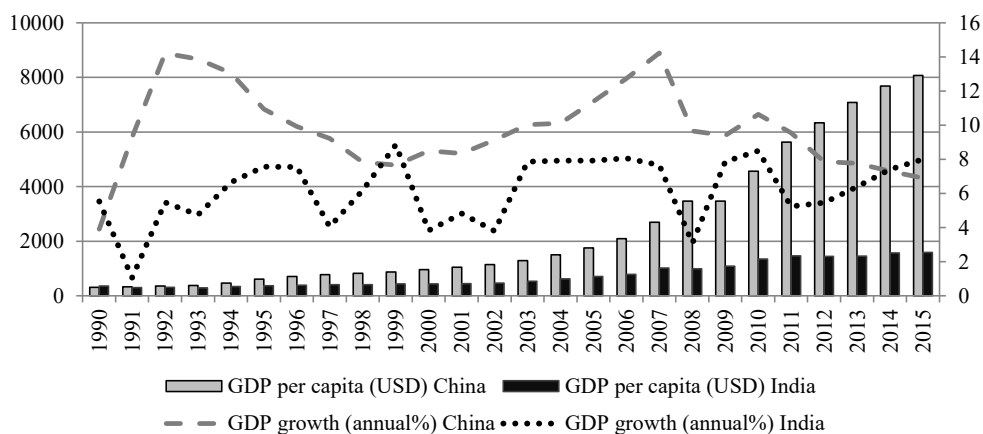


Figure 1. GDP per capita (USD) and its growth rate (%) in China and India in the years 1990-2015

Source: own study based on World Bank, UNCTADstat and FAO data

⁶ Unemployment – one of the important factors of production (A. Smith) is work alongside capital and land – By limiting unemployment (increasing the level of employment), GDP growth is possible [Godłów-Legiędź 2016].

⁷ The Coverage Ratio – a measure determining the international competitive position. If its value exceeds 100 it is said that a given country has a relative competitive advantage over its partners [Pawlak, Poczta 2008].

Table 1. Correlation coefficients for selected standardized economic measures and GDP per capita of China and results of linear regression

No.	Factor	Correlation	R ²	A index	Absolute term
1.	FDI influx	0.965	0.931	0.903	0.029
2.	FDI outflow	0.966	0.932	0.892	0.224
3.	Contribution of services to GDP	0.884	0.781	0.874	0.019
4.	Contribution of agriculture to GDP	-0.824	0.679	-0.812	0.842
5.	Export/GDP	0.880	0.775	0.816	0.048
6.	Import/GDP	0.903	0.814	0.849	0.034
7.	Foreign trade balance/GDP	0.676	0.457	0.695	0.123
8.	Terms of Trade index	-0.765	0.585	-0.741	0.827

Source: own study based on the World Bank, UNCTADstat and FAO data

Table 2. Correlation coefficients for selected standardized economic measures and GDP per capita in India and results of linear regression

No.	Factor	Correlation	R ²	A index	Absolute term
1.	FDI influx	0.984	0.962	1.000	0.031
2.	FDI outflow	0.756	0.57	0.791	0.107
3.	Contribution of services to GDP	0.936	0.876	0.964	0.016
4.	Contribution of agriculture to GDP	-0.880	0.914	-0.038	1.025
5.	Export/GDP	0.553	0.305	0.898	0.079
6.	Import/GDP	0.948	0.898	0.824	0.016
7.	FDI influx	-0.952	0.905	-0.898	0.894
8.	Contribution of import of telecommunication services	0.920	0.846	0.897	0.026
9.	Unemployment	-0.544	0.295	-0.536	0.75
10.	CR	-0.519	0.269	-0.551	0.751

Source: own study based on the World Bank, UNCTADstat and FAO data

resources and strategic assets. In the case of India, a greater role than in China is played by the influx of foreign direct investments and the contribution of services to GDP.

It needs to be stressed that India is an ideal location for investment capital, which is directly connected with its increasing contribution of services in GDP. Moreover, it is a pioneer in the sector of services, i.e. offshoring, IT services and R&D services [Zaremba 2015]. Causes for this situation may be found e.g. in state policy related to the fundamental restructuring of the fiscal policy and processes connected with the opening of that country to foreign capital [Zaremba 2015]. Moreover, India is one of the greatest importers of raw mineral materials, primarily oil and precious stones, as well as electrical machinery.

An increase in the contribution of services to GDP per capita is also evident in China, where the process of opening up to the world began earlier. Fundamental reforms, already in the early 1980's, outlined the directions for development. The structure of the economy was altered. Year-by-year, China is being transformed from an industrial country to a service provider. Both the contribution of services to GDP and the share of services in the employment structure gradually increased in the analyzed years.

The conducted analysis also showed that apart from factors having an advantageous effect on GDP per capita, there are some, with an increased impact resulting in an adverse influence on the level of GDP per capita. In the case of India, the strongest negative effect was observed for the factor related to the foreign trade balance/GDP. Its negative effect on GDP per capita is connected with the negative balance of trade in India. Since 1990, that country has been implementing the policy of opening up to the world, which has resulted in a significant increase in imports. However, to strengthen the economy, it would be recommended to aim at exports dominating over imports.

Additionally, the analysis showed that, both in India and China, the contribution of agriculture to GDP in the GDP structure was a factor having a negative impact on the economy.

Figures 2 and 3 present dependencies between GDP per capita (USD) and the contribution of agriculture to GDP in actual values (%). To present the dependencies more comprehensively, the power regression model was developed, which was a better fit compared to the linear model. It may be observed that the lower the contribution of agriculture to GDP per capita, the higher the level of GDP per capita. This dependence is parabolic. In the case of China, the dynamic growth of GDP per capita was observed only when the contribution of agriculture to GDP is below 15%. At 10%, a certain stabilization of the contribution of agriculture in GDP may be observed. The value of this index does not change dynamically, while, at the same time, intensive increments in GDP per capita may be observed. In the case of India, the dependence between the contribution of agriculture in GDP and GDP per capita is also negative. In that country, the contribution of agriculture to GDP in the national economy is higher than in the case of China, and over the

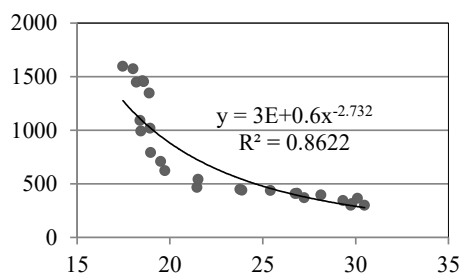


Figure 2. GDP per capita and the contribution of agriculture to GDP in India

Source: own study based on the World Bank, UNCTAD stat and FAO data

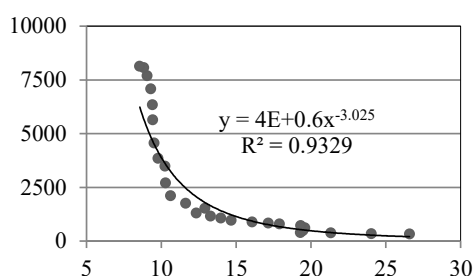


Figure 3. GDP per capita and the contribution of agriculture to GDP in China

Source: own study based on the World Bank, UNCTAD stat and FAO data

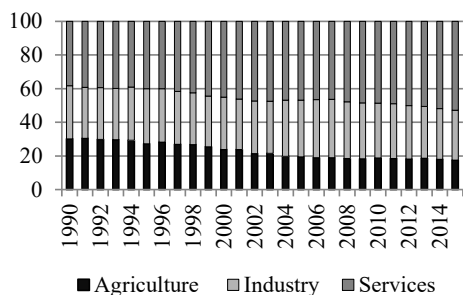


Figure 4. GDP structure in India in the years 1990-2015 (% GDP)

Source: own study based on the World Bank, UNCTADstat and FAO data

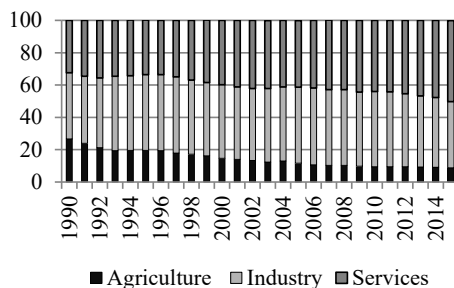


Figure 5. GDP structure in China in the years 1990- 2015 (% GDP)

Source: own study based on the World Bank, UNCTADstat and FAO data

entire analyzed period it did not drop below 17%. The dynamic increase in GDP in India took place only when the contribution of agriculture to GDP attained values below 20%. In comparison to developed economies this share is high. Moreover, in India, agriculture employed over 43% of the labor force and despite an upward trend its productivity remains low (Table 3).

Table 3. Selected indexes determining the development of agriculture in India and China in the years 1990-2015

List	Country	1990	1995	2000	2005	2010	2015
The share of the employed in agriculture [%]	China	55.3	48.3	42.6	33.5	24.5	18.4
	India	63.6	61.4	60.3	54.7	48.8	43.4
Agriculture [% GDP]	China	26.6	19.6	14.7	11.6	9.5	8.8
	India	30.1	27.2	23.9	19.5	18.9	17.5
Rural population [% total population]	China	73.6	69.0	64.1	57.5	50.8	44.4
	India	74.5	73.4	72.3	70.8	69.1	67.3
Plant production per 1 person employed in agriculture [t/person]	China	4.5	4.5	4.3	4.6	4.6	5.7
	India	3.8	4.0	4.4	3.3	2.9	3.7
Plant production per 1 ha [t/ha]	China	0.6	0.7	0.7	0.7	0.9	1.0
	India	0.7	0.9	1.0	1.0	1.2	1.2
Animal production per 1 person employed in agriculture [LU/person]	China	35.4	46.2	51.6	60.8	61.5	59.2
	India	5.1	4.6	4.5	3.3	2.5	3.0
Animal production per 1 ha [LU/ha]	China	5.0	7.00	8.00	9.6	11.4	10.0
	India	2.7	2.9	3.2	4.1	4.8	5.2

Source: own study based on the World Bank, UNCTADstat and FAO data

The situation in Chinese agriculture is better, as evidenced both by the share in the structure of employment and indexes of productivity (Table 3). Both the share of employed in agriculture and the contribution of agriculture to GDP in China, compared to 1990, decreased almost 3-fold (Figure 5, Table 3). In turn, the value of agricultural production increased both per 1 person employed in agriculture and per 1 ha UAA. Nevertheless, that country suffers from the problem of farmland shortage, which is directly related to growing population size, and thus the resulting development of infrastructure and building development [Cieślak 2012].

The continuous, relatively low productivity of agriculture in the analyzed countries is evidenced by high malnutrition rates. It results from various studies [Kłosiński 2008, Cieślak 2012, Zaremba 2015] that in India, where over 67% of the population inhabits rural areas, malnutrition affects approx. 15% of the population, while in China it is 9%. Causes for underdevelopment in agriculture may be found e.g. in the implemented policy, underdeveloped infrastructure, climate factors, inflation or a lack of appropriate technologies and machinery [Pacho 2009].

CONCLUDING REMARKS

To sum up, it needs to be stated that both India and China are developing countries with huge development potential. The conducted analysis showed that many factors similarly affect the level of GDP per capita. In both countries, the influx of foreign direct investments and the increasing role of services are key factors promoting development. In both countries, the dependence between a decrease in agriculture and an increase in GDP per capita has been confirmed.

Kazimierz Kłosiński [2008] and Katarzyna Nawrot [2014] were of the opinion that, despite social and economic transformations, agriculture remains a sector weakening the economy in India and China. It results from the conducted analysis that, between these countries, significant differences are evident in the dynamics and scale of this phenomenon. In the Chinese economy certain stabilization is observed in the contribution of agriculture to GDP, amounting to approx. 10%. The value of this index no longer decreases significantly, while simultaneously dynamic increases are found in GDP per capita. This may mean that such a contribution of agriculture to GDP in China, to a limited degree, slows the increase in GDP, which, at this level, depends, to a greater extent, on other factors. In the case of India, despite a perceptible reduction, the contribution of agriculture to GDP remains high. Nevertheless, higher increments in GDP per capita are still observed after the threshold of a 20% share of agriculture in GDP is exceeded. However, it seems evident that a further decrease in the role of agriculture will have a positive impact on economic growth.

In the Chinese economy, changes in agriculture are also more dynamic than in India, as manifested both in employment indexes, agricultural production and productivity.

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ZNACZENIE ROLNICTWA W GOSPODARCE NARODOWEJ CHIN I INDII – ANALIZA DŁUGOOKRESOWA

Słowa kluczowe: rolnictwo, kraje rozwijające się, ekonomia rozwoju

ABSTRAKT

Celem artykułu jest określenie pozycji rolnictwa w gospodarce Indii i Chin oraz weryfikacja na ile tendencja spadku znaczenia rolnictwa jest zauważalna w tych krajach w ciągu 25 lat (1990-2015). Kraje rozwijające się stanowią znaczącą grupę wśród wszystkich krajów na świecie. Na szczególną uwagę w tym kontekście zasługują Indie i Chiny – dwie największe światowe gospodarki rozwijające się, które od początku lat 90. XX wieku dokonały znaczącego progressu w dziedzinie przemian społecznych, jak i gospodarczych. Na podstawie zebranego materiału utworzono modele regresji, wykazujące zależności pomiędzy zmienną zależną PKB *per capita* a istotnymi zmiennymi niezależnymi, w tym również z udziałem rolnictwa w PKB. Z przeprowadzonych badań wynika, że największy pozytywny wpływ na PKB *per capita* ma napływ i odpływ bezpośrednich inwestycji zagranicznych oraz udział usług w PKB. Wraz ze wzrostem gospodarczym widoczna jest również wyraźna tendencja spadku udziału rolnictwa w wytwarzaniu PKB. Tempo i skala tego zjawiska jest jednak w badanych krajach różna. W przypadku Chin stabilny wzrost PKB *per capita* można zauważyć przy około 10-procentowym udziale rolnictwa w PKB, natomiast w przypadku Indii – przy 20-procentowym. Może to oznaczać, że taki udział rolnictwa w małym stopniu osłabia już wzrost PKB, zależnego na tym poziomie w większym stopniu od innych czynników.

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