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INNOVATION ACTIVITY ACROSS INDUSTRIAL SECTOR IN THE REGIONS OF UKRAINE

Abstract

Assessment of the state of industrial sector during 2011-2015 in the profile of the regions of Ukraine according to their level of innovation activity is made. Low level of innovation activity for most regions is defined as common based on the analysis of such key indicators for innovation activity of industrial agents as share of enterprises that innovate in relation to total number of industrial enterprises; share of innovative products sold in relation to total volume of industrial products sold; share of innovation costs in relation to total volume of capital costs. Besides, the reduction of the middle level group of innovation activity is observed (7 regions in 2015 against 12 regions in 2013) that testifies to the setback of the regions innovation development and absence of positive dynamics as well. The ranking of Ukrainian regions is built according to the values of innovation activity integral index for industrial sector. Also set of measures aimed at the promotion of innovation activity under globalization are suggested.

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Key words:

Innovation activity, integral criteria, industrial sector of the regions of Ukraine.

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Introduction

In the dynamic world of modern technologies, one of the most distinguishable characteristic that determines the competitive place of both an enterprise and state economy on the global market is their focus on innovation. The development model that is typical for Ukrainian economy is oriented on export of raw materials along with the high dependency of domestic enterprises on the import of technology and equipment. This inefficiency testifies the utter need in the transition to innovative path which could enable the country to implement its industrial potential capacity.

Therefore the necessity for the diagnostics of innovation activity across the regions of Ukraine is very timely in order to define the perspectives of their further development under the conditions of the globalization of world economic system.

The critical importance of innovation activity during the modernization of the national economy is commonly emphasized in the academic circles. This demands the pivotal changes in different areas so that the institutional environment provides a favorable business climate, academic environment generates research and development at a time when business commercializes these innovations.

Literature review

The above-mentioned problematic is well researched by N. Bondarchuk (2013), B. Burkynskyi (2007), M. Haman (2004), V. Kopytko (2016) and by the group of researchers under the supervision of V. Heiets, an academician of NAS of Ukraine (2014; 2015), A. Krysovatyi and Ye. Saveliev (2016).

However, the current situation under which Ukraine proceeds to lose its rank in The Global Competitiveness Report [1] (Rank of Ukraine in The Global Competitiveness Report 2016-2017) predetermines the necessity for further research and analytical assessments both on macro- and meso-level.

The aim of this article is to determine the innovation activity level of industrial sector of Ukraine broken down by its regions and develop recommendations how to increase it.

Main material

Innovation activity of industrial sector in Ukraine is characterized by such indicators as share of enterprises that innovate in relation to total number of industrial enterprises; share of innovative products sold in relation to total volume of industrial products sold; share of innovation costs in relation to total volume of capital costs.

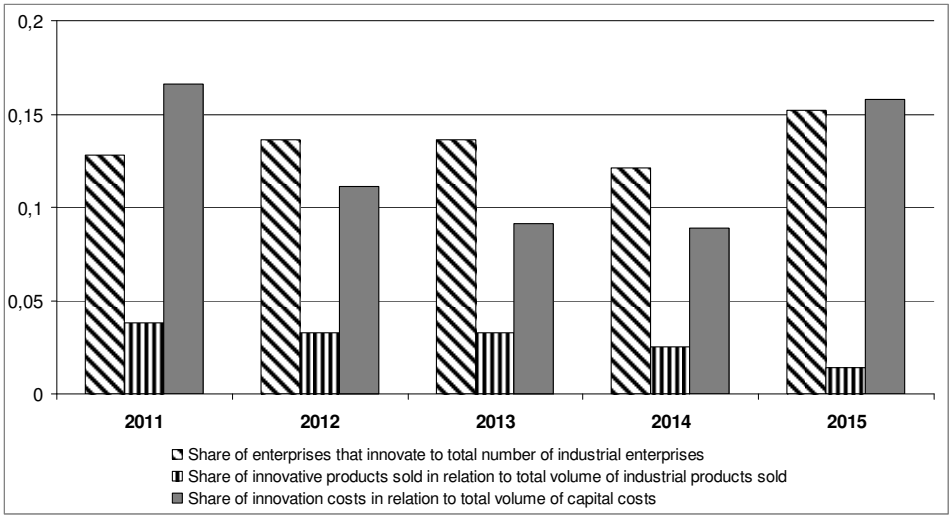
Nevertheless the number of enterprises that innovate across Ukraine was increasing (18,8% compared to 2011) (Fig. 1), their costs on innovations in total volume of capital costs were decreasing annually. Only in 2015 the share of innovation costs in relation to total volume of capital costs came around the level of 2011 year. Instead, the share of innovative products sold in relation to total volume of industrial products sold kept to fall and during 2015 it decreased by 2,5 times compared to 2011.

By integrating the above-mentioned indicators it is calculated the integral indexes of innovation activity at the industrial enterprises and based on this the grouping of the Ukrainian regions is conducted (Table 1).

[1] Ukraine took the 85th place among 138 countries in 2016, having lost six ranks during a year.

Fig.1

Trends of innovation activity in Ukraine



Source: calculated by author based on data of State statistic service of Ukraine

According to the determined gradation, most of the regions (16 regions both in 2011 and during 2014–2015) displayed low level of innovation activity. Besides, quantity reduction was observed in the group of middle level of innovation activity (from 12 regions in 2013 to 7 in 2015) that indicates about the impediment of innovation development of industrial sector across Ukraine and absence of positive dynamics. Only in 2012-2013 the quantity distribution between the groups of low and middle level was virtually the same taking into account that Zakarpattya region was on the verge of transition to the higher group.

Leader among the regions of Ukraine *by the level of innovation activity* during 2012–2015 was immutably Sumy region. The highest index value was observed in 2014 at the level of 0,824 points that was caused by the highest share of innovation costs in relation to total volume of capital costs (61,9%) and the share of innovative products sold in relation to total volume of industrial products sold (10,4%). It is needed to mention that innovation costs of 10-20% of industrial enterprises that innovated were in the range of 26-28% of total volume of capital costs in 2011–2013, and share of innovative products sold in relation to total volume of industrial products sold was 10,4-12,4%. However, in 2015 it was observed a decline of the share of innovation costs by 45,1 percentage points, as well as the innovative products sold- by 3,3 percentage points.

Table 1

Grouping of the regions of Ukraine according to the integral index of innovation activity

2011		2012		2013		2014		2015	
Khmelnytsky Region	0,689	Sumy Region	0,709	Sumy Region	0,689	Sumy Region	0,824	Sumy Region	0,682
Sumy Region	0,588	Khmelnytsky Region	0,708	Kharkiv Region	0,676	Kharkiv Region	0,585	Kharkiv Region	0,619
Ternopil Region	0,492	Kharkiv Region	0,645	Ivano-Frankivs'k Region	0,654	Mykolayiv Region	0,424	Mykolayiv Region	0,557
Zhytomyr Region	0,468	Ternopil Region	0,553	Vinnytsya Region	0,537	Vinnytsya Region	0,398	Kirovograd Region	0,501
Zaporizhzhya Region	0,429	Kirovograd Region	0,495	Mykolayiv Region	0,51	Poltava Region	0,365	Kherson Region	0,394
Kharkiv Region	0,419	Odessa Region	0,49	Kherson Region	0,495	Ivano-Frankivs'k Region	0,364	Dnipropetrovs'k Region	0,384
Ivano-Frankivs'k Region	0,396	Kherson Region	0,485	Volyn Region	0,43	Kherson Region	0,36	Lviv Region	0,361
Poltava Region	0,343	Ivano-Frankivs'k Region	0,47	Khmelnytsky Region	0,416	Chernivtsi Region	0,346	Zaporizhzhya Region	0,337
Ukraine	0,298	Chernivtsi Region	0,428	Kirovograd Region	0,415	Zaporizhzhya Region	0,309	**Ukraine**	0,327
Cherkassy Region	0,288	Vinnytsya Region	0,379	Zhytomyr Region	0,407	Kirovograd Region	0,295	Chernivtsi Region	0,316
Mykolayiv Region	0,274	Mykolayiv Region	0,357	Chernivtsi Region	0,38	Odessa Region	0,281	Odessa Region	0,314
Volyn Region	0,251	Poltava Region	0,351	Chernihiv Region	0,377	Zakarpattya Region	0,276	Ivano-Frankivs'k Region	0,311
Odessa Region	0,235	Zhytomyr Region	0,339	Zaporizhzhya Region	0,364	Volyn Region	0,274	Vinnytsya Region	0,303
Kirovograd Region	0,225	Zakarpattya Region	0,334	Zakarpattya Region	0,36	**Ukraine**	0,273	Ternopil Region	0,283
Donets'k Region	0,217	Zaporizhzhya Region	0,305	**Ukraine**	0,32	Lviv Region	0,265	Cherkassy Region	0,267
Kherson Region	0,214	**Ukraine**	0,304	Lviv Region	0,26	Rivne Region	0,224	Poltava Region	0,258
Zakarpattya Region	0,193	Volyn Region	0,286	Cherkassy Region	0,233	Ternopil Region	0,222	Zhytomyr Region	0,251
Chernivtsi Region	0,192	Cherkassy Region	0,249	Ternopil Region	0,231	Khmelnytsky Region	0,206	Zakarpattya Region	0,247
Luhans'k Region	0,17	Chernihiv Region	0,219	Donets'k Region	0,203	Cherkassy Region	0,178	Volyn Region	0,184
Vinnytsya Region	0,128	Lviv Region	0,207	Odessa Region	0,195	Donets'k Region	0,173	Khmelnytsky Region	0,168
Chernihiv Region	0,128	Rivne Region	0,207	Poltava Region	0,192	Kyiv Region	0,155	Kyiv Region	0,159
Lviv Region	0,113	Luhans'k Region	0,206	Rivne Region	0,188	Chernihiv Region	0,151	Chernihiv Region	0,147
Rivne Region	0,108	Donets'k Region	0,193	Dnipropetrovs'k Region	0,166	Zhytomyr Region	0,145	Donets'k Region	0,128
Kyiv Region	0,065	Dnipropetrovs'k Region	0,101	Luhans'k Region	0,163	Dnipropetrovs'k Region	0,118	Rivne Region	0,078
Dnipropetrovs'k Region	0,044	Kyiv Region	0,056	Kyiv Region	0,124	Luhans'k Region	0,063	Luhans'k Region	0,045

– high level of innovation activity (0,67÷1,0);

– middle level of innovation activity (0,34÷0,66);

– low level of innovation activity (0,0÷0,33).

The group of *the middle level of innovation activity* consisted of 7 regions in 2015 (as well as in 2014). It included those regions that kept their positions from the previous year (Kharkiv, Mykolayiv, Kherson) and those regions that gained in the ranking due to the increase of innovation costs in relation to total volume of capital costs – Dnipropetrovs'k (by 43,8 percentage points), Kirovograd (by 5 percentage points) and share of enterprises that innovate – Lviv (by 5,8 percentage points) and Zaporizhzhya (by 3,3 percentage points). At the same time the quantity of innovative enterprises also increased in Mykolayiv, Kirovograd, Kherson by 13,6, 10,1 total ouput, 9,9 percentage points accordingly.

Regions with *low innovation activity* (16 regions of Ukraine in 2015) can be conditionally divided into 3 subgroups.

The first subgroup represents the regions that were characterized by low innovation activity during the period analyzed. It included Luhans'k, Rivne, Kyiv and Cherkassy regions. They tended to demonstrate the small amount of enterprises that innovate, thus their share of innovative products sold in relation to total volume of industrial products sold was less than 1%. Share of innovation costs in relation to total volume of capital costs didn't exceed 6%, except Donets'k region in which the latter indicator increased by 10,2 percentage points with regard to the previous year and was 16,7%.

The second subgroup was formed by the regions that have a potential to increase in the innovation activity. It included Odessa, Zakarpattya, Volyn' and Chernihiv regions. Share of enterprises that innovate in Odessa region didn't fall under 10%, and in 2015 it increased to 17,2%. However, the share of innovation costs in relation to total volume of capital costs of industrial enterprises was affected by sharp fluctuations (from 27,1% in 2012 to 2% in 2013; from 19,5% in 2014 to 2,8% in 2015). In 2015 the share of innovative products sold in relation to total volume of industrial products sold (2,2%) reverted to the value of 2011, but during 2012-2013 it increased to 3,6%.

Opposite situation was observed in Zakarpattya region. Despite the consistently low quantity of enterprises that innovated (not more than 8,5% of the total quantity), their share of innovative products sold during 2011-2014 got one of the highest values comparatively to other regions. In 2015 this indicator was 4,6% having decreased by 10,9 percentage points with regard to 2013, but it didn't interfere with keeping a second rank in the overall rating of the innovative products sold. However the share of innovation costs in relation to total volume of capital costs at the enterprises in Zakarpattya region didn't exceed 3%, except the year 2012 (5%) that caused the low positions in comparison with other regions.

In Volyn' and Chernihiv regions the shares of enterprises that innovated were oscillating in the range of 8-14% during the period analyzed. Better results both by share of innovative products sold and by the share of innovation costs were observed in Volyn' region. But despite the positive trend of previous years, the innovation costs decreased in 2015 regarding the previous year (in Volyn' re-

gion – by 18,2 percentage points, in Chernihiv region – 7,8 Chernihiv – 7,8 percentage points) and caused the decrease of the share of innovative products sold.

The third subgroup represents the regions that during previous years demonstrated the middle level of innovation activity, but didn't manage to keep their ranks in 2015.This subgroup included Chernivtsi, Ivano-Frankivs'k, Vinnytsya, Poltava, Zhytomyr regions.

They were characterized by the share of enterprises that innovate in relation to total number of industrial enterprises at the level of 13-15% (except Ivano-Frankivs'k region – 18,4%). In general, their innovation costs were less than 5% (except Chernivtsi region – 7,3% in 2015 and Vinnytsya region – 24,7% that demonstrated the increase by 22,2 percentage points with regard to 2011). The enterprises of above-mentioned regions sold their innovative products in the range of 1,5-2% of the total volume of industrial products sold in 2015.

Within this subgroup we can detach Ternopil and Khmelnytsky regions that didn't recover after crisis 2013. Khmelnytsky region was affected by the biggest decline (52,1 percentage points regarding 2011) as the result of the halving of the share of enterprises that innovate and decrease of innovation costs as well (–37,9 percentage points). The share of innovative products sold in relation to total volume of industrial products sold in Khmelnytsky region didn't exceed 2% during the whole period analyzed, and during 2014–2015 it decreased by another 0,7%.

Notable decline of innovation activity (20,9 percentage points with regard to 2011) was observed also in Ternopil region. Despite the recovery of the share of enterprises that innovated in 2015 at the level of the 2011 year (17%), the share of innovative products sold in relation to total volume of industrial products sold was only 1,4% in 2015 (against 7,6% in 2011), and the innovation costs decreased by 16,4 percentage points with regard to 2011.

Conclusions

To summarize, we can state that innovation activity of industrial enterprises livened up in regions of Ukraine in 2015. The characteristics of this were the following:

1) revival of share of enterprises that innovate in relation to total number of industrial enterprises in 18 regions to their value level of 2011-2012. The most significant increase was observed in Mykolayiv region (by 14 percentage points), Kirovograd region (by 9,3 percentage points), Kherson region (by 8,8 percentage points), Poltava region (by 7,2 percentage points). However, in Volyn', Zakarpattya, Luhans'k, Ternopil and Khmelnytsky regions the value of this indicator didn't exceed the value of 2011;

2) growth of share of innovation costs in relation to total volume of capital costs in 9 regions with the highest values in Dnipropetrovs'k (by 43,8 percentage points) and Donets'k (by 10,2 percentage points) regions;

3) revival of share of innovative products sold in relation to total volume of industrial products sold with the regard to the previous year in Zhytomyr and Chernivtsi regions.

Simultaneously innovation activity was restrained by such negative characteristic features as:

1) the share of enterprises that innovate in relation to total number of industrial enterprises became lower with regard to 2014 in Rivne and Donets'k regions;

2) the share of innovative products sold in relation to total volume of industrial products sold decreased across the whole Ukraine except for Zhytomyr and Chernivtsi regions;

3) the share of innovation costs in relation to total volume of capital costs decreased with regard to the previous year in 14 regions. The most significant decline with regard to 2011 was observed in Khmelnytsky region (by 37,9 percentage points), in Zhytomyr region (by 32,1 percentage points), in Ternopil region (by 16,4 percentage points), Sumy region (by 11,1 percentage points), Volyn region (by 10,2 percentage points).

During 2013–2015 the share of innovation costs in relation to total volume of capital costs was decreasing in Ivano-Frankivs'k, Luhans'k, Ternopil and Khmelnytsky regions annually.

It is needed to mention that during the period of analysis western regions were in the innovation activity groups of middle and low level. Ivano-Frankivs'k region usually took high positions in 2011–2014 years, as well as Ternopil region in 2011–2012. However, in 2015 only Lviv region was in the group of middle level due to improving its results by 24,8 percentage points with regard to 2011. Zakarpattya, Chernivtsi and Volyn regions were teetering on the brink of middle and low level. Rivne region was holding the lowest positions among western regions.

Thus, the level of innovation activity across Ukraine demonstrates some small evidences of recovery by such initial indicators as share of enterprises that innovate in relation to total number of industrial enterprises (the value of this indicator has increased in 66,7% of regions with regard to 2011) and share of innovation costs (value of this indicator in 2011 was exceeded only in 37,5% of regions). However, the volume of innovative products sold in relation to total volume of industrial products sold continues to fall. Only Lviv and Kharkiv regions demonstrated the increase of the latter indicator in 2015 with regard to 2011.

Generalization of the results gives the possibility to suggest measures in order to increase the level of innovation activity in Ukraine. On a nationwide scale it is necessary to provide the following:

- formation of the result-oriented innovation system aimed at the achieving economic return at the level of project, enterprise, society;
- formation of the innovation infrastructure in order to coordinate the cooperation and communication among players of the innovation system responsible for different functional areas (ideas generation, R&D, marketing research, business processes set-up, projects funding, innovation product commercialization), and to form the single chain that leads from the fundamental researches to high-tech knowledge based production;
- implementation of the innovation speciality, determination and complex support those type of economic activity development of which has the most important strategic significance for the competitiveness of the country at the global market in the near decade;
- elaboration of the support programme for the enterprises that innovate with the clear selection criteria, transparent mechanisms of incentives and consultancy support during the whole period of development and implementation of the innovation product;
- elaboration of the programme of human capital development and talents retention inside the country;
- improvement of the education quality and providing the world academic mobility and opportunities for joint scientific researches with the most productive innovation centres;
- creation of the favorable business environment that provides the conditions for effective functioning of the enterprises, investments and development of their innovation activity, namely in the areas of proprietary rights protection as one of the most important innovation factors and prerequisite to keep the results of innovation activity inside the country;
- engagement of local governments to the participation in the international R&D cooperative programmes in the areas of scientific and technical researches and deepening the cooperation with the main innovation centres;
- implementation of the mechanisms for attracting foreign direct investments that involve science-based R&D.

Thus, the perspectives of further researches lie in elaborating the ways of providing the favorable innovative climate and searching the methods to modernize the capital stock as one of the most important factors of increasing the level of innovation activity in Ukraine.

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