

On the Prospects for the Use of High Technologies in the European Union's Post-Communist Countries

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ABSTRACT. The article deals with the current situation and prospects of using high technologies in the post-Communist countries of the European Union (EU). It shows that the scale of using high technologies in the post-Communist countries of the EU is much less than that of the EU's non-post-Communist countries. It is concluded that just becoming a member of the EU is not enough for developing high-tech industries in the post-Communist country. It is indispensable that the post-Communist countries of the EU make efforts to implement such an economic policy, which will be oriented on creating and developing a knowledge-based economy and facilitating priority funding of research and development (R&D). © 2019 Bull. Georg. Natl. Acad. Sci.

Key words: high-tech manufacturing, low-tech industries, EU, post-Communist countries, non-post-Communist countries, Eastern Partnership countries

For the economic development of the European Union (EU), it is of high priority to create and develop a knowledge-based economy. For this purpose, it is of the utmost importance to facilitate the development of a technological innovation system in EU countries.

It is impracticable to speak about sustainable economic development without focusing on creating and using high technologies in the modern world.

As we know, 11 countries of the 28 member states of the EU are former Communist countries. These countries are the following: Bulgaria, Estonia, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia, Hungary, the Czech Republic and Croatia.

Notwithstanding the fact that, unfortunately, the *catching up* type of economic growth [1: 34; 2, 3]

is not characteristic for the post-Communist countries of the EU [4: 133, 134], it is of high priority for the above mentioned countries to make the Central and Eastern Europe region a hub of technological innovations [5].

As customary, high-tech manufacturing mainly refers to the following industries such as information and communication technologies, biotechnologies, the aerospace industry, the pharmaceutical industry, electronics, etc.

Even those countries which are known for their high technologies do not turn their back (and rightly so doing) at developing the so-called "traditional" low-tech industries (the food industry, light industry, the metalworking industry, the pulp and paper industry, the wood processing industries, etc.).

The goal of the article is to present an analysis of the experience of the post-Communist countries in creating and using high technologies.

High-tech manufacturing and export. In order to draw a picture as to the extent to which membership in the EU promotes increased competition in high-tech manufacturing in the post-Communist countries, we will discuss the absolute level and structure of high-tech manufacturing by EU member countries in 2015 (see Table 1) [6].

Table 1. Absolute level and structure of high-tech manufacturing by EU member countries in 2015

No.	Countries	High-Tech Manufacturing	
		Added Value (mln, in EUR)	Shares of High-Tech Manufacturing by Countries (in percentages)
Non-Communist Countries			
1	Austria	4063	2.05
2	Belgium	8138	4.10
3	Cyprus*	–	–
4	Denmark	8526	4.30
5	Finland	2826	1.43
6	France	31802	16.04
7	Germany	54100	27.29
8	Greece	733	0.4
9	Ireland ¹	–	–
10	Italy	17575	8.86
11	Luxembourg*	–	–
12	Malta	104	0.05
13	Netherlands	6052	3.05
14	Portugal	787	0.4
15	Spain	8251	4.16
16	Sweden	9768	4.93
17	United Kingdom	27680	13.96
Post-Communist Countries			
18	Bulgaria	339	0.17
19	Czech Republic	1970	0.99
20	Croatia	455	0.23
21	Estonia	149	0.08
22	Hungary	3023	1.52
23	Latvia	184	0.09
24	Lithuania	226	0.11
25	Poland	3171	1.60

26	Romania	887	
27	Slovak Republic*	–	–
28	Slovenia	988	0.45
	EU	198264	100

* Relevant information is not available in this publication of Eurostat [6].

Table 1 shows that high-tech manufacturing is mainly accumulated in the EU's non-post-Communist countries and accounts for 91.02 percent of the total indicator for the EU while the total indicator for the post-Communist countries is only 5.24 percent. It is also to be underlined that Table 1, which is based on the statistical information of Eurostat, does not include relevant information on the Czech Republic, Cyprus, Ireland and Luxembourg and, therefore, the total of the relevant shares of non-post-Communist and post-communist countries do not makes up 100 percent.

It is equally interesting to follow how the export of these technologies from the post-Communist countries changed after they accessed the EU. Further, in order to more or less objectively evaluate these changes, it is reasonable to compare them with similar changes in the EU's "old" non-post-Communist member states and in the Eastern Partnership (EP) countries (Armenia, Azerbaijan, Belarus, Georgia, Moldova and Ukraine).

The post-Communist countries became members of the EU at different times. Most of them (the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, the Slovak Republic and Slovenia) became members of the EU on May 1, 2004 while Bulgaria and Romania joined the EU on January 1, 2007 and Croatia starting on July 1, 2013. It is obvious that for most of these countries it is better to take the year prior to their accession year to the EU as a base year; that is, 2003. Consequently, in order to compare similar indicators of various countries, we take the years 2003 and 2006 (the years prior to the accession year for Bulgaria and Romania to the EU, respectively) and 2012 (the year prior to Croatia's accession to the EU) and 2015.

Table 2. Percentages of shares of high technologies in the exports of manufactured goods by the EU and the EP countries

No.	Countries	Years			
		2003	2006	2012	2015
	EU Countries				
	Non-Post-Communist Countries				
1	Austria	16	13	13	13
2	Belgium	9	8	11	13
3	Cyprus	4	23	13	6
4	Denmark	20	18	14	16
5	Finland	24	22	9	9
6	France	20	21	25	27
7	Germany	17	17	16	17
8	Greece	13	11	9	11
9	Ireland	35	35	22	27
10	Italy	8	7	7	7*
11	Luxembourg	12	12	8	7
12	Malta	60	58	46	30
13	Netherlands	31	29	20	19
14	Portugal	9	9	4	5*
15	Spain	7	6	7	7
16	Sweden	16	16	13	14
18	United Kingdom	26	34	22	21
	Post-Communist Countries				
18	Bulgaria	4	6	8	8
19	Czech Republic	14	14	16	15
20	Croatia	12	10	10	9
21	Estonia	13	13	11	11
22	Hungary	26	24	18	14*
23	Latvia	5	7	10	13*
24	Lithuania	5	8	10	12
25	Poland	3	4	7	9
26	Romania	4	5	6	8
27	Slovak Republic	4	7	9	10
28	Slovenia	6	6	6	6
	EP Countries				
29	Armenia	1	1	3	5
30	Azerbaijan	5	2	7	3
31	Belarus	4	3	3	4
32	Georgia	25	16	2	6
33	Moldova	3	5	5	4
34	Ukraine	7	3	6	7
	EU	18	19	16	17

* Data for 2015 are not given in this data base of the World Bank [7] and, therefore, the data for 2016 are referred to.

Table 2 shows the shares of high technologies in the exports of manufactured goods. The data are developed by the World Bank [7].

One principal conclusion can be drawn from Table 2 which is that it is practically impossible to state unambiguously that accession to the EU alone suffices for creating a positive impact on increasing and developing high-tech manufacturing in the EU member post-Communist countries. Namely, a clearly positive tendency is observed for Bulgaria, Latvia, Lithuania, Poland, Romania and the Slovak Republic while a negative tendency is observed for Estonia (to a smaller degree) and for Hungary (to a significant degree). At the same time, the situation has practically not changed in this regard for the Czech Republic, Croatia and Slovenia.

Table 2 reflects similar trends in both the EU's non-post-Communist countries and the EP countries.

It is also noteworthy that almost equal levels were observed in 2015 as compared with the percentage shares of the high technologies in the total export of manufactured goods from the EU – only in five countries (France, Germany, Ireland, Malta and the United Kingdom) of the EU's 17 non-post-Communist countries while similar indicators for the post-Communist countries of the EU are less compared with the total indicator for the EU. These indicators are much less for EP countries.

In other words, it may be inferred that accession to the EU is not a sufficient condition for a breakthrough in regard to high technologies in the post-Communist countries of the EU. In reality, as Table 1 and 2 show, after accessing the EU manufacturing based on traditional technologies was mostly accumulated in the post-Communist countries [8: 114].

Ways to overcome technological backwardness. It is to be noted that the EU countries and regions are

characterized with unequal development. This inequality or, rather, the gap in high-tech manufacturing in the non-post-Communist and post-Communist countries of the EU, is even bigger [9].

Many interesting research studies on the inequality in high-tech distribution in the EU by its countries have been conducted [10]. One of the key areas is the digital divide across the EU [11] which is also characteristic of the educational sector [12].

The post-Communist countries of the EU have a certain potential to develop high-tech manufacturing. They are particularly distinguished from other developing countries with a higher level of education and compared with the EU's non-post-Communist countries, manufacturing and labor costs are lower. Further, the post-Communist countries of the EU have geographical and cultural proximity to the EU's non-post-Communist countries.

It is well known that high technologies create a basis for accelerating post-industrial development. For this kind of development, certain factors, such as a relatively higher investment potential, a relatively highly developed venture finance system, a relatively higher employment level in research and development (R&D) and increased funding for R&D in the whole field and, consequently, in employees and expenses incurred.

Considering the fact that moving from a command economy to a market economy was characterized with transformational recession (e.g., [13, 14] the main cause of which was a necroeconomy [15, 16] the post-Communist countries could not have high investment potential. Notably, technological backwardness [17] at present, which is the basis for a retroeconomy [18], cannot be a facilitating factor in increasing their investment potential.

Apparently, for economic breakthrough it is necessary that the EU's post-Communist countries be oriented on expanding the scale of high-tech manufacturing along with transitioning to a sustainable economic growth model [19].

For the post-Communist countries to be able to develop high-tech manufacturing and achieve sustainable economic growth in this way, *ceritas paribas*, it is necessary to develop a class of new entrepreneurs [20] who are adequate to the demands of a market economy in order to complete the transformation from *homo transformativus* to *homo economicus* as soon as possible [21: 260-262] and the replacement of "post-delets" with businessmen [22: 29-32].

Further development of "traditional" industries is essential in order to increase the speed of capital accumulation which requires maintaining and reinforcing a stable economic (and not only economic) environment for entrepreneurship.

We should take into account that only 1.2 percent of the gross domestic product (GDP) is spent on R&D in the EU's post-Communist countries while this indicator is 2.1 percent for the whole EU [5]. It is apparent that the above funding level for the mentioned activities is not enough for high technological production development at an adequate level.

The EU's post-Communist countries should play a significant role in implementing the idea of a "directed technological change" [23: 89].

It is very significant that the EU's post-Communist countries be oriented on creating and developing a knowledge based economy (e.g., [24]). At present, these countries, unfortunately, are very far from creating the necessary preconditions for developing a knowledge-based economy [5].

To make it possible for a country to move to the knowledge based economic model, a country should implement a relevant economic policy. Specifically, a country should make it a priority to train professionals which will carry out R&D work.

For this purpose, it is necessary to develop a country's universities and increase not only the level of education but also facilitate the expansion of R&D activities. This approach should also be applied to other scientific research institutions (besides universities). This would require an

increase in relevant funding. Tax breaks should be introduced for the private sector if it channels its profit (at least part of it) to R&D activities. In parallel, it is important that young people be sent abroad to study in leading universities of the world in order to have highly qualified specialists and it is necessary to create jobs in R&D for them to return to their home country.

Increasing venture funding for high-tech manufacturing is indispensable. This type of investment is oriented on establishing and developing high-risk (when the risk likelihood may be even more than 50 percent) knowledge-intensive companies. In this case a special role is to be played by the state which should defend national businesses from venture investors with dubious reputations and in this way reinforce its function as a public counsellor for businesses.

It is to be noted that the EU allocates billions of EUR for government-run and local venture funds. However, the efficiency of these funds is not always satisfactory [5].

Like in the whole EU, creating a single market for innovative products is key in transiting to the *catching up* model [4: 139-141].

For economic development to succeed generally and not only in the EU's post-Communist countries, it is necessary that technologies, including high technologies, be transformed into "public goods" [23: 91].

Conclusion. According to the official statistics high-tech manufacturing is mainly accumulated in

the EU's non-post-Communist countries (no less than 91.02 percent). Based on the World Bank data on the export of high technologies, it can be concluded that it is impractical to assert that the only accession to the EU is a sufficient condition for developing high-tech manufacturing in the post-Communist countries.

For the EU's post-Communist countries to fully realize their potential of high-tech manufacturing, it is necessary to increase the speed of capital accumulation which, especially at the beginning, should be achieved through further developing "traditional" industries. This will allow a significant increase in the share of expenses made on R&D in the GDP of the EU's post-Communist countries.

It is of critical importance that the economic policy in the EU's post-Communist countries be oriented on creating and developing a knowledge-based economy. For this purpose, all efforts should be channeled to training a professional cadre which will carry out R&D activities.

Special attention should be paid to both the individual and joint efforts of the EU's post-Communist countries to mobilize additional sources for the venture funding of high-tech manufacturing.

Creation of a single market for high-tech innovative products for the whole EU will give a great impetus to the further development of the whole EU and its post-Communist member states.

*ეკონომიკა***ევროკავშირის პოსტკომუნისტურ ქვეყნებში მაღალი ტექნოლოგიების გამოყენების პერსპექტივების შესახებ****ვ. პაპავა**

აკადემიის წევრი, ივანე ჯავახიშვილის სახ. თბილისის სახელმწიფო უნივერსიტეტი, თბილისი, საქართველო

სტატიაში განხილულია ევროკავშირის პოსტკომუნისტურ ქვეყნებში მაღალი ტექნოლოგიების გამოყენების არსებული მდგომარეობა და სამომავლო პერსპექტივები. ნაჩვენებია, რომ დღეისათვის ევროკავშირის პოსტკომუნისტური ქვეყნები ევროკავშირის არაპოსტკომუნისტურ ქვეყნებში არსებული მაღალი ტექნოლოგიების გამოყენების დონისგან საკმაოდ შორსაა. გაკეთებულია დასკვნა, რომ მხოლოდ და მხოლოდ ევროკავშირში გაწევრიანება სულაც არ არის საკმარისი იმისთვის, რომ ამა თუ იმ პოსტკომუნისტურ ქვეყანაში მაღალ ტექნოლოგიებზე დაფუძნებული წარმოება განვითარდეს. ამისათვის აუცილებელია, რომ ევროკავშირის პოსტკომუნისტურმა ქვეყნებმა თავად გამოიჩინონ ძალისხმევა, რათა გაატარონ ისეთი ეკონომიკური პოლიტიკა, რომელიც ორიენტირებული იქნება ცოდნაზე დაფუძნებული ეკონომიკის შექმნისა და განვითარების, “კვლევისა და განვითარების” სისტემის პრიორიტეტულად დაფინანსების ხელშეწყობაზე.

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