

EXPORT PERFORMANCE AND INDUSTRIAL OPPORTUNITIES OF METALS AND METALWORKING SECTOR IN REPUBLIC OF MACEDONIA

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The metals and metalworking sector are still one of the more important sectors in Republic of Macedonia, though they have gone through the serious challenges as a result of the global economic crisis. The data show that the total export value of these two sectors in 2016 is 536.4 million US \$, while the relative share in country's export is more than 11.3%. The results of our research indicate that the number of exporting products within metals and metalworking sector in 2016 is 312 out of total 589 products which are subject of world trade within these industries according to 6-digit HS classification of products based on UN ComTrade statistics, while the number of products that are exported with comparative advantages ($RCA > 1$) in the same year is about 47 products. Moreover, if we compare this number with the total number of products that country exports with comparative advantages in all sectors (460 products), we can conclude that more than 10% of total exporting products that Republic of Macedonia exports are coming from metals and metalworking sector.

These results show that these sectors have significant role for Macedonian economy and more importantly they have huge industrial potential for further export diversification (increasing the number of exporting products within these sectors) and inter-structural upgrading (moving from products with lower added value to products with higher level of sophistication).

In this context, the main aim of the paper is to explore the question „what are the main industrial opportunities of metals and metalworking sector? And how production and export structure of these sectors could be upgraded?“ To answer this question and to fulfill the main goal of the study we are investigating the current production and export structure of these industries at product level by using the product space methodology and several empirical indexes (RCA and PRODY). Additionally, we are searching for new more sophisticated products within these industries that country has latent comparative advantages to start exporting to other countries in the region and beyond based on the estimation of PROXY index.

Key words metals and metalworking sector, export performance, industrial opportunities, product space methodology.

1. INTRODUCTION

The metals and metalworking sector are still one of the more important sectors in Republic of Macedonia, though they have gone through the serious challenges as a result of the global economic crisis. The data show that the total export value of these two sectors in 2016 is 536.4 million US \$, while the relative share in country's export is more than 11.3%. The export of these sectors is composed from 312 products out of total 589 products which are subject of world trade within these industries according to 6-digit HS classification of products based on UN ComTrade statistics, while the number of products that are exported with comparative advantages ($RCA > 1$) is 47 products. Moreover, if we compare this number with the total number of products that country exports with comparative advantages in all sectors (460 products), we can conclude that more than 10% of total exporting products that Republic of Macedonia exports with comparative advantages are coming from metals and metalworking sector.

Based on the data presented above there is no doubt that these sectors have significant impact for Macedonian economy and moreover that the country has significant comparative advantages in exporting metal and metalworking products. However, more important question here is about the export structure of these industries having in consideration the fact that the country exports products with relatively low level of sophistication and added value. Hence, one of the most challenging issues is how to upgrade the production structure of these industries by promoting the intra-structural transformation (moving from products with lower level of sophistication to products with higher added value).

This process is not easy and it depends on country's production structure and the existence of capabilities that were already accumulated by the country. Moreover, the process of structural transformation is determined of the industrial policy that is created to facilitate the intra- and inter sectorial transformation.

In that context, the main aim of the paper is to explore the question „*What are the main industrial opportunities of Macedonian economy in metals and metalworking industry?*” To answer this question and to fulfill the main goal of the study we are investigating the current production and export structure of Macedonian economy in these industries and we analyze the products similarities by using the product space concept in order to identify the further development path of intra-sectorial transformation of the analyzed sectors.

The results of this paper could be very useful for the existing firms and potential investors about the products which have latent comparative advantages

to be produced and exported, and moreover to policy maker in the process of creating better industrial policy. The paper is composed from introduction part, methodology description, empirical analysis and conclusion.

2. LITERATURE REVIEW OF INTRA-SECTORAL STRUCTURAL TRANSFORMATION

One of the most important long-term challenges for low and middle-income countries is to move to higher technological intensive sectors and to higher value-added products in the same industries. These processes are the fundamental factors for long-run economic growth, so countries which have engaged in industrial upgrading and export diversification have had experienced a significant improvements of their economic performance.

There are numerous examples of inter- and intra-sectoral upgrading and diversification in emerging and developing countries. For instance, some countries have succeeded to shift their production structure from traditional industries to high-tech sectors. On the other side, there are some cases which show how some firms within an industry shift the production from products with lower to products with higher added value. For illustration, semiconductor firms in the Republic of Korea and Taipei, China started from integrated circuit packaging and testing, both low-value-added activities, to fabrication and eventually design, the highest level of valued added (Mathews 2006).

The same sort of upgrading is now emerging in the PRC, as in the case of the electronics firm Konka, which started out in 1979 as a producer of cassette players in Shenzhen. At that time, the company was one of the first high-tech firms established in the country's south as a result of the opening-up policy. Although controlled by a state-owned enterprise, Konka is essentially a private firm, listed on the Shenzhen Stock Exchange in 1992. Like its counterparts in the Republic of Korea and Taipei, China, Konka began its quest for technology as a contractor for original equipment manufacturing to advanced firms, but profits were volatile. In 1987, Konka began to produce branded products for the domestic market and to compete with imported brands, signalling a move to become an original brand manufacturer (Xie and Wu 2003; Mathews 2008). Ten years into this new strategy, Konka set up an R&D facility in Silicon Valley to develop digital televisions, producing the first such sets in the PRC. A year later, Konka began mass producing high-definition digital televisions.

Konka replicated many of the features observed in the Republic of Korea and Taipei, China, particularly in leveraging technologies by the use of outsourcing contracts to enable firms to upgrade their capabilities from original

equipment manufacturing to original design manufacturing and then to original brand manufacturing (Hobday 2000; Lee 2005). This is necessary because front-running vendor firms tend to move their orders for original equipment manufacturing to cheaper wage sites, and thus latecomers need higher value-added orders.

3. METHODOLOGY FRAMEWORK

There is no proven one-size-fits-all methodology which could make a best intra- and inter sector selection. The neoclassical trade theory advises countries to specialize in products in which they have a comparative advantage to maximize welfare by allocating resources to their best use. However, this recommendation is very general and static. Hence, it has been created the Growth Identification and Facilitation Framework of Lin and Monga (2011) and the Product Space theory of Hidalgo et al. (2007) as modern methods for sector selection.

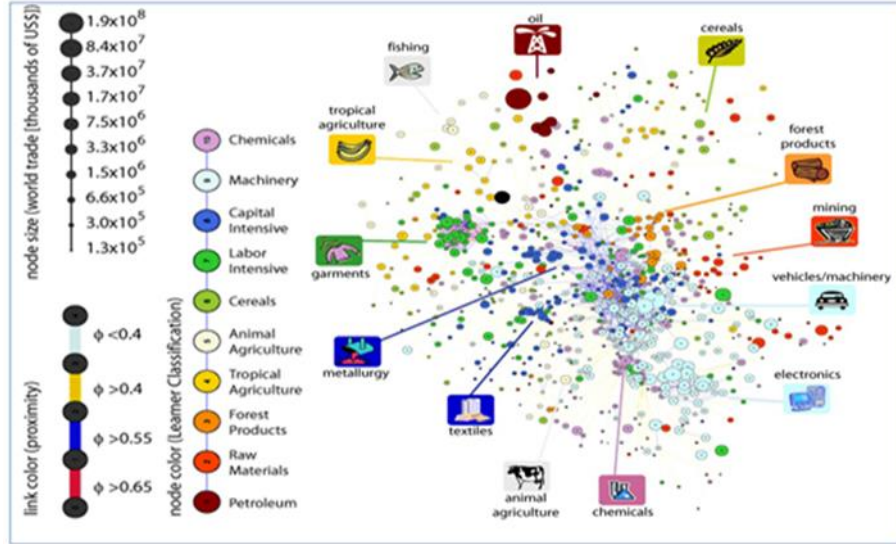
The Growth Identification and Facilitation Framework emphasizes that countries should target sectors that are consistent with their comparative advantage, and that low- and middle-income countries should study the experiences of countries that today have two to three times their per capita income and a similar economic structure. *The Product Space theory* is based on the idea that the products a country exports with revealed comparative advantage must embody that country's capabilities. The message for developing countries is to target products that use capabilities similar to those that they already have, and to develop new capabilities that allow them to get into products with higher value-added.

The Growth Identification and Facilitation Framework is a tool based on Justin Lin's *New Structural Economics* (2012). Its six-step framework can help policymakers in developing countries identify industries with 'latent comparative advantages' and facilitate competitive private sector development. The steps are: 1) Choose the right country benchmarks, 2) Assist domestic private firms, 3) Attract global investors, 4) Scale up self-discoveries, 5) Recognize the power of industrial parks, and 6) Provide limited incentives to the right industries.

The Product Space theory is an application of network theory, depicting the network of connecting products that tend to be co-exported. The Product Space shows all products exported and how 'close' they are with each other. The product space can be represented mathematically by a matrix of the pairwise distances for all n products, where it's showed how 'close' the products are to

each other, with the idea of proximity reflecting whether they are co-exported or not.

Figure 1 The product space



Source: Hausmann et al. 2011

The figure above shows the Product Space using 800 products (Hausmann et al. 2011). Each circle depicts a product and the size of the circles is proportional to the product’s share of world trade. Each product within several industries (agriculture, metals and metalworking, machinery, electronics, chemicals, textile and garments, and others) is represented by different colors.

However, the main aim of our research is to identify the top industrial and export opportunities of metals and metalworking industry by investigating the products which have the higher possibility to be exported through building a comparative advantage in their production. For this purpose, we estimate the “density” index which is based on the product space idea.

The “density” index measures the average proximity of a new potential product, j , to a country’s current productive structure:

$$density_{i,t} = \frac{\sum_j x_{i,t} \phi_{i,j,t}}{\sum_j \phi_{i,j,t}}$$

where high density value means that the country has many developed products surrounding to the j product. Once we estimate the value of this index for all

potential products within the analyzed industries, it's necessary to select only the products with higher possibilities to be exported based on the index which are characterized with higher sophistication level compare with the average export sophistication of products that country has already exported with comparative advantages. Hence, we estimate the PRODY index which measures the level of sophistication at product level.

The **product sophistication level** ($PRODY_K$) is calculated as a weighted average of GDP per capita of countries exporting that product. The index can be presented by the following equation:

$$PRODY_K = \sum_j \frac{(x_{jk}/X_j)}{\sum_j (x_{jk}/X_j)} Y_j$$

where, the term, x_{jk}/X_j , is the relative share of export product in the total value of country's export, while the term, $\sum_j (x_{jk}/X_j)$, is the aggregate relative share of all countries exporters of that product. So, the index represents the weighted average of the GDP per capita, where the weighted corresponded to country's comparative advantage value of exported product^k.

4. EMPIRICAL ANALYSIS OF INDUSTRIAL OPPORTUNITIES OF METALS AND METALWORKING INDUSTRY

The metals and metalworking sector are still one of the top exporting sectors in Republic of Macedonia, though they have gone through the serious challenges as a result of the global economic crisis. The data shows that the total export value of these two sectors in 2016 is 594 million US \$, while the relative share in country's export is almost 10%. The export value of metals sector is about 375 million US \$, while the export value of metalworking sector is 220 million US \$.

In the table below is presented the data about the top ten exporting products of these sectors in terms of export value and relative share in country's total export. It's obvious that most of the products are metals as a less added value industry compare with metalworking sector.

Table 1 The top ten exporting products from metals and metalworking sectors

#	HS-product code	Export value, in US \$	Relative share in total export, %
1	720260	85.161.414	1.40%
2	730660	70.144.496	1.10%
3	720842	66.939.364	1.10%
4	721070	53.115.379	0.86%
5	720843	48.470.021	0.79%
6	721049	31.175.314	0.51%
7	720221	29.240.285	0.47%
8	730630	23.405.561	0.38%
9	732183	20.220.755	0.33%
10	730890	15.243.472	0.25%

Source: Authors' calculation based on UN database

The estimated results of our research indicate that the number of exporting products within metals and metalworking sector in 2016 is 312 out of total 589 products which are subject of world trade within these industries according to 6-digit HS classification of products based on UN ComTrade statistics, while the number of products that are exported with comparative advantages ($RCA > 1$) in the same year is about 47 products.

Moreover, if we compare this number with the total number of products that Republic of Macedonia exports with comparative advantages in all sectors (460 products), we can conclude that more than 10% of total exporting products that country exports are coming from metals and metalworking sector. The RCA index of these industries is about 0.9, which show that Republic of Macedonia has comparative advantage in export of these industries. In the Table below are presented the top ten products in analyzed sectors in terms of the RCA value.

Table 2 The top ten products of metals and metalworking sectors in Republic of Macedonia, based on RCA index

#	HS-product code	RCA	PRODY, US \$	Export value, US\$
1	730120	46.97	22.726	5.368.648
2	730661	38.43	18.046	51.026.876
3	732189	30.66	26.137	14.733.341
4	731441	20.41	21.430	3.159.666

5	732119	15.14	19.121	3.987.270
6	720221	93.95	31.628	93.785.960
7	720260	243.1	13.164	286.257.634
8	720851	22.67	20.887	77.977.510
9	720852	45.68	19.042	51.389.703
10	721070	17.89	15.238	64.160.885

Source: Authors' calculation based on UN database

Additionally, we have identified the top ten products (which are characterized with higher level of sophistication compare with the average level of existing exporting products in these sectors) which country has real economic pre-condition, so existing firms and potential investors could start producing and exporting by building comparative advantage. The identification of the industrial opportunities at product level is based on density index estimation.

Table 3 Export diversification opportunities of metals and metalworking sector in Republic of Macedonia

#	HS-product code	Density index	RCA index	Export value, US \$	PRODY, US \$
1	720719	0.0976	0.00	/	39.300
2	731442	0.0894	0.26	14.641	47.671
3	730240	0.0872	0.00	/	25.374
4	720838	0.0826	0.00	/	21.545
5	731021	0.0773	0.05	30.564	23.015
6	732290	0.0755	0.11	33.724	31.058
7	730840	0.0753	0.08	114.638	32.948
8	731010	0.0741	0.22	82.939	23.519
9	730230	0.0738	0.00	/	67.044
10	731431	0.0712	0.00	/	41.553

Source: Authors' calculation based on UN database

According to the estimated results of our research, we can conclude that Republic of Macedonia has comparative advantages in these sector, but the export structure is not satisfied in terms of the number of products that country exports with comparative advantages and the level of sophistication of those products. However, the results show that there is a significant industrial opportunity of these sectors in terms of the possibility for increasing the number of exporting products and the possibility for improving the export structure by moving to products with higher added value.

5. CONCLUSION

The main aim of the paper is to explore the question „*What are the main industrial opportunities of Macedonian economy in metals and metalworking industry?*” To answer this question and to fulfill the main goal of the study we are investigating the current production and export structure of Macedonian economy in these industries and we analyze the products similarities by using the product space concept in order to identify the further development path of intra-sectorial transformation of the analyzed sectors.

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These results could be a useful guide for policy makers in the process of creating better industrial policy towards supporting those industries and sectors which have latent comparative advantage. Actually, the recent research show that countries with a set of vertical industrial policy directed to previous identified strategic sectors and industries have experienced successful structural transformation of their production and export structure which accelerate the long-run economic growth.

Hence, this research can help policy makers in our country how to design an approach which will put in place the previous accumulated capabilities within the metals and metalworking industries towards an intra-industrial transformation and diversification by increasing the number of exporting products with higher added value.

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