

ANALYSIS OF THE STRUCTURE OF FOREIGN TRADE IN GOODS BY TENOR OF TECHNOLOGY, THE CASE OF ODESSA REGION, UKRAINE

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Abstract: *The analysis of gross regional product of Odessa region (Ukraine) for 2007–2014 is made by current and fixed prices, the structure of the region's foreign trade is studied by amount, tenor of technology and selected commodity codes. Peculiarities in the dynamics of change in the export-import ratio are revealed for the whole nomenclature of goods and for products manufactured in industries classified in 3rd, 4th and 5th tenor of technology. Measures to intensify investment- and innovation-based development of the regional economy are proposed, for industry optimization and effective restructuring of the regional economy and foreign trade in industrial goods.*

Keywords: *globalization, foreign trade, structural change in exports and imports, economic restructuring, investment- and innovation-based development, tenor of technology, export-import ratio, regional economy.*

Problem setting. The global economy at the current phase of its development features globalization challenges, intensified transformation of knowledge, advanced R&D and technologies in products and services with high added value, the striving to gain competitive advantages at global markets, the enhancing competition at country and company level and the increasing scopes of international trade in goods.

The abovementioned raises the importance of methodological elaborations and improvements for analyzing export capacities in regions, dynamics and shares of exports and imports of goods by type and tenor of technology (TT), import substitution to attain positive trade balance, and use of these methodologies in studies of foreign economic activities in regions and their contribution in the international trade of the respective countries.

Literature review. Scopes and problems of foreign trade in high tech products have been subject to comprehensive studies by Ukrainian researchers. It a latest one [1] it is argued that innovation and investment policy needs to focus on the model of "leading development", whereas the enhancement of the effectiveness of foreign trade transactions in

Ukraine is conditional on structural transformations in the economy, which, apart from legal, organizational and institutional framework, would require adequate amount of investment.

Analysis of the Ukrainian foreign trade, made in [2], reveals low competitiveness of the Ukrainian manufacturers at global markets, which prevents Ukraine from being an equal and fair partner in global trade. Also, the goods that are highly demanded at external markets, such as selected categories of goods manufactured in the metallurgy sector, fail to conform to the international standards. The structure of economy and high tech exports in Ukraine and Serbia in comparison with other countries is studied in [3]. Structural analysis of the Ukrainian exports in 2007–2011 is made by TT. It is shown that elaboration and implementation of strategies focused at building and development of regional innovation clusters should be an important step aiming to intensify structural change in the economy and the industry of transitional countries.

Objective of the article is to analyze the gross regional product (GRP) of Odessa region in 2007–2014 by current and fixed prices, to study the dynamics of change in the foreign trade in goods by TT, with defining export and import quotas and export-import ratios by TT, to compare exports in Odessa and Kharkov regions, and to formulate regional policy measures promoting the advanced structure of exports and enhancing the export capacity of the region.

Results. Odessa region is a highly developed region of Ukraine with heavy industrial and R&D capacities, effective agrarian sector, good potentials for the sustained economic growth and enhancement of living standards. The GRP in reported prices grew in 2007–2013 from 33116 million UAH to 69760 million UAH (or 2.11 times), which may seem an evidence of a positive economic trend in the region. Yet, once GRP is re-estimated in fixed prices of 2005 with use of deflation index for GRP, another trend occurs. In 2013, GRP amounted to only 23315 million UAH, being even slightly lower than in 2007 (23503.3 million UAH), which is an evidence of deep and chronic stagnation rather than stability of reproduction processes in the regional economy. Change did not occur in 2014, as GRP in Odessa region, according to our estimations, made 23641.9 million UAH in fixed prices, corresponding to the figure of 2007.

In 2013, Odessa region, with the total population of 2395.2 thousand and 5.1% of economically active population in Ukraine, accounted for 4.6% of the national GRP, which was lower than in 2010 (5.0%), and for 2.2% of industrial sales, which was lower than in 2010 (2.9%). The region has enterprises in mechanical engineering and metal work, chemical products and oil refinery, foods and beverages, consumer goods and other industries. As of 2013, the regional industry employed 94.4 thousand persons or 9% of the total regional employment, which was lower than in 2011 (106.5 thousand or 10.2%).

The best developed sector within mechanical engineering is machine-tools, with enterprises manufacturing metal cutting tools, blacksmith and press equipment, and road construction machinery. Other manufacturers in the region are instrument-making enterprises, of which the major ones are open joint stock companies “Electronmash” and “Tochmash”, factories “Kinap” and “Ukrkabel”. Although many enterprises do not work on full capacity now due to the crisis, production capacities in nearly all of them could nevertheless be preserved.

In 2013, sales of innovation products that were new for market made 551.55 million

UAH, which was 10.7% higher than in 2012 (498.13 million UAH). Yet, exports of such products made only 114.47 million UAH, which was 17.5% lower than in 2012 (158.646 million UAH).

To estimate exports and imports of the products classified in the 5th TT, 4th TT and 3rd TT, we used recommendations given in [4] on harmonization of the classification of technological capacity of commodities by OECD methodology for manufacturing with data of the Ukrainian Classification of Commodities for Foreign Trade Activities. As a result, 5th TT (the first level of technological capacity) includes the commodity groups with the following codes: 85 – Electric machines and equipment; 90 – Devices and apparatus; 30 – Pharmaceutical products; 88 – Space navigation devices; 91 – Watches; 37 – Goods for Photography and Filming; 92 – music instruments. 3rd TT includes commodities originating from the industries with medium and low technologies: basic metals and products made thereof, mineral fuels, ores, non-organic chemical products, rubber products etc.; and the commodities originating from the industries with low technologies: crops, fruits of oil plants, fats and oils, foods, alcoholic and non-alcoholic drinks, wood and products made thereof, paper, cardboard etc. The estimated data for the regional exports are shown in Table 1.

Table 1. Exports from Odessa region and structure of exports by TT

Indicator	2007	2008	2009	2010	2011	2012	2013
GRP, million UAH, current prices	33116	46994	48647	53878	61499	64743	69760
GRP share in the total, %	4.6	5.0	5.3	5.0	4,7	4.4	4.6
GRP, million UA (prices of 2005)	23503.3	25949.2	23765.0	23153.4	23137.3	22574.3	233155
Exports of goods, million USD	1098.5	2314.9	1445.2	1684.4	1541.1	1804.3	1628.4
Share of exports in the total Ukrainian exports, %	2.234	3.457	3.641	3.277	2.253	2.593	2.572
Export quota of the region, %	16.79	26.83	23.16	24.81	19.93	22.03	18.66
Exports structure by TT, %							
3rd TT	65.5	76.74	80.64	81.51	69.21	73.33	79.13
4th TT	28.30	20.69	17.09	15.63	27.48	22.16	17.07
5th TT	6.20	2.57	2.27	2.86	3.31	4.51	3.80
4th TT and 5th TT	34.5	23.26	19.36	18.49	30.79	26.67	20.87
Exports per 10.000 population, for 4th and 5th TT, USD							
4th TT	1301,5	2001,3	1032,9	1101,3	1773,2	1653,5	1160,0
5th TT	285,0	248,9	136,9	201,5	213,4	336,3	258,6
4th TT and 5th TT	1586,5	2250,2	1169,8	1302,8	1986,6	1989,8	1418,6

Source: estimated by data of the Ukrainian State Statistics Service

Basically, the analysis for 2007–2014 shows the upward tendency in exports of goods, from 1101.4 million USD in 2007 to 1628.4 million USD in 2013 (1.48 times growth), and to 1780.1 million USD in 2014. The reduction in exports in 2010 compared with 2010 was caused by the stoppage of “Lukoil – Odessa NPZ” refinery company. At the same time, the share of regional exports in the total commodity exports of Ukraine featured minor change from 2.234% in 2007 to 2.572% in 2013. In the period of financial and economic crisis (2009 and 2010), exports of goods from Odessa region fell by 1.6 and 1.37 times, respectively, in comparison with 2008. In 2013, exports from the region fell by 8.8% compared with 2012. The regional tendency follows the national one: reduction of exports from 68.8 billion USD in 2012 to 63.32 billion USD in 2013, or by 8.1%. The measure of export quota has been constantly down since 2008, being an indication of the shrinking demand for products manufactured in Odessa region and the worsening conditions for exports-related activities in the region.

The largest exports of goods in the region and their essential growth are found for the products classified in 3rd TT. In the period under study, their sales increased from 721.41 million USD in 2007 to 1288.4 million USD in 2013 (or nearly 1.79 times) in parallel with their reducing share in the total regional exports (from 20.69% to 17.07%). However, exports of the products classified in 4th TT tended to fall from 478.99 million USD in 2008 to 277.91 million USD in 2013 (1.73 fold) in parallel with their reducing share in the total regional exports from 17.0% to 15.8%. The most considerable reduction in exports of the products classified in 4th TT was recorded in time of the financial and economic crisis, in 2009 (247.04 million USD), which is 1.94 times lower than in 2008 (478.99 million USD). Yet, the share of the products classified in 4th TT in the regional exports made 17.09% in 2009, which is 3.6% lower than in the previous year.

In 3rd TT, the top position by the amount of exports is taken by the products with code 31 (plastics, polymers), and the second position – by the products with code 84 (nuclear reactors, boilers, machines). From 2007 to 2017, exports of the former group grew 1.4 times, from 237.08 million USD to 332.1 million USD, whereas exports of the latter group fell from 47.66 million USD to 43.71 million USD.

In 2013, exports of goods classified in 5th TT made 61.95 million USD, which is 1.1 times less than in 2007 (68.27 million USD). The share of high tech exports in 2013 was only 3.8% compared with 6.2% in 2007. The largest share of exports in 5th TT was accounted for by the products with code 85 (electric machinery) and code 88 (aircraft). From 2007 to 2013, exports of the former category of goods were gradually up from 40.08 million USD to 46.15 million USD, whereas exports of the latter category, consisting of the advanced high tech products, fell 1.89 times, from 11.71 million USD to 6.2 million USD. Also, large exports of products with code 90 (optical and photography devices) and code 30 (pharmaceutical products) should be mentioned.

Cumulative exports of the goods classified in 4th and 5th TT grew from 379.99 million USD in 2007 to 475.92 million USD in 2012 (1.25 times), largely due to the growth in exports classified in 4th TT. The total regional exports grew by 9.3% in 2014 compared to the previous year, and made 1780.1 million USD.

An important criterion of the established favorable conditions for foreign economic activities, of the effective export capacities and the effective measures for enhancing exports at regional or country level can be exports of goods per 10,000 of population, which is used to

measure the effectiveness of exports-related activities in a region. In Odessa region, cumulative exports of goods classified in 4th and 5th TT per 10.000 of population made 1586.5 USD in 2007, which is 1.39 times lower than in Kharkov region (2227.9 USD per 10.000 of population) [5]. This gap between Odessa and Kharkov regions increased to 2.27 times in 2013.

Imports are important as a tool for finding solutions related with restructuring of national and regional economies, through closures of outdated production facilities and reallocating resources to more effective ones, and as a factor for enhancing competitiveness and stimuli for domestic manufacturers to up-grade the quality of products. In 2007–2013, regional imports grew from 2543.9 million USD to 3438.7 million USD (1.35 times). The share of regional imports in the total Ukrainian imports changed from 4.193% in 2007 to 4.467% in 2013, with the highest share of 5.795% recorded in 2010. In 2013, regional imports fell by 866.2 million USD compared with 2012; in 2014 they made 2078.6 million USD, which is 39.5% lower than in 2013. Hence, in 2014 Odessa region had the lowest imports over the period under study, even lower than in the crisis year of 2009 with imports worth 2600.8 million USD (Table 2).

Table 2. Imports of goods in Odessa region and imports structure by TT

Indicator	2007	2008	2009	2010	2011	2012	2013
Imports of goods in the region, million USD	2543.9	4762.8	2600.8	3520.3	3145.4	4304.9	3438.7
Share of the region's imports in the total Ukrainian imports,%	4.193	5.568	5.724	5.795	3.808	5.081	4.467
Import quota of the region,%	38.793	55.195	41.669	51.846	40.681	53.134	39.400
Imports structure by TT,%							
3rd TT	1481.64	3051.45	1840.13	2595.6	2249.84	2740.99	2555.49
4th TT	857.33	1417.62	559.39	683.32	653.95	640.72	682.58
5th TT	204.93	293.73	201.29	241.38	241.6	923.19	200.62
4th TT and 5th TT	1062.26	1711.35	760.67	924.7	895.56	1563.91	883.21
Imports structure by TT,%							
3rd TT	58.24	64.07	70.75	73.73	71.53	63.67	74.32
4th TT	33.7	29.76	21.51	19.41	20.79	14.88	19.85
5th TT	8.06	6.17	7.74	6.86	7.68	21.45	5.83
4th TT and 5th TT	41,76	35,93	29,25	26,27	28,47	36,33	25,68
Imports of goods classified in 4th and 5th TT, per 10.000 of population							
4th TT	3579.5	5923.0	2339.0	2859.3	2737.9	2678.9	2849.0
5th TT	855.6	1227.2	841.6	1010.1	1011.5	3859.9	837.4
4th TT and 5th TT	4435.1	7150.2	3180.6	3869.4	3749.4	6538.8	3686.4

Source: estimated by data of the Ukrainian State Statistics Service

Annual regional imports of goods classified in 3rd TT, which made 1481.64 million USD in 2007 or 58.24 % of the total regional imports, grew only 1.72 times in 2013. Yet, their share in the imports of goods grew up to 74.32%. Imports of goods classified in 4th TT reduced from 857.33 million USD in 2007 to 682.58 million USD in 2013 (1.26 times), with their share reduced from 33.7% to 19.85%.

Of the imports classified in 4th TT, the top position by the amount of imports was with goods with code 87 (land transport vehicles, except for railway ones): 318.47 million USD in 2007; 170.77 million USD in 2012; and 157.78 million USD in 2013. The second position was with the goods with code 84 (nuclear reactors, boilers, machines): imports of these goods were gradually decreasing and made 313.81 million USD in 2007 and 230.59 million USD in 2013. The third position was with goods with code 39 (plastics, polymers), with the imports amounting to 152.41 million USD in 2007 and 142.39 million USD in 2013.

At the same time, imports of goods classified in 5th TT, which amounted to 204.93 million USD in 2007 and 200.62 million USD in 2013, underwent minor change, but the share of imports in this TT in the total imports fell from 8.06% до 5.83%. This evidences of inadequate use of the progressive mission of the imports of goods classified in 5th TT as a factor boosting the overall effectiveness of inudstiral production. In 2007, the cumulative share of imports of goods classified in 4th and 5th TT made 41.76%, being much higher than in 2013 due to reduced imports of goods classified in 4th TT.

The comparison of imports of goods per 10.000 of population in Odessa and Kharkov regions shows that the imports to Odessa region are much higher than to Kharkov region. For Odessa region, the cumulative imports of products classified in 4th and 5th TT made 4435.1 USD per 10.000 of population in 2007, which is 3.75 times higher than for Kharkov region with the imports worth 1183.25 USD per 10.000 of population. In 2013, the imports were 3.84 higher for Odessa region than for Kharkov region.

The analysis of change in exports-imports ratio (EIR) is shown in Table 3.

Table 3. Exports-imports ratio for the whole nomenclature of goods and by TT, 2007–2013

Indicator	2007	2008	2009	2010	2011	2012	2013
The whole nomenclature	0.43	0.49	0.56	0.48	0.49	0.41	0.47
3rd TT	0.49	0.58	0.63	0.53	0.47	0.48	0.50
4th TT	0.36	0.34	0.44	0.39	0.65	0.62	0.41
5th TT	0.33	0.20	0.16	0.19	0.21	0.09	0.31

Source: estimated by data of the Ukrainian State Statistics Service

For the products classified in 3rd TT EIR is higher than for the ones classified in 4th and 5th TT, which is an evidence of higher significance of foreign trade for attaining the region's self-sufficiency on the commodity groups classified in 3rd TT. EIR for Odessa region is far lower than for Kharkov region, which equaled 0.74 in 2002 and 0.87 in 2013 for the whole nomenclature. The decreasing level of EIR for higher TTs is an evidence of weak attention paid in Odessa region to formation and development of technologies and industries classified in 4th and 5th TT.

The analyzed change in exports and imports of goods by TT, change of EIR and the considerable decrease in the ratios of exports of goods from Odessa region compared with Kharkov region shows that Odessa region tends to preserve the structure of exports dominated by goods with low added value and has obvious barriers for innovating and innovations. As a result, Odessa region has limited capacities to solve the problems related with industry optimization and essential growth of industrial output that would be competitive at domestic and global markets, diversification of the regional economy through enhancing exports of goods classified in 4th and 5th TT or launching manufacturing and exports of products classified in 6th TT.

It should be mentioned that Odessa region has already elaborated program documents on social and economic development in the region. The draft Strategy for economic and social development of Odessa region till 2015 includes the section "Industry Modernization. Development of High Technology Industries" aiming at "building up the integral 'industry – science – technology' complex capable to develop and support internal needs, manufacture competitive goods for exports and increase the output of high tech industrial products" [6]. The analysis shows that the aim is unlikely to be achieved. According to "Strategy of Economic and Social Development of the Odessa City till 2022", intensive development of economic activities based on innovation, comprehensive modernization of fixed assets at innovating enterprises and gradual transition of the industry to the new technological level is envisaged not earlier than at the third phase of the Strategy implementation (2019–2022) [7]. We, however, believe that manufacturing of products classified in 5th and 6th TT needs to be boosted just now. Also, a report of the director of Public Enterprise "Ukrpromzovnish-expertyza" comes to mind, where the priorities of Odessa region ranked as follows: agriculture, food industry and processing of agricultural products, sea ports, chemical industry, mechanical engineering, tourism and resorts [8]. We believe that the top priority needs to be assigned to development of mechanical engineering and industries classified in 5th and 6th TT.

Growth in exports-related activities is conditional on intensification of innovating at industrial enterprises of Odessa region. Unfortunately, by innovating Odessa region lags behind more advanced regions of Ukraine. In 2013, innovating enterprises in the region numbered 69 (17.6% of the total), which is higher than in 2014 (67 enterprises or 16.8%). In Ukraine, the share of innovating enterprises was 16.8% in 2013 and 16.1% in 2014. Their innovation-related expenditures amounted to 323.9 million UAH, including 321.5 million UAH (99.3% of the total expenditures) spent for purchase of machinery, equipment and software, 960.6 thousand UAH (0.3%) for internal and external R&D, 1.5 million UAH (0.5%) for other purposes.

Unfortunately, the main investors in innovation are enterprises themselves, with 320.6 million UAH of investment (99.0% of the total expenditures for innovation). Due to limited investment in 2014, innovations were being introduced at only 39 innovating enterprises (9.8% of the total number). During 2014, the new technological processes introduced in the region numbered 30, including 11 resource saving or alternative technologies; 82 types of innovation products were launched.

The revealed tendencies and structure of foreign trade in Odessa region give evidence on inadequate use of direct and indirect methods of the regional policy aiming at creating favorable conditions for investment- and innovation-driven development of the region, at

building up the effective structure of industry and exports of goods, enhancement of labor productivity in the region.

The issue of economic restructuring and restructuring of exports and imports of goods at national and regional level has been even more urging due to the following reasons: economic degradation in Ukraine in 2014 (nearly 7% decline in GDP, 10.1% decline in industrial production, nearly 20% decline in exports of goods and services); mass-scale troubles in the economy in 2015 due to warfare in the East and the related negative factors; enforcement, on April 24, 2014, of EU preferences enabling Ukrainian producers to export to EU countries without paying custom duties; rapid shrinkage of exports to Russia. The main methods of structural policy in Ukraine and its regions should be: abandonment of development strategies relying on extracting and low technology sectors, state targeted programs and investment, accelerated development of high tech industries, institutional transformations, introduction of resource saving technologies, diversification of exports and leading growth in exports of goods classified in 5th and 6th TT.

Conclusions. The effective structural change in exports and imports of goods in Odessa region can occur once reforms and programs are implemented with respect to building regional infrastructure and regional innovation clusters, enhancement of investment attractiveness of the region, implementation of public procurement policy for high tech products, setting up public and private partnerships in innovative industries, motivation of business sector towards innovating through optimization of taxation policy to have tax burden relieved at all the phases of innovation process. It is important to elaborate and implement measures aiming at interactions between public research organizations and public HEEs, on the one hand, and industrial enterprises, on the other, for promoting advanced technologies to industry, establishing national and regional innovation funds by raising government and business investment on parity basis, implementation of advanced mechanisms for venture investment, more extensive participation of transnational high tech companies in the regional economy etc. Setting up and implementation of the state policy of structural change at national and regional level are important drivers of the effective restructuring of exports in Odessa region.

REFERENCES:

- [1] Makukha S. N. (2012). Restructuring of Foreign Trade in Ukraine: A Requirement of the Time. In: *Business-Inform*, No 1, 8–11. (Published in Russian)
- [2] Goryanskaya T. V. (2014). Foreign Trade of Ukraine: Performance and Trends of Development. In: *Bulletin of Donetsk State University, Series B: Economics and Law*, Vol. 2, 28–30. (Published in Russian)
- [3] Denysiuk Volodymyr (2013). Analysis of economic and exports structure of Ukraine and Serbia as country level indicators of economic development. In: *International Journal of Economics and Law*, Vol. 3, No 7, 8–17.
- [4] Bazhal Yu. M. (2011). Strategic Analysis of the Potentials for Building up the Economy of New Social and Technological Tenor in Ukraine. In: *Technological Imperative of the Strategy of Social and Economic Development in Ukraine*, Kyiv: Institute for Economics and Forecasting of the NAS of Ukraine, 203–244. (Published in Ukrainian)

- [5] Denysiuk V. A. (2015). Analysis of Innovation Activities and Tendencies in Economic Development in a Region (Case of Kharkov Region). In: Soloviyov V. P., Vertinskaya T. S. (Eds.) *Innovation-Driven Development of the Regions of Belarus and Ukraine on the Basis of Cluster Network Form*, Minsk: Belaruskaya Navuka, 187– 212. (Published in Russian)
- [6] Draft Strategy of Economic and Social Development of Odessa Region till 2015. Approved by Resolution of Odessa Regional Public Administration, from December 24, 2004 No. 928/A-2004. (published in Ukrainian)
- [7] Strategy of Economic and Social Development of the Odessa City till 2022. Odesa:TEC, 2013, 80 p. (Published in Ukrainian)
- [8] Vlasyuk V. Potential Areas of Intensifying the Real Sector of Economy in Odessa Region. Regional Seminar of the Office of Fridrich Ebert Foundation in Ukraine and Secretariat of the National Trilateral Socio-Economic Council “Preservation of Jobs in Regions through Implementing Economic Modernization”, Odessa, May 2015. (published in Ukrainian)