



ПРОМЫШЛЕННОЕ РАЗВИТИЕ И БЛАГОСОСТОЯНИЕ СТРАНЫ: ПРИМЕР БЕЛАРУСИ

К. В. ШЕСТАКОВА¹⁾, Е. М. КАРПЕНКО¹⁾

¹⁾*Белорусский государственный университет, пр. Независимости, 4, 220030, г. Минск, Беларусь*

Анализируется взаимосвязь индустриализации страны и ее экономического благосостояния. На основе эконометрических моделей проведена оценка влияния в Республике Беларусь промышленного сектора на показатели, отражающие благосостояние страны на различных уровнях (скорректированный чистый национальный доход на душу населения, уровень бедности населения, средняя годовая заработная плата). Сделан вывод о значимой роли промышленного сектора Республики Беларусь в формировании ее благосостояния.

Ключевые слова: индустриализация; промышленное развитие; экономический рост; национальное богатство; экономическое благосостояние страны; промышленная политика.

INDUSTRIAL DEVELOPMENT AND COUNTRY'S WELFARE: CASE OF BELARUS

K. V. SHESTAKOVA^a, E. M. KARPENKA^b

^a*Belarusian State University, 4 Niezaliežnasci Avenue, Minsk 220030, Belarus*

Corresponding author: K. V. Shestakova (shestakovak@bsu.by)

The authors analyse the relationship between the country's industrialisation and wealth. Based on econometric models the assessment of influence of industrial sector on indicators of country's welfare at various levels (which are adjusted net national income per capita, poverty level, average annual salary) was carried out. The conclusion about the significant role of the industrial sector of the Republic of Belarus in the formation of its welfare was made.

Keywords: industrialisation; industrial development; economic growth; national prosperity; welfare; industrial policy.

Historically, economic development was closely associated with industrial development because it was concerned with the industrial revolution. Therefore, industrialisation has been the main driver of economic growth and many economists assign great importance to this component. A. Hirschman [1], P. Rosenstein-Rodan [2],

Образец цитирования:

Шестакова КВ, Карпенко ЕМ. Промышленное развитие и благосостояние страны: пример Беларуси. *Журнал Белорусского государственного университета. Экономика.* 2021;1:94–99 (на англ.).

For citation:

Shestakova KV, Karpenka EM. Industrial development and country's welfare: case of Belarus. *Journal of the Belarusian State University. Economics.* 2021;1:94–99.

Авторы:

Кристина Владиславовна Шестакова – кандидат экономических наук; доцент кафедры международного менеджмента экономического факультета.

Елена Михайловна Карпенко – доктор экономических наук, профессор; заведующий кафедрой международного менеджмента экономического факультета.

Authors:

Kristina V. Shestakova, PhD (economics); associate professor at the international management department, faculty of economics.

shestakovak@bsu.by

Elena M. Karpenka, doctor of science (economics), full professor; head of the international management department, faculty of economics.

karpenkaem@bsu.by





A. Lewis [3], M. Cimoli [4], M. P. Timmer [5] and some others stated that a crucial element in economic development is transformational a predominantly rural economy into a «modern» economy with a thriving industrial sector. Industrialisation leads to economic structure and country's infrastructure upgrading, supports the achievements of socio-economic and environmental objective: jobs creation, «green» production, innovation stimulation. Industrialisation is recognised as the core force of «economic miracles» of Japan, Korea, China, Ireland, Singapore and some others. The hypothesis about a special role of industrial sector in economic development is also confirmed by the fact that it demonstrated higher productivity in comparison with other sectors (agriculture and service) across different income groups (fig. 1).

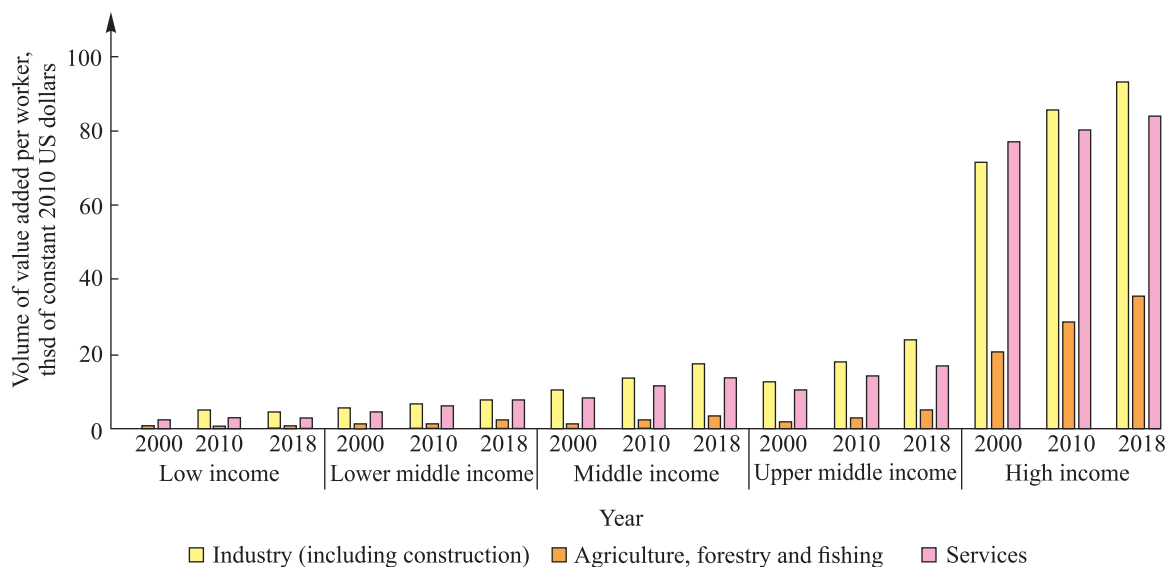


Fig. 1. Volume of value added per worker in sectors of economy across income groups (the authors' own research results based on World Bank's world development indicators (WDI)¹)

United Nations Industrial Development Organisation (UNIDO) has long been a major mover and initiator for industrial development (the Lima declaration on industrial development and cooperation of the 2nd General conference of the UNIDO (1975), the Lima declaration on towards inclusive and sustainable industrial development at the 15th session of the General conference of the UNIDO in Lima (2013)). No country, except a few resource rich ones like Australia and Canada, has attained prosperity without a period of sustained industrialisation. UNIDO sets up the key targets for it in terms of socio-economic and environmentally related aspects. Recently, many scientific studies have investigated the linkage between national prosperity and countries industrial development² [6; 7]. They examine the effect of industrialisation on economic development, unemployment and inequality. The analysis found evidence that industry-driven economies grow significantly faster than others did. However, for Belarus such studies have not been carried out. Thus, this study explores the hypothesis of the impact of industrial development on welfare in Belarus.

In 2019 Belarusian industrial sector included 16 106 enterprises of different size and types of ownership that is 0.83 % more than in 2015. It generated 25.7 % of GDP and 93.7 % of country's export. In 2019 in industrial sector were employed 23.6 % of total country's employment³. The manufacture value added (MVA) per capita in current dollars has doubled in comparison with 1990 (fig. 2) and has exceeded 1423 US dollars despite of the periods of falling (1990–2000, 2015–2017).

Total contribution of Belarus in world MVA in 2017 amounts 0.09 % (fig. 3). In should be noted that the share of Belarus in world MVA is lower that its' share in world population. That fact may indicate about insufficient development of manufacturing or ineffective usage of its potential.

For the purpose of study of the relationship between industrialisation and country's wealth a range of indicators are suggested which measure country's welfare and could be largely viewed as endogenous (it is shown in the table). This indicators the potential effect of raising prosperity on different level of national economy in the process of industrial development.

¹World development indicators [Electronic resource]. URL: <https://databank.worldbank.org/source/world-development-indicators> (date of access: 17.01.2021).

²Industrialisation as the driver of sustained prosperity / ed. by Li Yong. Vienna : United Nations Industrial Development Organisation, 2020. 178 p.

³Промышленность Республики Беларусь. Минск : Нац. стат. комитет Респ. Беларусь, 2016. 196 с.

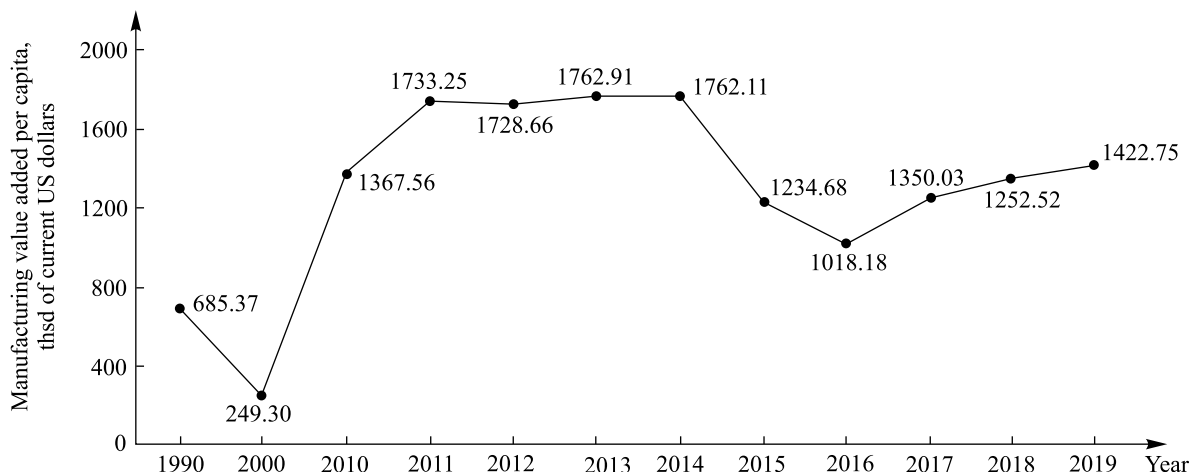


Fig. 2. Manufacturing value added per capita (the authors' own research result based on UNIDO statistics⁴)

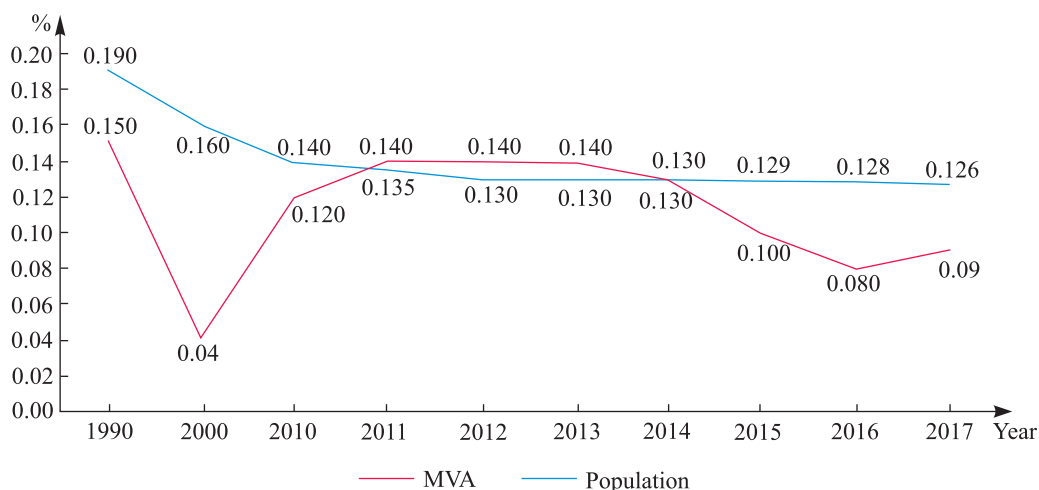


Fig. 3. Belarus' share in world MVA and world population (the authors' own research result based on World Bank's WDI⁵)

Country's wealth measurement indicators

Indicator	Economic concept	Level of country's wealth measurement
Adjusted net national income (ANNI) per capita, constant 2010 US dollars	Measure of the available income that can be consumed or invested to increase the nation's future consumption.	Nation
Poverty rate (Pov), %	Measure number of people whose income falls below the poverty line, identify level of life.	Population
Average annual salaries (ASal), constant 2010 US dollars	The main source of individual prosperity formation.	Employees

⁴UNIDO statistics data portal [Electronic resource]. URL: <https://stat.unido.org/> (date of access: 17.01.2021).

⁵World development indicators [Electronic resource]. URL: <https://databank.worldbank.org/source/world-development-indicators> (date of access: 17.01.2021).



The empirical analysis accounts for a wide range of exogenous confounding. Based on the definition of the term «industrialisation» given by S. Kuznets (1973) («industrialisation is a structural transformation process involving changes in the sectorial composition of the economy» [8]) exogenous variables are chosen and divided into two groups of factors:

- quantitative estimation which includes value added produced by agriculture (AgrVA), industry (IndVA) and service (SerVA), evaluated in constant 2010 US dollars;
- qualitative estimation which includes productivity in agriculture (AgrPr), industry (IndPr) and service (SerPr), evaluated in constant 2010 US dollars.

The assumption that industrialisation influence country's wealth on different levels is investigated by providing econometric analyses and baseline regressions estimation.

Industrialisation and national wealth

This study seeks to examine the effect of industrialisation on the evolution of adjusted net national income per capita in the process of development. Data, which is the basis for this analysis, was conducted between 1992 and 2018. The analysis focuses on estimation the influence of value added per capita created by agriculture, industry, service, and productivity per worker in agriculture, industry and service on adjusted net national income per capita.

Model «Adjusted net national income – value added» provides estimation of the relationship between adjusted net national income per capita and sectorial value added. The model is significant. All estimations are reliable.

$$\text{ANNI} = -1547.1 + 4.118\text{AgrVA} + 1.017\text{IndVA} + 0.952\text{SerVA}, R^2 = 0.996$$

(-6.78)
(4.74)
(3.99)
(4.74)

According to the regression the main factor that influence on adjusted net national income is value added per capita produced in agriculture. The effect of industrialisation on national welfare is positive and is estimated as a 1000 US dollars increase in industry value added leads to 1017 US dollars increase in national income. It is less in comparison with agriculture as the amount of the consumption of the fixed capital in industry is greater.

Specific analyses of relationship between MVA per capita and adjusted net national income per capita shows strong positive correlation (fig. 4): 1 % change in MVA per capita leads to the 3.95 % increase in national income. It is due to this manufacturing is widely considered to be an economy's «engine of growth» in Belarus.

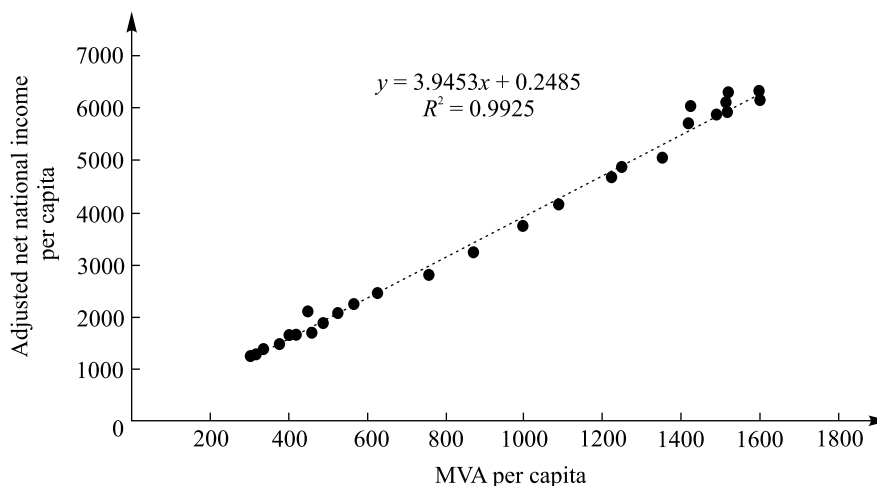


Fig. 4. The relationship between MVA per capita and adjusted net national income per capita for Belarus, constant 2010 US dollars (the authors' own research result based on UNIDO statistics⁶)

⁶UNIDO statistics data portal [Electronic resource]. URL: <https://stat.unido.org/> (date of access: 17.01.2021).



Model «Adjusted net national income – productivity» focuses on the potential impact of productivity in different sectors of national economy on national income formation. The baseline regression for analyses is shown in (1).

$$\text{ANNI} = -1393.18 + 0.152\text{AgrPr} + 0.335\text{IndPr} + 0.099\text{SerPr}, R^2 = 0.994 \quad (1)$$

(–4.1269) (3.652) (5.090) (0.97)

The exogenous variable «productivity in service sector» is statistically insignificant ($t_{\text{observed}} = 0.97$ is less $t_{\text{nor}} = 1.725$). So, after the model improvement it has been transformed to (2).

$$\text{ANNI} = -1081.47 + 0.153\text{AgrPr} + 0.382\text{IndPr}, R^2 = 0.994 \quad (2)$$

(–10.1269) (3.68) (13.28)

In the case of adjusted net national income formation, the industry has strong impact: 100 US dollars increase in industry productivity per capita rises the adjusted net national income per capita by 38.2 US dollars. Therefore, it proves the hypothesis that industrialisation has great impact on the national prosperity in Belarus.

Industrialisation and population wealth

The analysis focuses on the potential impact of industrialisation on poverty reduction. To assess the effects of industrialisation on poverty in the long-run, the analysis is restricted to the 2000–2018 period, since data on poverty rate in Belarus is only available in the post-2000 period.

Model «Poverty rate – value added» investigates the linkage between poverty rate in Belarus and value added in sector of national economy.

$$\text{Pov} = 47.6 - 0.0806\text{AgrVA} - 0.01516\text{IndVA} + 0.01318\text{SerVA}, R^2 = 0.834$$

(4.79) (–1.168) (–1.53) (1.022)

Coefficients for agriculture value-added and service value added are not statistical significant. These variables have been excluded from the model. The new model describing the relationship between industry value-added and poverty rate is show in (3):

$$\text{Pov} = 42.27 - 0.01724\text{IndVA}, R^2 = 0.818 \quad (3)$$

(11.84) (–8.74)

The model estimates impact of industry value added to poverty rate reduction as positive and significant. The increase in industry value added in 100 US dollars will decrease the poverty rate by 1.72 %.

Model «Poverty rate – productivity» indicates the relationship between poverty rate and productivity in different sectors of economy:

$$\text{Pov} = 29.049 - 0.00063\text{AgrPr} - 0.0473\text{IndPr} - 0.0486\text{SerPr}, R^2 = 0.816$$

(1.39) (–0.295) (–2.182) (0.833)

Similarly to the model «Poverty rate – value added», the coefficients for productivity per worker in agriculture and service are not statistical significant and these exogenous variable should be removed from the model. After the model improvement it has been transformed to (4).

$$\text{Pov} = 46.33 - 0.00303\text{IndPr}, R^2 = 0.8075 \quad (4)$$

(11.379) (–8.689)

The resulting model is representative and states that 100 US dollars change in productivity per worker in industry causes 0.3 % change in poverty rate. Therefore, industrial sector in Belarus is substantial for reduction poverty and social welfare increase. Industry has the potential to create jobs for low-qualified labour force.

Industrialisation and employment wealth

The study further explores the effect of industrialisation on the change income of population employed in economy. As a depended factor suggested average annual salary in constant 2010 US dollars. The analyses conducts data between 1992 and 2018.

Model «Salary – value added» links average annual salaries and value-added per capita produced in sectors of national economy.

$$\text{ASal} = -3270.1 + 7.7028\text{AgrVA} - 2.863\text{IndVA} + 2.047\text{SerVA}, R^2 = 0.893$$

(–9.66) (5.97) (–7.5858) (6.873)

According to the model, industry sector gives negative impact to the change of average annual salaries. This fact could be explained by the prevalence of activities with low value-added in the structure of industrial sector.

Model «Salary – productivity» clears relationship between average annual salary and productivity.

$$\text{ASal} = -4650.07 + 0.4871\text{AgrPr} - 0.6139\text{IndPr} + 0.9246\text{SerPr}, R^2 = 0.7937$$

(–5.017) (4.27) (–3.94) (3.282)

There is a clear link between productivity per worker in the main sectors of the economy and change of average annual salary. The model indicates indirect relationship between production per worker in industry sector: 100 US dollars raise in productivity per worker in industry causes 61.39 US dollars decrease in average annual salary.

The highly significant negative correlation between average annual salary and productivity in industry per worker could be the result of disbalance between the growth rate in salaries and growth rate in productivity per worker in industry. Negative relationship between average annual salaries and industry value-added and industry productivity shows that industrialisation is a process that should involve structural transformation not only of the economy, but also within industry itself and the manufacturing sector in particular. It should lead to technological transformation and upgrading and reduce the imbalances between changes in average salaries and the growth rate of value added and productivity in industry sector.

Therefore, the survey has established a direct link between industrialisation and overall economic prosperity growth in Belarus. It approves the proposed hypothesis about influence of industrial development into prosperity and welfare growth in Belarus.

The outcomes of this research for Belarus show that industrialisation processes need to be managed and initiated by government to make sure that national wealth are achieved at all levels and no parts of society within a country are left behind the process of sustainable economic development. Successful industrialisation is a process of finding the appropriate industrial policy. So, inclusive and efficient industrial policy should be suggested as a tool for managing national prosperity.

References

1. Hirschman AO. *Strategy of economic development*. New Haven: Yale University Press; 1958. 230 p.
2. Rosenshein-Rodan PN. Problems of industrialisation of Eastern and South-Eastern Europe. *Economic Journal*. 1943; 53(210/211):202–211. DOI: 10.2307/2226317.
3. Lewis WA. Economic development with unlimited supplies of labour. *Manchester School*. 1954;22(2):139–191. DOI: 10.1111/j.1467-9957.1954.tb00021.x.
4. Cimoli M, Dosi G, Stiglitz JE, editors. *Industrial policy and development. The political economy of capabilities accumulation*. Oxford: Oxford University Press; 2009. 575 p. DOI: 10.1093/acprof:oso/9780199235261.001.0001.
5. Timmer MP, Szirmai A. Productivity growth in Asian manufacturing: the structural bonus hypothesis examined. *Structural Change and Economic Dynamics*. 2000;11(4):371–392. DOI: 10.1016/S0954-349X(00)00023-0.
6. Kaldor N. *Strategic factors in economic development*. Ithaca: New York State School of Industrial and Labour Relations; 1967. 83 p.
7. Reinert E. *How rich countries got rich and why poor countries stay poor*. London: Constable & Robinson; 2007. 365 p.
8. Kuznets S. Modern economic growth: findings and reflections. *American Economic Review*. 1973;63(3):247–258.

Received by editorial board 03.03.2021.