ИНСТИТУТ ЗА ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ НА БЪЛГАРСКАТА АКАДЕМИЯ НА НАУКИТЕ
ИКОНОМИЧЕСКИ ИЗСЛЕДВАНИЯ
ECONOMIC STUDIES

*Zhelyu Vladimirov*[1]

Volume 27 (5), 2018

# DISCUSSING INNOVATION POLICY BIASES IN THE NEW EU MEMBER STATES[2]

*The data show that there is a significant and persistent gap in innovation performance between new and old EU Member States. Most of Eastern European countries (EEC) are moderate innovators, except for Slovenia, while Bulgaria and Romania belong steadily to modest innovators. Obviously the new member states face more challenges in creating and implementing effective innovation policies.*

*Therefore, the goal of this paper is to analyze biases in innovation policy of the new member states (NMS), including Bulgaria, and to suggest some measures to overcome these. It includes an analysis of EU and national EEC innovation policies, investigation of main theoretical approaches underpinning these policies, effects of path-dependency, innovation policy biases, the role of transnational corporations, global value chains, and human capital. It concludes with some propositions to the improvement of EEC' innovation policies.*

*The necessity of such research originates from the fact that often the EEC policymakers accept uncritically the elements of innovation policy from more developed countries without considering the specificity of local context. The uncritical acceptance of "best practices" approach leads inevitably to biased innovation policies. For example, the EEC innovation policies tend to be based on rather linear understanding of innovation with an accent on R&D and high-tech sectors at the expense of demand-side and medium- and low-tech sectors. It seems that these countries fall into the so-called "periphery paradox". It consists in policy efforts to promote innovation, which are however detached from efforts to strengthen the local actors (firms, universities, and institutions) which demand and offer the knowledge for innovation. This way the innovation policy addresses missing actors.*

*In order to close the innovation performance gap between old and new EU member states there is a need to modify the innovation policies in EEC as the prevailing R&D based model is less relevant compared to a model of creating local innovation capabilities.*

*JEL: O32, O38*

---

[1] *Zhelyu Vladimirov is from Sofia University St Kliment Ohridski, Faculty of Economics and Business, e-mail: jeve@feb.uni-sofia.bg.*

[2] The article is supported by the state budget funds for scientific research, allocated to the Sofia University *St Kliment Ohridski* (contract № 80.10-219/26.04.2018).

## 1. Introduction

In the knowledge-based economy, the innovations are considered as a key driver for the firms and countries competitiveness and growth. The "successful economic development is intimately linked to a country's capacity to acquire, absorb, disseminate, and apply modern technologies, a capacity embodied in its NIS (National Innovation System)" (Metcalfe and Ramlogan, 2008, p. 436). OECD (2010) consider that innovations are one of the most fundamental processes underpinning economic growth, and providing solutions to economic and social challenges. The innovation process, however, requires an appropriate *public policy*, particularly for less developed innovation countries. Suurna and Kattel (2010, p. 647) define innovation policy as a set of public sector efforts aimed at enabling the private sector to move into activities that exhibit high rates of innovations.

Although the innovation became an important driver for both the European Union (EU) international competitiveness and the EU internal socio-economic cohesion, a considerable *gap* in innovation performance persists between old and new Member States (NMS). Most of NMS are moderate innovators, except for Slovenia, while Bulgaria and Romania belong *steadily* to modest innovators (EC, 2018c, p. 7). The main differences between old and NMS refer to the lower R&D intensity in the export products; smaller share of employment in high and medium high-tech sectors and in knowledge-intensive services; larger share of micro-enterprises and SMEs; and lower GDP per capita. In order to close this gap, the changes in innovation policy are of particular relevance for the NMS.

The necessity of innovation policy is justified by "market failures" to provide incentives for technology demand and diffusion of innovations (Edquist, 2001). These failures seem to occur more often in Eastern European Countries (EEC), which is due to a great extent to their legacy. In the socialist period, these countries were characterized with specific R&D and innovation accumulation not leading to increased total factor productivity (TFP), while in the post-socialist period a tendency to increased TFP was accompanied by declining R&D. In other words, the growth in EEC countries during the 1990s and early 2000s was based more on the improvements in the production capability rather than on R&D and innovation (Kravtsova and Radosevic, 2012, pp. 110-112).

In respect to the innovation policy in catching-up economies, Kattel and Primi (2012) have identified the so-called "periphery paradox". It consists in rising political attention towards innovation, which is however *detached* from efforts to strengthen the local actors (firms, universities, and institutions) which demand and offer the knowledge for innovation. This way the innovation policy *addresses missing actors*. The other side of this "paradox" is the *weak link* between academy and industry, which is due to the little need or capacity of local firms to "absorb" the results of R&D. Therefore, neglecting the innovation capacity of the existing actors eliminates the efforts of NMS innovation policy to strengthening science-industry links (Radosevic and Reid, 2006).

The Schumpeterian growth theory suggests that countries at different innovation levels should have different policy mixes (Aghion et al., 2013). In their review of the Decade of Innovation Policy in the EU countries, Izsák et al. (2015, p. 797) reveal, however, that a relative *homogeneity* of policy mixes across countries prevailed despite their differences in technological developments. This homogeneity reflects the emphasis on "best practices" without considering the specific challenges of each country. For example, the prevalent *R&D orientation* of innovation policies may be appropriate for technology leaders but not necessarily for modest and moderate innovator countries such as EEC.

Nevertheless, the EE policymakers often accept *uncritically* the elements of innovation policy from more developed Western countries (Ulnicane, 2006). This copy-paste practice corresponds to the EE *institutional legacies*, where strong vested interests favored the model of R&D based innovation at the expense of the *demand side* of innovation (Banchoff, 2002). The policy-makers have not understood that the innovation policy plays a different role in rich industrialised and catching-up economies. In the first group the main aim is to produce new technologies, while in the catching-up economies the aim is to absorb these technologies and find new areas of their use (Varblane et al., 2007). Therefore, the innovation policy could not be successfully implemented in another country without adapting it to the local economic, social, and cultural conditions.

Borrás and Edquist (2013, p. 1520) also argue that instrument mixes should be different and dependent on the context for which they are designed: "The very specific and unique nature of each innovation system, with its individual strengths and weaknesses, as well as concrete problems and bottlenecks, on the one hand, and the very specific national/regional traditions regarding state-market-society relations on the other, mean that any "one-size-fits-all" attempt is irrelevant". Reid (2011) indicate that certain elements that could be considered key failures in the national systems of innovation in EEC are not taken into account in the policy priorities. These include some framework type failures such as the weaknesses in education and financial systems, institutional failing, and the "demand" side of innovation.

Obviously, the EE economies face more challenges in creating effective innovation policies as their competitiveness is still based on relatively low production costs. Therefore, it is crucial for these countries to identify which types of innovations to support and how to do it, given the budgetary constraints and trade incentives that tend to push towards specializing into low value added (VA) activities (ECLAC, 2008).

The **goal** of this paper is to analyse biases in innovation policy of the NMS (EEC and particularly, of Bulgaria), and to suggest some measures to overcome these. It includes an analysis of EU and national EEC innovation policies, investigation of main theoretical approaches underpinning these policies, effects of path-dependency, innovation policy biases, the role of transnational corporations (TNCs), global value chains (GVCs), and human capital. It concludes with some propositions to the improvement of EEC' innovation policies.

## 2. Literature Review

### *2.1. EU innovation policies – making no difference between new and old member states*

The EU elaborated an integrated approach to economic growth based on innovations, which, however, did not take into account the differences between old and NMS. In accordance with this approach, the member states set up their strategies for innovation, competitiveness and smart specialisation. The analysis of these strategies leads to the conclusion that the proposed measures also do not consider both institutional and innovation capacity differences between the EU member states. It is common to all NMS that: (1) The normative policy documents on innovation policy were formulated very recently and to a great extent due to the EU's pressure; (2) Innovation policy plans were often short-term; and (3) The existing policy mix reflected strongly the priorities and objectives as defined in the EU programs for R&D and innovation (Suurna and Kattel, 2010, p. 653)

For example, the European Commission (EC) has identified specific sectors to be supported such as: space technology, clean and energy efficient motor vehicles, transport equipment, healthcare, environmental goods, energy supply industries, security industries, chemicals, engineering, transport-equipment, agro-food and business services (EC, 2010). The support consists in implementing advanced technologies and promoting innovations. These sectors, however, are more developed in countries that rank highly in terms of R&D and innovation, and the support is focused on gaining competitive advantages in leading areas of emerging growth (Ormala, 2017).

At the same time, the NMS displays *persistent gaps* with frontier economies in terms of production structure specialization and aggregate innovation performance. These countries show "periphery" features: co-existence of islands of technological excellence with a prevailing low-tech and low-skilled labor production. In most EEC the economic structure is characterized by low productivity growth and dominated by outsourcing activities with low demand for R&D (Kattel and Primi, 2012). Hence, these countries are not quite able to contribute to the high technology development through innovation. Török et al. (20139) also observed that the NMS face significant challenges, as they move towards more knowledge- and skills-oriented industries, which are hampered by weaknesses in innovation capacity and knowledge transfer.

The diversity of technological specialisations, industrial structures, and research policies implies that the relative importance of EU policy instruments differs between member states (Chobanova, 2007, p. 96). Therefore, the NMS need to consider the *absorptive capacity* of their economies and to create innovation policies, which correspond to their specifics.

### *2.2. NMS innovation policies – not taking into account country's specifics*

Although the majority of enterprises in NMS are non-R&D innovators, the national innovation policies still focus on (a small number of) active innovators and neglect the huge amount of local firms. The company-specific R&D intensity in these countries is relatively low, and tend to rely on R&D embodied in imported inputs (Reid, 2011).

For example, the share of manufacturing products in the EEC' exports increased from 80% in 1999 to 85% in 2013, while the share of machinery and transport equipment in their exports increased between 1995 and 2014 from 20.2% to 44.3%. These increases are due to the new role of EECs as manufacturers of intermediate goods, and as suppliers of machinery and transport equipment within the GVCs (Bierut and Kuziemska-Pawlak, 2016, pp. 12-16). At the same time, the relatively low share of high-tech manufacturing exports (26% vs 33% in Germany and 38% in the EU-15; data for 2014) indicates a relatively low non-price competitiveness (Bierut and Kuziemska-Pawlak, 2017, p. 523). The share of high-tech exports in total exports from these countries remains lower than in more advanced EU countries, with some exception of Hungary and Czech Republic (Table 1).

Table 1

High-tech exports (% of exports)

| | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| EU-28 | 16.1 | 15.4 | 17.1 | 16.1 | 15.4 | 15.7 | 15.3 | 15.6 | 17.0 | 17.9 | 17.8 |
| Hungary | 21.3 | 20.2 | 22.2 | 21.8 | 20.9 | 17.3 | 16.3 | 14.5 | 15.4 | 15.9 | 15.7 |
| Czech Republic | 14.1 | 14.1 | 15.2 | 16.1 | 16.4 | 16.1 | 15.1 | 15.3 | 15.5 | 15.0 | 15.3 |
| Estonia | 7.8 | 7.5 | 6.9 | 10.4 | 14.8 | 14.1 | 14.9 | 16.3 | 15.5 | 15.6 | 12.0 |
| Slovakia | 5.0 | 5.2 | 5.9 | 6.6 | 6.6 | 8.2 | 9.6 | 9.9 | 10.0 | 9.7 | 10.6 |
| Latvia | 4.6 | 4.6 | 5.3 | 4.8 | 6.7 | 6.4 | 8.0 | 9.7 | 11.0 | 10.2 | 10.2 |
| Croatia | 6.5 | 6.7 | 7.6 | 7.0 | 5.8 | 7.2 | 7.9 | 6.6 | 7.1 | 9.7 | 9.3 |
| Poland | 3.0 | 4.3 | 5.7 | 6.0 | 5.1 | 6.0 | 6.7 | 7.9 | 8.5 | 8.4 | 8.5 |
| Lithuania | 7.3 | 6.5 | 5.8 | 6.0 | 5.6 | 5.8 | 5.8 | 6.6 | 7.6 | 7.8 | 8.1 |
| Romania | 3.5 | 5.4 | 8.2 | 9.8 | 8.8 | 6.3 | 5.6 | 6.4 | 7.3 | 8.3 | 7.9 |
| Slovenia | 4.6 | 5.2 | 5.5 | 5.3 | 5.3 | 5.2 | 5.5 | 5.4 | 5.9 | 5.7 | 5.5 |
| Bulgaria | 3.5 | 3.6 | 4.6 | 4.1 | 3.7 | 3.8 | 4.0 | 3.9 | 4.4 | 5.1 | 5.4 |

*Source: Eurostat (http://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=en&pcode=tin00140&plugin=1)*[3]

As data shows, Bulgaria, Slovenia, Romania, and Lithuania have relatively low share of high-technology exports. The majority of Lithuanian manufacturing value-added is produced in low-tech industries, while Bulgaria's low share of high-tech-intensive export is attributed to the limited and decreasing R&D expenditures. In Romania, the automotive multinational affiliates induce certain high-tech export but the general level is low (Éltető, 2014, p. 53).

[3] The data shows the share of exports of all high technology products in total exports. High technology products are defined according to SITC Rev. 4 as the sum of the following products: Aerospace, Computers-office machines, Electronics-telecommunications, Pharmacy, Scientific instruments, Electrical machinery, Chemistry, Non-electrical machinery, Armament. The total exports for the EU do not include the intra-EU trade.

This situation is due to the fact that many of the local enterprises (mainly SMEs) lack the absorption capacity for new technologies. The insertion of EEC countries into GVCs contributed both to a higher share of their value added (VA) in the exports of other countries, and to an increase of the foreign VA in their exports, which in 2011 was equal to 46.9% (OECD-WTO, 2015). Kravtsova and Radosevic (2012) found that even the high-tech sectors in EEC are not actually R&D intensive as these countries are specialized in low VA segments of high-tech sectors. Currently, the EEC lag behind more developed EU countries in terms of intramural R&D and patent applications. The R&D intensity even of electronics is lower than the average for manufacturing, which means that the high-tech orientation in EEC is an effect of statistics, due to foreign-owned firms investing in the 'low-end' of high-tech (Srholec, 2006). The Summary Innovation Index 2017 relative to EU-28 in 2010 and 2017 shows that two countries (Bulgaria and Romania) have the lowest index (below 50% of EU average both in 2010 and 2017), and the majority of EEC are moderate innovators (Table 2).

Table 2

Summary Innovation Index 2017 of EEC relative to EU 2010 (and 2017)

| | Relative to EU in 2010 | | | | | | | | Relative to EU in 2017 |
|---|---|---|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2017 |
| EU-28 | 100.0 | 100.3 | 98.8 | 99.9 | 99.8 | 101.8 | 104.6 | 105.8 | 100.0 |
| BG | 49.5 | 47.4 | 39.5 | 42.2 | 44.0 | 45.6 | 47.5 | 48.0 | 45.4 |
| CZ | 90.0 | 88.5 | 82.7 | 84.2 | 83.8 | 85.5 | 84.5 | 87.1 | 82.3 |
| HR | 56.2 | 57.6 | 52.2 | 54.5 | 49.1 | 53.9 | 54.4 | 54.2 | 51.2 |
| LV | 48.2 | 48.3 | 45.5 | 45.3 | 54.9 | 61.7 | 58.4 | 59.8 | 56.5 |
| LT | 55.1 | 56.9 | 60.0 | 59.6 | 58.3 | 64.3 | 77.3 | 75.3 | 71.1 |
| HU | 69.7 | 68.5 | 65.3 | 65.4 | 66.1 | 66.8 | 67.7 | 69.6 | 65.7 |
| PL | 53.5 | 53.8 | 50.3 | 52.0 | 50.3 | 51.7 | 54.7 | 56.7 | 53.6 |
| RO | 46.9 | 46.7 | 40.1 | 39.9 | 32.2 | 30.4 | 32.4 | 32.9 | 31.1 |
| SL | 96.2 | 98.4 | 95.7 | 96.3 | 98.0 | 97.1 | 98.1 | 97.6 | 92.2 |
| SK | 63.0 | 66.1 | 68.7 | 70.9 | 66.5 | 68.6 | 69.8 | 67.8 | 64.0 |
| DE | 127.8 | 129.2 | 128.8 | 128.9 | 124.5 | 125.3 | 124.4 | 126.5 | 119.6 |

*Source: EC (2018c, p. 98).*

If we take, however, Germany as a reference point, the Summary Innovation Index 2017 (relative to Germany 2017) is equal to 26% for Romania, 38% % for Bulgaria, 45% for Poland, 54% for Slovakia, 55% for Hungary, and 69% for the Czech Republic (the EEC' average is 51%).

In general, the NMS have also smaller GDP per capita in PPS compared to older member states, although there are significant differences amongst them. As of 1 June 2018 the GDP per capita in PPS for Bulgaria is 49% relative to the EU-28, for Croatia – 61%, for Romania – 63%, for Latvia – 67%, and for Hungary – 68% (Eurostat, 2018). These data suggest that a great share of the population in these countries are low-income consumers, and can't support more sophisticated and consequently more expensive products and services. If Luxembourg enjoy an almost EUR 2,000 gross minimum wage in 2018, Bulgaria ranks last with just EUR 261.00, (https://www. reinisfischer.com/minimum-wages-european-union-2018).

Based on these assumptions the question arises to what extent the EEC will be able to participate in the new super-advanced industrial world. Given their deficiencies in the technological level and skills base how far they can contribute to develop space technology, clean motor vehicles, nanotechnologies, and bioengineering innovations? (Bartlett, 2014, p. 36). The EC accounted that "differences in innovation performance in the EU has started to increase, signalling a possible *halt to convergence* in Member States' innovation performance" (EC, 2013, p. 5).

Therefore, it seems that the current innovation policy mixes of instruments do not well reflect the NMS' level of innovation capacity. Often, these mixes are simply transferred from elsewhere rather than being an appropriate response to domestic challenges (Izsák et al., 2015). Under such conditions, Reid (2011) distinguishes four possible types of *system failure*: capability failures; institutional failures; network failures; and framework failures, to which Tsipouri et al. (2009) add "policy failure" (deficiencies in the system of governance). Veugelers (2015) also considers that three types of deficits that can arise: (1) deficits in resources and capabilities for innovation; (2) deficits in incentives for innovation; and (3) systems failures. Amongst these *capability failure* seems to be the most significant, ahead of institutional and market failures. According to von Tunzelmann (2004) the basic failing in transition countries is not so much "market failure" or "government failure", but pervasive "network failures". Particularly, the lack of *social capital* (Putnam 1995) and trust is a serious barrier to the development of the innovation system in these countries.

In summary, low level of R&D intensity and poor demand for innovation in many parts of EE economies, combined with insufficient innovation capabilities, institutional weakness, network failures, relatively small purchase power of consumers, and lack of trust and social capital, constitute specific conditions, to which innovations policies should adapt.

### *2.3. The case of Bulgaria – a gap between political rhetoric and reality*

Against the background of the EU priority sectors, the actual picture of the Bulgarian export shows that the greater share consists in raw materials. The country export specialisation is mainly in low-tech products: manufactured goods classified chiefly by material (23.12% of total export); mineral fuel, lubricants and related materials (17.39%); machinery and transport equipment (16.69%); miscellaneous manufactured articles (15.70%); chemical and related products n.e.c. (10.1%); food and live animals (7.47%); crude materials, inedible (except fuel) (5.91%); beverages and tobacco (2.4%); animals and vegetable oils, fats and waxes (1,02%); and commodities and transactions n.e.c. (0.2%) (NSI, 2018). It is worth noting that products with a higher R&D intensity have the lowest values of the Balassa Index, although it shows a small increase from 0.4 in 2001 to 0.58 in 2011 (Iarlyiska and Dimitrova, 2012).

Most of the Bulgarian companies work *under the technology frontier*, and "their growth is based on improvements in productivity that are neither related to R&D and dissemination of knowledge, nor to generation of knowledge" (OPIC 2014-2020, 2015, p. 16). The share of innovative enterprises of total number of enterprises is 27.4% in 2012 and 27.2% in 2016 (NSI, 2018), while the EC Digital Economy & Society Index ranks the country steadily on 27 positions (amongst 28 EU countries) for consecutively 2014, 2015, 2016, and 2017 years; (Todorova and Slavcheva, 2018, p. 9). The share of *digitised enterprises* in 2017 (12%) is among the lowest in the EU (EC, 2018b), while the proportion of the population ordering goods or services over the internet in the previous 12 months is 17.7% (EU average: 57.5 %). The number of people using e-banking is also low, accounting for 8.65% of Internet users (and 5.49% of all individuals). Not surprisingly, the share of turnover from sales of the new to the market products in 2016 is only 2.7% of the total turnover of enterprises, the share of turnover from sales of the new to the firm, but not to the market products is 3.3% of total turnover, and these shares are about 1/3 of the EU average (NSI, 2018).

There is a large gap between the political rhetoric to enhance R&I in Bulgaria and the reality of budgetary constraints on these activities. The Bulgarian R&I system is characterised by significant underfunding, of between 0.5- 0.6 % of GDP in the last decade. The RIO country report for 2017 accounts that an insufficient financial support to the R&D&I system continue, as the gross domestic expenditure on R&D (GERD) (as % of GDP, 0.57% in 2011, 0.96% in 2015, and 0.78% in 2016) remains below in respect to both target and EU-28 average. Public expenditure on R&D as a percent of GDP (public R&D intensity) fell from 0.34% in 2009 to 0.25% in 2015; for this indicator, Bulgaria ranked 28th among the EU Member States in 2015. In 2014, the GDP on R&D (GERD) per capita in Bulgaria equalled EUR 46.3, while the EU-28 average reached EUR 558.4 (Todorova and Slavcheva, 2018, p. 15). The R&D by the business sector (as a percentage of GERD) increased from 30 % in 2009 to 50 % in 2010, up to 61 % in 2013 (near the EU-28 average of 64 %), mainly due to the EU's Operational Programmes (EC, 2017, p. 9). The intensity of the business enterprise expenditure on R&D (BERD) has been on the rise since 2009, although on a small pace (Table 3).

Table 3

Main R&I Indicators 2017, Bulgaria

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|
| R&D intensity | 0.56 | 0.53 | 0.60 | 0.63 | 0.79 | 0.96 | 0.78 |
| General government expenditure on education as % of GDP | 3.60 | 3.40 | 3.30 | 3.70 | 4.10 | 4.00 | 3.40 |
| R&D funded by BES (% of GDP) | 0.09 | 0.09 | 0.13 | 0.12 | 0.18 | 0.34 | |
| BERD (% of GDP) | 0.28 | 0.28 | 0.37 | 0.39 | 0.52 | 0.70 | 0.57 |
| BERD funded by the government | | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 | |
| Turnover from innovation as % of total turnover) | 7.6 | | 4.2 | | | | |
| Trade balance of high technology products as % of GDP | na | na | -3.50 | na | -2.56 | -2.38 | na |
| SMEs introducing product or process innovations as % of SMEs | | | 21.4 | | 23.0 | | |
| World Share of PCT applications | 0.02 | 0.02 | 0.02 | 0.03 | 0.03 | 0.02 | |

*Source: EC (2018b, p. 64; Todorova and Slavcheva, 2018, p. 16)*

The employment in high and medium-high technology manufacturing in Bulgaria has a smaller share of total employment (3-4% vs the EU average 5.5-6%), while both the share of employment in R&D activities and the R&D expenditure relative to GDP are around half the EU average. The issues with human capital is evident in the fact that "annual requirements of engineering and technical professionals are almost 3 times more than graduates in this area (64,000 versus 23,000) (Anavi, 2015).

The share science and technology personnel of active population in Bulgaria is increasing from 3.3% in 2010 to 6.1% in 2016, while the R&D personnel from all sectors together amounts to 0.68% of the labour force in 2015, compared with an EU-28 average of 1.2%. The structure of R&D personnel is skewed towards government sector (0.25 vs 0.16 of the EU-28 average), while the shares of business enterprise and the higher education lag behind (0.14 and 0.38 vs 0.29 and 0.65 respectively) (Todorova and Slavcheva, 2018, p. 18).

Not surprisingly, both researchers and expert reports on the Bulgarian R&I system are quite critical. For example, in 2007 Chobanova (2007) identified a gap between the R&D objectives and R&D funding base; between fostering innovation aim and slow recovery of R&D in business enterprises; between strengthening the human R&D resource base in economy objective and level of R&D personnel salaries and of funding R&D activities. Eight years later she found that the innovation policy did not lead to the desired results. The structural challenges to the Bulgarian IS remained almost the same, which suggests that this IS addressed inadequately these challenges (Chobanova, 2015, pp. 3-4).

Other reports such as the World Bank 3S Report for Bulgaria (2013) and the RIO country report 2017 also indicate that the R&I system is fragmented, the current funding leads to the low levels of public appreciation of scientific research and low salaries (Todorova and Slavcheva, 2017). The EC report in 2018 find that the system is characterised by a high level of *institutional fragmentation* (especially in the HE sector), and there is an acute – and long-standing – problem-related to national *funding for research*. Research-industry links are impeded by lack of a critical mass in research-performing industrial actors and the low technological absorptive capacity of the domestic sector. There is also a widespread *lack of trust* in the R&I system, which is reflected, in the *low level of researcher salaries* and in the low – and declining – priority the government allocates to knowledge creation in general (EC, 2018a)

### *2.4. Two models of innovation policies*

The review of innovation policies shows that there are two competing models to stimulate the innovation performance. The first model is based on a *linear* understanding of the innovation process by promoting mainly R&D initiatives, while the second model is more complex. According to Tödtling and Trippl (2005) the linear model was dominating until the 1990s. It considers R&D as the main source of innovation by ignoring important feedback loops and interactions among the distinct stages of the process (Samara et al., 2012). By stimulating science-based innovations, it supports primarily the *high tech sectors* at the expense of medium and low-tech ones.

This model emphasised the *supply* of innovation inputs by *neglecting the absorption capacity* of firms and the specific demand for innovation support in different countries and regions. Many policies simply follow "best innovation practices" derived from high-tech areas and well-performing regions, which are often applied regardless of particular regions and countries. The specific strengths and weaknesses in terms of industries, knowledge institutions, and innovation potential are frequently not taken into account. In reality, however, innovation activities differ strongly between central, peripheral and old industrial areas (Tödtling and Trippl, 2005), and there is no one "best practice" innovation policy. Therefore, there is a need for more differentiated innovation policies, which have to deal with *specific innovation barriers in different countries and regions*.

According to the *non-linear* model, innovation results from an interactive learning process of knowledge accumulation, transformation, and commercialisation. This model is reflected in the concept of "system of innovation" (SI) at national, regional, and sectoral level (Freeman, 1987, Lundvall, 1992, Nelson, 1993). The theoretical foundation of this approach lays in the *evolutionary economic theory* (McKelvey, 2005; Saviotti, 2005; Fagerberg et al. 2009), according to which the innovation is an interactive process of learning, highly dependent on history (path dependence), as well as on economic, political and other social factors. Hence, innovation should be seen as an *evolutionary and non-linear process*, requiring intensive communication and collaboration between different actors (companies, universities, educational and financing institutions, standard setting bodies, industry associations and government agencies) (Tödtling and Trippl, 2005, p. 1206). Applying an evolutionary approach to shaping innovation policy, apart from being more economically justified, would also help to increase the demand for knowledge developed in the country (Chobanova, 2001, p. 119).

The concept of NIS allows for revealing the differences between countries in respect to their economic structure, R&D institutional base and innovation performance. The main message of the NIS is that the firms carry out innovation through extensive interactions with universities, research centres, users and suppliers, and under a specific institutional context (Filippetti and Archibugi, 2011). Therefore, the IS concept is viewed as an evolutionary and social process of collective learning (Edquist, 2005).

Soete (2007) distinguishes four essential factors for the well-functioning NIS, which are: (1) investment in social and human capital; (2) research capacity of a country or region and its connection with the higher education system; (3) geographical proximity (regional clusters); and (4) the "absorptive capacity" of firms, clients and consumers in a particular region or country. These factors can be represented as elements of a virtual circle mutually reinforcing each other (Soete, 2007, pp. 278-281). Watkins et al. (2015) also present the functions that an effective innovation system should support.

Kivimaa and Kern (2016, p. 206) propose that policy mixes favourable to sustainability transitions need to involve both policies aiming for the "creation" of new and for "destroying" (or withdrawing support for) the old. Based on that, it seems that the policy mixes to promote R&I in EEC did not contribute to significant "catching up", partly because the "destroying" function was not accompanied by the "creation" one.

### *2.5. Path-dependency effects*

Radosevic (1998) argues that the transformation of NIS in the post-socialist economies of Eastern Europe during the 1990s was evolving between the restructuring and erosion of potentially viable R&D capacities. In their former structure of innovation industrial R&D institutes played the dominant role both in terms of personnel and in terms of expenditure. Suurna and Kattel (2010) also note that the former R&D institutes could have a key role in bridging academic research with industry needs as they were essentially the only existing link between the two. With the collapse of the institute system, however, the links between academy and industry have been destroyed and became the weakest link in the EEC R&D system. During the transition period, the innovation policy was considered to be of secondary importance in respect to privatisation and macroeconomic stability.

The transition period does not lead to successful technological restructuring, quite the contrary. Chobanova (2016) indicates that this process was accompanied by an "implosion" of the Bulgarian R&D system. During the period 1990-1997 the separate state research organizations (about 37) working for state-owned big complexes, as well as R&D offices inside business enterprises, were closed. The R&D funding has withered quickly, and the R&D expenditure from 2.39% in 1990 levelled off at an annual average of just below 0.5% of GDP in the period 2003-2012. The most striking result was the collapse of R&D performance in the business enterprise sector. By 1999 its share dropped by about a factor of three since the early 1990s from more than 90% to about 20% of total (Chobanova, 2007, p. 82). No less important is that the R&D outflow led to the depreciation of problem-solving expertise as many scientists, researchers, and engineers move to better off non R&D activities or abroad (Radosevic, 1998). For example, from 1996 to 2003 the number of total R&D personnel in Bulgaria declined by approximately 40%, and the number of researchers by about 35% (Chobanova, 2007, p. 83).

Filippetti and Archibugi (2011) demonstrate that the recent crisis has not been of the same magnitude across all European countries due to great *differences of structural characteristics of their NIS*. Countries with stronger NIS have been less affected by the downturn, while the most negatively affected were the catching-up NMS. Specifically, the presence of qualified human resources plays a crucial role in cushioning the effects of a downswing in innovation in frontrunner countries, while it seems to be less the case in NMS. "There is the risk that the effects of the downturn will turn out to be structural, and as a result of the crisis at least some of the New Member States will *be no longer able to sustain the catching-up process* they started before the recession"(Filippetti and Archibugi, 2011, p. 188).

According to Chobanova (2016, p. 78) the current innovation gap cannot be justified by both the transition legacy and the 2008-2009 crisis, as all other countries have been affected by these). She considers that the reasons must be sought somewhere else - *in concept, policy*, tools and mechanisms for their implementation.

### *2.6. Demand-led versus supply-led innovation policies*

If the linear model reflects mainly the *supply side*, the non-linear model includes also the *demand side*. The demand-based innovation policies is defined as a "set of public measures to increase the demand for innovations, to improve the conditions for the uptake of innovations and/or to improve the articulation of demand in order to spur innovations and the diffusion of innovations" (Edler, 2009, p. 3). These policies complement and not substitute the supply side measures. For example, the Aho et al. report (2006) suggests that on the supply side, it is necessary to increase resources for R&D, and to improve the structural mobility in Europe, while on the demand side it is necessary to create a market that stimulates innovation.

If the supply of innovation is generally dominated by public resources, demand is driven by private resources (Soete, 2007). Therefore, a way to drive demand for innovative products is to use the public procurement instruments. David et al. (2008, p. 687) argue that "public policy supporting innovation has proven to be especially effective where funding for R&D was combined with complementary policies supporting the adoption of innovation". An important direction for a well-balanced *policy-mix* is to link R&D funding to internal and external demand for these activities (Chobanova, 2015). According to Borrás and Edquist (2013) a relevant issue to analyse in innovation systems is the appropriate balance between demand-side innovation policy instruments and supply-side instruments.

The demand side is a key innovation category, which includes the users of new knowledge and the customers for innovations. The demand policies, however, should be selected in areas in which local producers are competitive due to the knowledge of local demand conditions. One of the comments of the World Bank 3S Report for Bulgaria (2013) is that the funding instruments in Bulgaria have been designed with the idea of the "supply-push" model, while the priority is rather to promote market-oriented (demand-driven) research.

Howells (2005, p. 1231) indicates an almost complete disregard of demand factors in the formation of regional innovative activities, while a more "demand side" perspective of innovation policy will contribute to the local growth. Instead of applying strategic approach, based on analysis of the *national needs*, the policy measures in EEC often follow the EU financing priorities without adaptation to national priorities. In many of these countries, political instruments and tools do not fit the needs of the firms.

### *2.7. R&D (supply side) biases in NMS innovation policies*

The typical NMS innovation policy measures aim to commercialize certain R&D results, mainly in a high-tech area (Kattel and Primi, 2012), while the demand for R&D and skills remain relatively low because of the prevailing specialization into low-end activities. Therefore, where firms carry out basic modernisation of production and incremental innovations, a policy fostering high-level R&D basically *misses its target*. The results of Kravtsova and Radosevic (2012) suggest that R&D plays a relatively small direct role in the current performance of the EE economies. Reinstaller and Unterlass (2011) also find that when we move down the technology intensity ladder, we see that R&D investment and other innovation expenditures are no more the principal factors driving innovation in the innovation-intense industries. In the countries with these types of industries, technology transfers are more important drivers of innovation along with non-R&D-based innovation activities. This applies to the group of NMS that are technologically more advanced, while in the group of less advanced NMS, technology transfer is the only significant source of product innovations.

According to Edler (2009) all EEC have focused on the supply side and have paid little attention to the demand side for innovation. These policies are facing inevitably a range of system failures such as information and adoption problems, lack of skills to absorb a new technology, with training and education being severe bottlenecks, and so on. Even the poor demand for innovation is recognised, the proposed solution is still supply-side (Edler, 2009, p. 20). Not surprisingly the capacity to generate demand for innovation is the *weakest aspect* of the national innovation capacity of EEC (Radosevic, 2004, p. 655). Aho et al. (2006) also argue that the supply side especially in cohesion regions of the EU is best served if linked to their own context and *the needs of this local context*. It means that innovation policies are successful if correspond to the needs of local demand conditions.

Almost all innovation policy implementation problems in the EEC are due to very weak and disorganised actors with unresolved coordination problems. The policymakers didn't understand that in a catching-up context, R&D denotes mostly *absorptive rather than innovative capability*, which is in line with the two sides of R&D (Kravtsova and Radosevic, 2012). Therefore, the EEC need to overcome the existing mismatch between R&D oriented innovation policy and the needs of new technology absorption.

For example, although the core of the Bulgarian RIS3 is the promotion not only the supply but also the demand for R&I results, the research in the business sector is not accompanied by policies to stimulate demand for its results (Chobanova, 2015). Bulgarian RIS3 focuses again on development and implementation of new technologies by neglecting the knowledge and technology transfer, and the absorptive capacity of local firms (Ministry of Economy, 2017). The efforts to introduce demand-side innovation policies are expressed modestly in corporate and income tax exemption of R&I public institutions, as well as in the accelerated depreciation tax (100% annually) for assets acquired by means of R&D in the private sector too. As Chobanova (2014) indicates, however, tax incentives for R&D expenditures are very limited in scope and have failed to attract private enterprises.

### *2.8. (Neo) Schumpeterian theory of innovation-based growth*

According to the (neo) Schumpeterian theory of growth (Aghion and Howitt, 1998) the successful innovation policies should take into account the technological level of individual countries. Under this framework, not all countries are equally placed to generate and benefit from innovations. Innovation will be a strong dis-equilibrating factor in the processes of economic growth, giving rise to the pervasive differential growth rates between different areas (Verspagen, 1997). Areas that are close to existing successful innovative areas have a better chance of success, while "innovation poor" regions can be locked into a "vicious"' circle of innovation stasis or decline (Howells, 2005, p. 1223)

Therefore, countries at a different distance from the technological frontier are supposed to have different policy mixes. If a country is operating far from the technological frontiers (which is expressed in the characteristics of their products and exports), it would be better to support the upgrading of its activities instead of relying on R&D based industries, where other countries have greater advantages. Radosevic (2011) shows how the implementation of a neo-Schumpeterian perspective promotes policies which are country-specific depending on each country's distance from a technology frontier. This approach differs substantially from the focus on "best practices policies" that prevails in the NMS policies.

The uncritical acceptance of "best practices" leads inevitably to *biased innovation policies* as in the case of most EEC. Kattel and Primi (2012) argue that the innovation policies in these countries tend to be based on a rather linear understanding of innovation (from lab to market), whereas most of the countries are specialized into low-end production activities with low demand for R&D. The majority of firms in catching-up economies do not work on the technology frontier and hence they do not feel a need for R&D. Instead, they should be at first helped to move closer to the productivity frontier through the innovation diffusion and afterwards they should start to invest into R&D (Varblane et al., 2007).

Collier et al. (2016) find that the accelerated innovation process is accompanied by a concentration of knowledge production in privileged "technology frontier" areas, which leads to a continuous decrease in demand for nationally-based results of R&D and a subsequent increase in brain drain (Chobanova, 2011). These trends contribute further to the widening of the technology gap between more and less innovative countries and regions.

### *2.9. High-tech biases in NMS innovation policies*

The innovation discourse in the NMS is still very much driven by a science-based, high tech model where the technology diffusion plays a secondary role (Edler, 2009). Based on the analyses of different strategic documents in the NMS Varblane et al. (2007) found that the major focus in these documents has been on the creation of *high-technology industries* such as biotechnology or ICT by neglecting the demand side of local firms. In reality, first, the R&D systems in these countries and their performance disintegrated heavily during 1990s; and second, this was complemented by the strong specialization into low-end value chains where the demand for R&D and skills remain relatively low (Kattel and Primi, 2012)

Nevertheless, the innovation policy in EEC is dominated by *high-tech bias*, which supports a small number of innovative companies but leaves the majority of firms (mostly SMEs) untouched by innovation policy. The NMS pursue rather narrow innovation policies, which might lead to the creation of "islands of excellence" or "cathedrals in the desert" with little relevance for overall socio-economic development (Ulnicane, 2006). Policies targeting high-innovation intensity are likely to fail in countries that are dominated by not knowledge-intensive sectors as is the case of NMS (Reinstaller and Unterlass, 2011).

Varblane et al. (2007) warns against the emergence of a *dual economy* in catching-up EEC with low productivity traditional sector, and a small high-tech sector that is relatively isolated from the rest of the economy. The obsession with high-tech industries diverts the attention of policymakers from the real problems of local firms to develop their proper innovation capabilities (Havas, 2006). Therefore, a more adequate strategy for NMS is to stimulate the use of high technology in a wider range of sectors, including low-tech ones as customers of high-tech sectors. It would be better to foster technology transfer, increase absorptive capacity, and improve the basic institutional conditions that encourage growth.

### *2.10. The role of TNCs and GVCs for innovation in NMS*

Nölke and Vliegenthart (2009) consider the EE economies as dependent market economies (DMEs), where most R&D is done outside and then imported. The NMS are considered by foreign corporations mainly as a place for production and not for research. This situation is leading to a growing dualism in economies between a small number of innovative (often foreign) enterprises and the rest.

Particularly in high-tech industries, the linkages of local firms to TNCs is minimal. As Szalavetz (2008) argues high-tech production and export in peripheral countries are not related to any local R&D efforts, or have no local R&D basis. Foreign investors prefer to improve recipient countries' productive, but not technological capability. Researchers in Slovakia also identified a little technology transfer from TNCs to local suppliers, which decreases the chances for technology and innovation spin-off (Akbar and Ferencikova, 2007). Additionally, foreign firms are reluctant to provide core technology into their subsidiaries in countries with weak intellectual property rights (IPR) (Fu et al., 2011). The great share of EE consumers also are not quite able to buy leading-edge technology and innovation products, mainly because of the small disposable income. Therefore, the pre-conditions for innovations to be absorbed in the EE markets are challenging (Edler, 2009). Not surprisingly, Fu et al., 2011, p. 1204) observe that studies largely fail to provide convincing evidence that there is a significant positive technological transfer or spillover effect of FDI on local firms.

The results of Ivanova and Ivanov (2017) suggest that Bulgaria is deeply integrated in global value chains (GVCs) mainly through manufacturing activities such as petrol refining, the production of basic metals, machinery, electrical and transport equipment. The country participates in highly fragmented GVCs and specialises in processing and assembly functions. The products with which Bulgaria participates in GVCs are predominantly inputs rather than final products, which explains relatively low domestic VA content and an intense usage of foreign inputs. The Bulgarian companies with export potential, even when in high added-value industries, are engaged in low added-value activities (Move.BG, 2016).

Fu and Gong (2011) show that geographically clustered and well-connected local firms in China are more likely to produce innovations, rather than local MNCs partners. If foreign firms dominate the high-technology industry, indigenous innovations are the driving forces of the technological capabilities building in the indigenous sector. Some local high tech industries can also grow, although in isolation with the rest of the economy. Besides, they identify negative effects of foreign R&D on local firms in China, due to the strong competition for talent, resources, and markets between foreign and indigenous firms.

Undoubtedly, the GVCs open opportunities for local firms to "move up the value chain" from manufacturing to more advanced functions such as marketing, designing, and R&D through intensive learning and experience accumulation (Watkins et al., 2015). The benefits of technology diffusion can be felt, however, with parallel indigenous innovation efforts and the presence of conducive innovation systems (Fu et al., 2011). Therefore, local firms need to learn how they can absorb, develop, and recombine new and existing knowledge to produce more innovative products and services (Pietrobelli and Rabellotti, 2011).

The technology diffusion and adoption rely on absorptive capacity of local firms, which is defined as "the ability of a firm to recognise the value of new, external information, assimilate it and apply it to commercial ends" (Cohen and Levinthal 1990, p. 128). It depends strongly on the level of *human capital and R&D expenditures* of the country. Foreign technology can help the upgrading of local firms only if sufficient indigenous R&D activities and human capital are present (Fu et al., 2011, p. 1210). Therefore, the decision makers need to understand that the economic growth and competitiveness of their countries depend largely on the capacity of local firms to innovate (Rondé and Hussler, 2005, p. 1150).

### *2.11. Institutional and human capital dimensions of innovation systems*

Innovation systems are social systems as they include social actors such as institutions and organisations, the behaviour of which is influenced by the existing sets of habits, practices and rules (Samara et al., 2012, p. 626).

Institutions (formal or informal) provide incentives, information and resources, reduce uncertainty, and attenuate conflicts, while some institutions may provide the wrong incentives, faulty information, allocate insufficient resources, fuel conflicts, and fail to reduce uncertainty. Niosi (2002) reveals some sources of NIS institutional inefficiencies, ineffectiveness, as well as sources of system inefficiencies, while Tödtling and Trippl (2005) demonstrate that the failures of regional innovation systems (RIS) may be due to an underdeveloped institutional structure. They also observe some indications of *core-periphery differences* of innovation between large agglomeration and rural regions, which can be extended between countries too. The main problem in peripheral regions is a low level of R&D and innovation due to the dominance of SMEs in traditional industries, weakly developed firm clusters, few knowledge providers and a weak endowment with innovation support institutions (Tödtling and Trippl, 2005, p. 1215). For such regions innovation policy should support organisational and technological "*learning*" and should target the SMEs innovation weaknesses. Therefore, innovation policy should deal with enhancing *human capital* (training of workers) and social capital (i.e. encouraging the formation of trust-based relationships between regional actors). Particularly, neo-Schumpeterian models underline the role of human capital as the most important factor, responsible for the country's level of innovation and absorption capacity.

Castellacci and Natera (2013) maintain the idea that the dynamics of NISs is driven by the coevolution of two main dimensions: *innovative capability* and *absorptive capacity*, which influence each other and both are related to the human capital. If R&D is the central innovative capability factor for advanced economies, infrastructures and international trade are the key absorptive capacity variables for middle-income countries. In this framework, financing for innovation should not be considered as a "direct business transaction", i.e. paying public money and receiving an invention later. Innovation financing should to be considered as an *indirect capability strengthening process* (Szalavetz, 2008, p. 34). Therefore, financing for firms' innovation contributes to the increasing level of absorptive capacity, technology, and human capital as a main driver of the firms' performance.

### *2.12. Necessity to modify the EEC innovation policies*

Borrás and Edquist (2013) define the "policy mix" as a set of different and complementary policy instruments to address the problems identified in a national or regional IS. The selection of innovation policy instruments must be done in relation to the actual problems identified in the IS. These instruments are related to four groups of activities: (1) R&D and *competence* building; (2) *Demand-side* activities; (3) Provision of *constituents* for IS; (4) *Incubation* activities (start-ups, entrepreneurship, small financing, etc.) (Borrás and Edquist, 2013, p. 1518)

The literature review leads to the conclusion that the current innovation policies are unable to overcome the innovation performance gap between new and old EU member states, and therefore need to be modified. The *theoretical framework* of such modification could be the concept of technology upgrading through the creation of *local innovation capabilities*. Kravtsova and Radosevic (2012) distinguished between technology and production capabilities. *Technology capabilities* refer to R&D, design, and engineering, while *production capabilities* require to produce efficiently. A key challenge for EEC is how firms can make the *transition* from efficient production to technological capabilities. Bihde (2006) also argue that the downstream activities and the diffusion of technologies can have greater economic effects through productivity gains than the production of the innovation at the first place.

The necessity to modify the existing innovation models in EEC comes from the fact that the R&D based model is of much lesser economic relevance compared to alternative patterns of technology upgrading from production to innovation capability. The process of upgrading starts with the improvements of production capability and is followed by some incremental innovations. Following this, firms focus on mastering advanced manufacturing and exploratory developments (prototypes). The next step of applied research has a significant threshold and requires different types of skills (Radosevic and Stancova, 2015, p. 12).

Therefore, the EEC countries should develop their own specific policy models as a unique response to the particular challenges that each country is facing. Where the firms and/or universities are weak, as it is often the case for moderate and modest innovators, promoting the links between them is not an effective solution. This is particularly true when local companies have little capacity to "absorb" the results of research, or even don't express any interest in technological upgrading.

According to Filippetti and Archibugi (2011) periods of technological breakthroughs can represent a crucial "window of opportunity" for lagging behind countries to catch up. The catching-up processes, however, require a reliable base of internal knowledge, human resources (particularly, *qualified human resources*) and infrastructures.

## 3. Conclusions and Policy Implications

The short review of the NMS innovation policies and underpinning theoretical approaches reveals that these policies follow rather a linear model of innovation process with the accent on the *supply side* (R&D) and neglecting the *demand side*. Consequently, the NMS innovation policies aim at developing *high tech sectors* at the expense of medium and low-tech ones. These policies create an impression that the policymakers do not want to see the current situation objectively. Wishful type of thinking and neglecting path-dependency make the proposed action plans inadequate and not implementable (Varblane et al., 2007).

The IS considers that innovation comes not just from science, but also from the experience of producers and users, which means that innovations can happen in all economic sectors. Therefore, an important task of EEC policy is to stimulate innovation not only in high-tech sectors but in low and medium-tech industries too. These industries also are innovative or at least have a potential to implement innovation developed by high-tech sectors. Consequently, the innovation policies in catching-up economies, where low-tech or traditional sectors are widespread, should focus on innovation *in all sectors, not just high-tech firms*.

The measures targeting the adoption of innovations on the *demand side* may have more widespread effects than direct support for R&D. Creating effective links between demand-side and supply-side tools can improve the efficiency of the innovative system (Edler, 2009). Chobanova (2016) argues that national policies should encourage research where the country has accumulated competence, which means that it should respond to internal and external *demand*. Such policy should be the core of the strategy for smart specialization by focusing not only to promote the supply, but the demand for results of research and innovation carried out in the country.

A broad meaning of the NIS implies that innovation is seen as a continuous nonlinear cumulative process involving *not only radical and incremental innovation*, but also the *diffusion, absorption and use of innovation* (Varblane et al., 2007). Consequently, technological transfer and non-R&D innovation activities could be more important drivers of innovation (Kaderabkova and Radosevic, 2011). In countries that are far from the technology frontier, the innovation policy mix should foster the *knowledge absorption* and *diffusion*. It means a re-orientation of R&D systems in EEC from the knowledge generation to *knowledge diffusion and creation of knowledge absorption capacity*. Where local companies are not able to generate a demand for R&D, the policy should focus on the development of needs for R&D activities. Since non-R&D innovators innovate primarily through technology transfer and training, the policy in these countries should be targeted towards more support for these aspects (Reid, 2011). Therefore, the improvements of the EEC' innovation policies can be achieved by more active government initiatives to *build up local innovation capabilities* (Plank and Staritz, 2013).

As the majority of firms in catching-up economies are SME, they need an access to the appropriate channels of communication about available innovation. This can be done through the creation of *institutions for innovation diffusion* management. Olczyk and Kordalska (2016) argue that the industrial policies of EEC need to be modified through measures that facilitate the SMEs inclusion in early (research, conception and product design) and finishing (sales, marketing and distribution services) stages of global value chains. Therefore, the integration of local firms into networks of foreign investors should be supported. As FDI do not provide automatically the local supplier with innovation skills and competences, additional actions are required to support the development of *local innovation capabilities*.

The OECD (2010) study makes a clear distinction between a few high-performance new and small firms that can have a disproportionate effect on innovation, and the greater share of SMEs, which are less innovative. The two models of innovation policies should target these two groups of SMEs. The R&D based model can be directed to a small number of highly innovative SMEs, while the Doing, Using, and Interactive model can match the requirements of the majority of low innovative SMEs. If the first model reflects the *supply side* of the innovation policy, the second model aims to enhance the *demand side*.

The theory shows that *innovation is a process of learning* both by individual personnel and by the organisation as a whole (Montes et al., 2005). As one of the key shortages in EE economies is lack of *skilled people*, the new innovation policies should include measures to promote the firms' absorptive capabilities through *learning (education/training) system* (Kravtsova and Radosevic, 2012, p. 123). The SMEs that are more innovative are more committed to learning than those that are less innovative, including the personal learning of leaders and directors and the learning of their employees (Saunders et al., 2014). Such measures will increase the local *human capital* and will ensure the necessary competences of skilled people. Although the human capital is a central element of economic growth theory, few innovation programmes concentrate on *human capital* directly (McGuirk, 2015). Upgrading the technology and skills, however, "requires continuous investment by the local firms themselves in people, organisation and equipment" (Schmitz, 2004, p. 356).

No less serious barrier to the innovation development in EEC is a lack of social capital and, particularly, *lack of trust*. Therefore, special measures are needed to increase the trustworthiness and networking. The literature points out also that the *organisational culture* is an important factor for stimulating the propensity to innovation (Padilha and Gomes, 2016). Fostering the innovation culture requires more training for employees and experimentation with new processes and products (Amabile, 1988).

Several authors have underlined, however, that there is no single optimal policy model for innovation (Reid, 2011; Izsák et al., 2015). Therefore, the countries should develop their own *specific policy models* as a unique response to the particular challenges that each country is facing. For example, among EEC only Slovenia has followed a different approach to innovation policy strongly focused on *local capacity building* (Drahokoupil, 2007).

While the government strategies are broadly in line with the innovation challenges facing the NMS, closer analysis of the policy mix would suggest that there is a need for further *refinement* of policy measures and methods (Reid, 2011, p. 143). Country-specific studies are needed to assess innovation activities more thoroughly. The technological path-dependency could be used by these economies not as a threat but as an opportunity. There is no need to change the already established EEC industry portfolio but simply to climb up the value ladder in the existing export potential industries.

## References

Aghion, P., Howitt, P. (1998). Endogenous Growth. Cambridge, MA: MIT press.

Aghion, P., Akcigit, U., Howitt, P. (2013). What do we learn from Schumpeterian growth theory?. – NBER Working Paper 18824, CA. Ma.

Aho, E., Cornu, J., Georghiou, L., Subirá, A. (2006). Creating an Innovative Europe. Report of the Independent Expert Group on R&D and Innovation appointed following the Hampton Court Summit. Available at: http://ec.europa.eu/invest-in-research/pdf/2006_aho_group_report_en.pdf [Accessed 8 April, 2017].

Akbar, Y. H., Ferencikova, S. (2007) Industrial Clustering and Global Value Chains in Central and Eastern Europe: Role of MNEs in Industrial Upgrading. – Prague Economic Papers, 3, pp. 237-251.

Amabile, T. M. (1988). A model of creativity and innovation in organizations. – In: Staw, B. M., Cummings, L. L. (eds.) Research in Organizational Behavior, 10 (pp. 123-167), Greenwich, CT: JAI Press.

Anavi, E. (2014). Project for Action Plan for the reindustrialization of Bulgaria for the period 2014-2015. Presentation at the meeting of the Industry Council of the Ministry of Economy and Energy, 24 March, 2014 (In Bulgarian).

Banchoff, T. (2002). Institutions, Inertia and European Union Research Policy. – Journal of Common Market Studies, 40(l), pp. 1-21.

Bartlett W. (2014) Shut out? South East Europe and the EU's New Industrial Policy. – LSE "Europe in Question" Discussion Paper Series, LEQS Paper No. 84/2014.

Bierut, B. K., Kuziemska-Pawlak, K. (2016). Competitiveness and Export Performance of CEE Countries. – NBP Working Paper No. 248, Economic Institute, Warsaw, Available at: https://www.nbp.pl/publikacje/ materialy_i_studia/248_en.pdf [Accessed 10 July, 2018].

Bierut, B. K., Kuziemska-Pawlak, K. (2017). Competitiveness and Export Performance of CEE Countries. – Journal Eastern European Economics, 55 (6), pp. 522-542.

Bihde, A. (2006). Venturesome Consumption, Innovation and Globalization. Paper for a Joint Conference of CESifo "Perspectives on the Performance of the Continent's Economies" Venice, 21-22 July 2006, Available at: http://www.bhide.net/bhide_venturesome_ consumption.pdf [Accessed 10 June, 2017].

Borrás, S., Edquist. C. (2013). The choice of innovation policy instruments. – Technological Forecasting & Social Change, 80, pp. 1513-1522.

Castellacci, F., Natera, J. M. (2013). The dynamics of national innovation systems: A panel cointegration analysis of the coevolution between innovative capability and absorptive capacity. – Research Policy, 42, pp. 579-594.

Chobanova, R. (2001). Innovation policy of Bulgaria at the beginning of the 21st century. – Economic Studies, 2, pp. 107-128 (In Bulgarian).

Chobanova, R. (2007). Innovation Performance and Challenges to the Bulgarian Innovation Policy. – Economic Studies, 1, pp. 77-97.

Chobanova, R. (2011) Innovativeness of a National Economy: The Case of Bulgaria. Lambert Academic Publishing, Saarbrücken, Germany.

Chobanova, R. (2014). ERAWATCH country reports: BULGARIA 2012, Available at: https://rio.jrc.ec.europa.eu /en/library/erawatch-country-report-bulgaria-2012 [Accessed 11 July, 2018].

Chobanova, R. (2015). Research and innovation policy: towards smart specialization for economic development of Bulgaria. – Economic Thought, 5, pp. 3-27 (In Bulgarian).

Chobanova, R. (2016). Research and Innovation in Bulgaria's development: Before a Policy Dilemma. – Journal of Vietnam's Socio-Economic Development, 87, pp. 69-80, Available at: https://www.researchgate.net/ publication/312592466.
Cohen, D., Levinthal, D. A. (1990). Absorptive capacity: a new perspective on learning and innovation. – Administrative Science Quarterly, 35, pp. 128-152.
Collier, Z. A., Wood, M. D., Chobanova, R., Linkov, I. (2016). Leveraging stakeholder knowledge in the innovation decision making process. – International Journal of Business Continuity and Risk Management, 6(3), pp. 163-181.
David, P., Aghion, P., Foray, D. (2008). Science, Technology and Innovation for Economic Growth: Linking Policy Research and Practice in "STIG Systems". – Research Policy, 38(4), pp. 681-693.
Drahokoupil, J. (2007). From National Capitalisms to Foreign-Led Growth: The Moment of Convergence in Central and Eastern Europe. – In: Becker, J., Weissenbacher, R. (eds.). Dollarization, Euroization and Financial Instability. Central and Eastern European Countries between Stagnation and Financial Crisis? (pp. 87-108), Marburg: Metropolis.
EC. (2010). Europe 2020 Flagship Initiative Innovation Union, Research & Innovation Policy. SEC (2010) 1161, Available at: https://ec.europa.eu/research/innovation-union/pdf/ innovation-union-communication-brochure_ en.pdf [Accessed 29 October 2017].
EC. (2013). Industrial competitiveness of EU member states: some progress made, but many challenges still lay ahead. MEMO. Brussels, 25 September 2013, Available at: http://europa.eu/rapid/press-release_MEMO-13-816_en.htm [Accessed 6 September, 2017].
EC. (2017). Specific support to Bulgaria - Background report. Horizon 2020 Policy Support Facility. Written by: Ruslan Zhechkov and Bea Mahieu, Technopolis Group.
EC. (2018a). The research evaluation and performance-based funding system in Bulgaria. Specific Support to Bulgaria. Horizon 2020 Policy Support Facility, written by Luc Soete, Bea Mahieu, Terttu Luukkonen, and Erik Arnold
EC. (2018b). Commission Staff Working Document. Country Report Bulgaria 2018 Including an In-Depth Review on the prevention and correction of macroeconomic imbalances. Brussels, 7.3.2018 SWD (2018) 201 final.
EC. (2018c). European Innovation Scoreboard, Available at: https://ec.europa.eu/growth/ industry/innovation/ facts-figures/scoreboards_en [Accessed 25 July, 2018].
ECLAC. (2008), Structural change and productivity growth: 20 years later: old problems, new opportunities. ECLAC-United Nations: Santiago, Chile.
Edler, J. (2009). Demand Policies for Innovation in EU CEE Countries. – Manchester Business School Working Paper No 579, Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1509473 [Accessed 6 October 2017].
Edquist, C. (2001). The Systems of Innovation Approach and Innovation Policy: An Account of the State of the Art. Lead Paper Presented at the DRUID Conference, June 12-15, Aalborg.
Edquist, C. (2005). Systems of innovation-perspectives and challenges. – In: Fagerberg, J., Mowery, D., Nelson, R. (eds.). The Oxford Handbook of Innovation (pp. 181-208), Oxford: Oxford University Press.
Éltető, A. (2014). Foreign trade trends in the EU10 countries. – In: Éltető, A. (ed.). Mind the Gap, Integration Experiences of the Ten Central and Eastern European Countries, (pp. 41-60), Centre for Economic and Regional Studies of the Hungarian Academy of Sciences Institute of World Economics. Available at: https://www.researchgate.net/publication/269222419_Mind_the_Gap_ Integration_Experiences_of_ the_Ten_Central_and_Eastern_European_Countries [Accessed 25 July, 2018].
Eurostat. (2018). GDP per Capita in PPS, Available at: https://ec.europa.eu/eurostat/tgm/table.do?tab= table&init=1&language=en&pcode=tec00114&plugin=1 [Accessed 30 July, 2018].
Fagerberg, J., Mowery, D. C., Verspagen, B. (2009). The evolution of Norway's National Innovation System. – Science and Public Policy, 36, pp. 431-444.
Filippetti, A., Archibugi, D. (2011). Innovation in times of crisis: National Systems of Innovation, structure, and demand. – Research Policy, 40, pp. 179-192.
Freeman, C. (1987). Technology Policy and Economic Performance: Lessons from Japan. London: Pinter.

Fu, X., Gong, Y. (2011). Indigenous and foreign innovation efforts and drivers of technological upgrading: evidence from China. – World Development, 39 (7), pp. 1213-1225.
Fu, X., Pietrobelli, C., Soete, L. (2011). The role of foreign technology and indigenous innovation in the emerging economies: technological change and catching-up. – World Development, 39(7), pp. 1204-1212.
Havas, A. (2006). Knowledge-intensive activities vs. high-tech sectors: Learning options and traps for Central European policy-makers. – In: Piech, K., Radosevic, S. (eds.). The Knowledge-based Economy in Central and Eastern Europe Countries and Industries in a Process of Change (pp. 259-279). Palgrave Macmillan.
Howells, J. (2005). Innovation and regional economic development: A matter of perspective?. – Research Policy, 34, pp. 1220-1234.
Iarlyiska, M., Dimitrova, N. (2012). Competitiveness of the Bulgarian Export. Ministry of Finance, Available at: http://www.minfin.bg/bg/page/874 (In Bulgarian) [Accessed 20 September, 2016].
Ivanova, N., Ivanov, I. (2017). The Role of Bulgaria in Global Value Chains. – BNB Discussion paper DP/105/2017.
Izsak, K., Markianidou, P., Radošević, S. (2015). Convergence of National Innovation Policy Mixes in Europe – Has It Gone Too Far? An Analysis of Research and Innovation Policy Measures in the Period 2004-2012. – Journal of Common Market Studies, 53(4), pp. 786-802.
Kaderabkova, A., Radosevic, S. (2011). Innovation Policy in Multi-Tier Europe: Introduction. – In: Radosevic, S., Kaderabkova, A. (eds.). Challenges for European Innovation Policy: Cohesion and Excellence from a Schumpeterian Perspective (pp. 1-8), Cheltenham: Edward Elgar.
Kattel, R., Primi, A. (2012). Innovation and Innovation Policy in the Periphery: Latin America and Central and Eastern Europe Compared, Available at: https://www.researchgate.net/publication/237138570_ The_periphery_paradox_in_innovation_policy_Latin_America_and_Eastern_Europe_ Compared [Accessed 10 July 2017].
Kivimaa, P., Kern, F. (2016). Creative destruction or mere niche support? Innovation policy mixes for sustainability transitions. – Research Policy, 45, pp. 205-217.
Kravtsova, V., Radosevic, S. (2012). Are systems of innovation in Eastern Europe efficient?. – Economic Systems, 36, pp. 109-126.
Lundvall, B.-A. (1992). National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning. London: Pinter.
McGuirk, H., Lenihan, H., Hart, M. (2015). Measuring the impact of innovative human capital on small firms' propensity to innovate. – Research Policy, 44 (4), pp. 965-976.
McKelvey, M. (2005). Using Evolutionary Theory to Define Systems of Innovation. – In: Edquist, C. (ed.). Systems of Innovation: Technologies, Institutions and Organizations (pp. 200-222). London and New York: Routledge.
Metcalfe, S., Ramlogan, R. (2008). Innovation systems and the competitive process in developing economies. – The Quarterly Review of Economics and Finance, 48(2), pp. 433-446.
Ministry of Economy. (2017). Innovation Strategy for Smart Specialisation. The Republic of Bulgaria 2014-2020, Available at: http://www.mi.government.bg/files/useruploads/files/innovations/ris3_ final_27062017_ eng.pdf [Accessed 30 May, 2018].
Montes, L. J., Moreno, A. R., Morales, V. G. (2005). Influence of support leadership and teamwork cohesion on organizational learning, innovation and performance: an empirical examination. – Technovation, 25, pp. 1159-1172.
Move.BG. (2016). More competitive or poorer? (2016). Available at: https://move.bg/more-competitive-or-poorer [accessed j12 July, 2018].
Nelson, R. R. (1993). National Systems of Innovation: A Comparative Study. Oxford: Oxford University Press.
Niosi, J. (2002). National systems of innovations are "x-efficient" (and x-effective). Why some are slow learners. – Research Policy, 31, pp. 291-302.
Nölke, A., Vliegenthart, A. (2009). Enlarging the Varieties of Capitalism: The Emergence of Dependent Market Economies in East Central Europe. – World Politics, 61(4), pp. 670-702.
NSI (National Statistical Institute). (2018). Available at: http://www.nsi.bg/en [Accessed 21 July, 2018].

OECD. (2010). SMEs, Entrepreneurship and Innovation. OECD Studies on SMEs and Entrepreneurship. Available at: https://read.oecd-ilibrary.org/industry-and-services/smes-entrepreneurship-and-innovation_978926408035 5-en#page6 (Accessed 7 February, 2017).
OECD-WTO. (2015). Trade in Value Added database, October 2015, Available at: http://www.oecd.org/sti/ind /measuring-trade-in-value-added.htm [Accessed 10 June, 2018].
Olczyk, M., Kordalska, A. (2016). Gross Exports versus Value-Added Exports: Determinants and Policy Implications for Manufacturing Sectors in Selected CEE. – Eastern European Economics, 55(1), pp. 91-109.
OPIC 2014-2020, 2014 BG16RFOP002 – March 2015), Available at: http://www. opcompetitiveness.bg/images/ filerepository/3733_OPIC_2014_2020_adopted_by_EC_16.03.2015_EN.pdf [Accessed 3 September 2017].
Ormala, E. (2017). Overview of eleven member states innovation policies, Available at: http://www.iit-project.eu/wp-content/uploads/2017/02/IIT-649351-D3.1-Overview-of-eleven-member-states-innovation-policies_final-report-copy-3.pdf [Accessed 20 January 2018].
Padilha, C. K., Gomes, G. (2016). Innovation culture and performance in innovation of products and processes: a study in companies of textile industry. – RAI (Revista de Administração e Inovação), 13(4), pp. 285-294.
Pietrobelli, C., Rabellotti, R. (2011). Global value chains meet innovation systems: are there learning opportunities for developing countries?. – World Development, 39(7), pp. 1261-1269.
Plank, L., Staritz, C. (2013). "Precarious upgrading" in electronics global production networks in Central and Eastern Europe: the cases of Hungary and Romania. Available at: http://www.capturingthegains. org/pdf/ctg-wp-2013-31.pdf [Accessed 7 May 2017].
Putnam, R. D. (1995). Bowling Alone: America's Declining Social Capital. – Journal of Democracy, 6(1), pp. 65-78.
Radosevic, S. (1998). The Transformation of National Systems of Innovation in Eastern Europe: Between Restructuring and Erosion. – Industrial and Corporate Change, 7(1), pp. 77-108.
Radosevic, S. (2004). A Two-Tier or Multi-Tier Europe? Assessing the Innovation Capacities of Central and East European Countries in the Enlarged EU. – Journal of Common Market Studies, 42(3), pp. 641-666.
Radosevic, S. (2011). Science-Industry Links in CEE and CIS: Conventional Policy Wisdom Facing Reality. – Science and Public Policy, 38 (5), pp. 365-378.
Radosevic, S., Reid, A. (2006). Innovation policy for a knowledge-based economy in Central and Eastern Europe: driver of growth or new layer of bureaucracy?. – In: Piech, K., Radosevic, S. The Knowledge-based Economy in Central and Eastern Europe Countries and Industries in a Process of Change (pp. 295-311), Palgrave Macmillan.
Radosevic, S., Stancova, K. C. (2015). Internationalising Smart Specialisation: Assessment and Issues in the Case of EU New Member States. – Journal of the Knowledge Economy, pp. 1-31.
Reid, A. (2011). EU innovation policy: one size doesn't fit all!. – In: Radosevic, S., Kaderabkova, A. (eds). Challenges for European Innovation Policy: Cohesion and Excellence from a Schumpeterian Perspective (pp. 112-149), Cheltenham: Edward Elgar.
Reinstaller, A., Unterlass, F. (2011). Sectoral innovation modes and level of economic development: implications for innovation policy in the new member states. – In: Radosevic, S., Kaderabkova, A. (eds). Challenges for European Innovation Policy. Cohesion and Excellence from a Schumpeterian Perspective (pp. 77-111), Cheltenham: Edward Elgar.
Rondé, P., Hussler, C. (2005). Innovation in regions: What does really matter?. – Research Policy, 34, pp. 1150-1172.
Samara, E., Georgiadis, P., Bakouros, I. (2012). The impact of innovation policies on the performance of national innovation systems: A system dynamics analysis. – Technovation, 32, pp. 624-638.
Saunders, M. N. K., Gray, D. E., Goregaokar, H. (2014). SME innovation and learning: the role of networks and crisis events. – European Journal of Training and Development, 38(1/2), pp. 136-149.
Saviotti, P. P. (2005). Innovation Systems and Evolutionary Theories. – In: Edquist, C. (ed.) Systems of Innovation: Technologies, Institutions and Organizations (pp. 180-199), London and New York: Routledge.

Schmitz, H. (ed). (2004). Local Enterprises in the Global Economy: Issues of Governance and Upgrading. Cheltenham, UK and Northampton, MA, USA: Edward Elgar.
Soete, L. (2007). From Industrial to Innovation Policy. – Journal of Industry, Competition and Trade, 7, pp. 273-284.
Srholec, M. (2006). Global production systems and technological catching-up: thinking twice about high-tech industries in emerging countries. – In: Piech, K., Radosevic, S. (eds.). Knowledge-Based Economy in Central and Eastern Europe: Countries and Industries in a Process of Change (pp. 57-78). London: Palgrave.
Suurna, M., Kattel, R. (2010). Europeanization of innovation policy in Central and Eastern Europe. – Science and Public Policy, 37(9), pp. 646-664.
Szalavetz, A. (2008). The role of innovation in peripheral countries' catching-up. – In: Chobanova, R. (ed.). Demand for knowledge in the process of European economic integration (pp. 29-36), Institute of Economics, Bulgarian Academy of Sciences.
The WB. (2013). Input for Bulgaria's Research and Innovation Strategies for Smart Specialization (February 2013). Available at: https://www.mi.government.bg/files/useruploads/files/innovations/full_report_ 3s.pdf [Accessed 9 July, 2018].
Todorova, A., Slavcheva, M. (2017). RIO Country Report 2016: Bulgaria. Available at: https://rio.jrc.ec.europa.eu/en/country-analysis/Bulgaria/country-report [Accessed 10 July, 2018].
Todorova, A., Slavcheva, M. (2018). RIO Country Report 2017: Bulgaria. Available at: https://rio.jrc.ec.europahttps://rio.jrc.ec.europa.eu/en/country-analysis/bulgaria/country-report [Accessed 8 July, 2018].
Török, Á, Csuka, G., Kovács, B., Veres, A. (2013). The "resurrection" of industrial policy in the European Union and its impact on industrial policy in the New Member Countries. – Work Package 306 MS69 "Research paper on a new industrial policy for catch-up economies", Working Paper no 26, Available at: http://www.foreurope.eu/fileadmin/documents/pdf/Workingapers/WWWforEurope_WPS_no026_ MS69.pdf [Accessed 10 May 2017].
Tsipouri, L., Reid, A., Miedzinski, M. (2009). European Innovation Progress Report 2008. Brussels: European Commission, DG Enterprise. Available at: http://www.proinno-europe.eu/node/admin/uploaded_documents/EIRP2008_Final_merged.pdf [Accessed 3 March 2018].
Tödtling, F., Trippl, M. (2005). One size fits all? Towards a differentiated regional innovation policy approach. – Research Policy, 34, pp. 1203-1219.
Ulnicane, I. (2006). Building Innovation Capacities in New Europe: Role of Public Policy. – In: King, R., Muravska, T. (eds.) European Union Enlargement of 2004 and Beyond: Responding to the Political, Legal and Socio-Economic Challenges (pp. 497-508), University of Latvia.
Varblane, U., Dyker, D., Tamm, D. (2007). How to Improve the National Innovation Systems of Catching-Up Economies?. – Trames, 11(61/56), 2, pp. 106-123.
Verspagen, B. (1997). European 'regional clubs': do they exist, and where are they heading?. – MERIT Working Paper 2/97-010, MERIT, Maastricht.
Veugelers, R. (2015). Do we have the right kind of diversity in Innovation Policies among EU Member States?. – Work Package 302, MS228 "Diversity of Innovation Policies in the EU", Working Paper No 108.
von Tunzelmann, N. (2004). Network alignment in the catching-up economies of Europe. – In: McGowan, F., Radosevic, S., von Tunzelman, N. (eds.). The Emerging Industrial Structure of the Wider Europe (pp. 23-37), London: Routledge.
Watkins, A., Papaioannou, T., Mugwagwa, J., Kale, D. (2015). National innovation systems and the intermediary role of industry associations in building institutional capacities for innovation in developing countries: A critical review of the literature. – Research Policy, 44, pp. 1407-1418.