
Distribution of Enterprises Innovation Development Effects among CEE Member States

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Abstract:

Purpose: The purpose of this study is twofold: (1) to assess the development of selected innovation effects related to enterprises activities (2) to analyze the distribution of this development among transforming CEE member states.

Design/Methodology/Approach: Both the assessment of enterprises innovation development effects, as well as its distribution, was designed on the basis of international standards for measuring innovation activity. The research group occurred in this study consisted of all CEE member states and covered the period of 2016–2022. Adopted methodology involved index methods and comparable analyses based on statistical structure parameters.

Findings: The development of innovation effects among CEE member states provided ambiguous results. Business process innovations maintained the strongest and the most coherent effect of enterprises activities among CEE member states. The turnover from products implementations which were new to the market also revealed high assessment, however this relation was relevant only for few member states. On the contrary, all countries revealed both the highest and the most coherent relative decrease of export to import ratio.

Practical implementation: Further commercialization effects driven by implemented process innovation as well as visible diversification of turnover should therefore maintain the fields for further empirical studies.

Originality value: Transforming economies should in particular be focused on expanding innovation activities of enterprises in order to increase productivity and competitiveness. Although there are regular studies on innovation results concerning all EU member states, the perspective of Central and Eastern European economies (CEE) seems not sufficiently exposed.

Keywords: Innovation effects, development, distribution, enterprises, Central and Eastern European economies.

JEL codes: O3, O4, O31.

Paper type: Research article.

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1. Introduction

Global economy provided vast evidences on positive influence of innovation on macroeconomic growth and development. This relation is based mainly on the evidence deriving from highly developed countries, showing that innovation determines the potential for growth. It is also argued, that especially emerging economies should focus on building capabilities and developing new industries, in order to increase complexity and achieve sustainable long-term growth (Grossman and Helpman, 2001; Hausmann and Hidalgo, 2009).

There is mainstream consent among economic and management scholars, that innovation is also a constitutive element of entrepreneurship, which puts enterprises in the position of the main actors on the field of innovation emergence. This is especially important in the current reality of disruptive changes related to new technologies rapid development (Schwab, 2016; Brynjolfsson, 2014; Hémous and Morton, 2022). It is also underlined, that taking the enterprises perspective into consideration, the primary and the final event of innovation process should be the implementation of a new product or solution in practice (Janasz *et al.*, 2001).

It therefore seems clear that transforming economies should in particular be focused on expanding innovation activities of enterprises, however the reality is often adverse (Petrariu *et al.*, 2013). Although some progress towards the developed countries is observed, according to many existing empirical studies, the innovation outlook of many Central and Eastern European (CEE) economies belonging to EU is negative in this respect. Moreover, enterprises innovation development effects in the reality of transforming economies seems not sufficiently exposed in existing studies.

In the described context, the purpose of this paper is twofold: (1) to assess the development of selected innovation effects related to enterprises activities and (2) to analyse the distribution of this development among transforming CEE member states. The study covered eleven CEE member states in the period of 2016–2022.

Eurostat database was used to perform the analysis. Both the assessment of enterprises innovation development effects, as well as its distribution, were designed on the basis of international standards for measuring innovation activity. Eurostat database was used to perform the analysis. Adopted methodology involved index methods and comparable analyses based on statistical structure parameters of central tendency, variability and asymmetry.

The outline of this paper is as follows. The first section provides theoretical background by reviewing the literature related to enterprises innovation effects. This section also defines the existing research gap. The second section presents adopted methods and the results of conducted research. The final section presents the most important conclusions related to the conducted analysis, indicates limitations and identifies fields for further research areas.

2. Theoretical Background

Numerous attempts have been made to identify factors that may have an impact on economic growth. It was emphasized that the technological advancement and industrial innovation drive growth in the long-term (Grossman and Helpman, 1994; Freeman and Soete, 1997). Adopting innovation as an internal factor deriving from investments allowed to describe technology as good of non-competitive consumption.

It was explained that innovations are initiated by enterprises guided by the possible profits from implementation, which are further justified by the costs of creative destruction. In this way economies increase competitiveness in the long-run (Hamel and Prahalad, 1994; Audretsch, 1995).

Many empirical studies have found positive relationship between productivity, patented innovations and research and development activities of enterprises. Although some studies also provide ambiguous results in this respect (Kortum, 1997), patenting innovations and research and development activities have been identified as main factors of technological change (Pakes and Griliches, 1984).

The empirical research deriving from emerging economies generally proved the main role of innovation in economic development. The positive impact on firms productivity and profitability was revealed. It was argued that the engagement in innovation activities with special focus on research and development lead to higher productivity, profitability and efficiency of operations (Hall *et al.*, 2009). The perspective of emerging economies was also frequently related to the technology transfer and innovation diffusion via foreign direct investments (Ketteni *et al.*, 2015; Szklarz *et al.*, 2021).

Irespectively, the studies concerning innovation process and its stages as well as effective process management have been developed. In general process stages were identified as follows: development of a new idea, application of a new idea in production, introduction of a new product or service to the market, increase in sales turnover caused by growth of demand for a new product or service, maturity with an established position of a new product and emerging imitators (Griffin, 2021).

This direction has also empowered further modelling and identification of key innovation areas and activities for enterprises. The theoretical studies were operationalized in the form of models precisely identifying the stages (phases) of innovation process in enterprises such as: research phase, strategy phase, resources phase, implementation phase, results and re-investment phase (Tidd *et al.*, 2001; Pavitt, 2003). The definitions of innovation process, despite their diversity, are united by noticing the values that are important for the strategic and operational management, which are defined primarily as creating value for the customer through

the development and introduction of new products, and other solutions, as well as new relationships with the market (Polinkevych, 2018).

The overview of theoretical and empirical studies should be completed with innovation-performance relationships as a final phase of any implementation. Despite some research mainly concerning small firms and providing mixed results in this respect (Vermeulen *et al.*, 2005), the general overview proved that although innovation can imply high initial or continuous investments and risks, the benefits generally seem to outweigh the costs.

Furthermore, single innovation process outcomes (patents, new products) provide less impact on enterprises performance than complete and innovation orientation (Rosenbusch *et al.*, 2009). Additional perspective to the studies concerning innovations and enterprises activities derived from both the current tempo of changes related to disruptive development of ICT technologies and economic complexity deriving from increasing challenges (Balland *et al.*, 2022). There are already numerous examples of IT and ICT technologies which adopted on the ground of industrial automation mainly related to process improvement empower further implementations and have potential to boost productivity in the future (Davis *et al.*, 2012; Lee *et al.*, 2013).

In the described context, the research gap could still be identified within two perspectives. Firstly, the recent tempo of changes and additional complexity related to new technologies emergence seems to justify to put the research concerning enterprises innovation effects in the center of attention. Secondly, frequently used methodologies assume comparable innovation measures adapted to both developed and developing economies, whereas it seems justified to assess the development of emerging economies performance separately and to compare it within the groups of countries having similar transformation track-record.

3. Methods and Results

The assessment of enterprises innovation development of CEE economies was designed on the basis of international standards for measuring innovation activity contained in the Oslo Methodology (OECD/Eurostat, 2018). The research group occurred in this study consisted of all CEE member states which are: Bulgaria, Czechia, Estonia, Croatia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. The study covered the seven-years period of 2016–2022.

Eurostat database was used to perform the analysis. For the purpose of this study innovation effects of enterprises activities were defined with the following indicators:

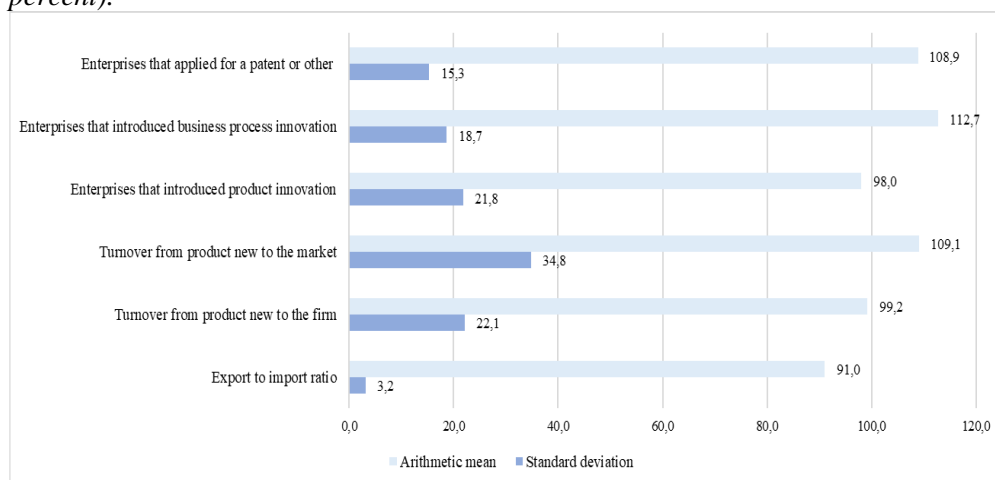
(1) enterprises that applied for a patent, registered an industrial design, trade mark or used trade secrets in total;

- (2) enterprises that introduced business process innovation;
- (3) enterprises that introduced product innovation;
- (4) turnover of enterprises from new or significantly improved products that were new to the market;
- (5) turnover of enterprises from new or significantly improved products that were new to the firm; and finally
- (6) export to import ratio. For the comparability reasons only relative values were included with export to import ratio as the only exception.

Applied methodology involved firstly, estimating the relative index values for each of selected indicators and subsequently conducting comparable analyses based on statistical structure parameters of central tendency, variability and asymmetry, which were in particular: mean, median, quartiles, standard and quarter deviation, classic and positional coefficient of variation and asymmetry measures.

The results of arithmetic mean and standard deviation values of analyzed innovation effects for the research group of CEE member states are presented in Figure 1. Three of selected indicators revealed relative increase during the analyzed period: enterprises that introduced business process innovation (12,7% on average), turnover of enterprises from new or significantly improved products that were new to the market (9,1% on average), and enterprises that applied for a patent, registered an industrial design, trade mark or used trade secrets in total (by 8,9% on average). Subsequent three indicators revealed relative decrease: turnover of enterprises from new or significantly improved products that were new to the firm (by 0,8% on average), enterprises that introduced business product innovation (by 2% on average), and finally export to import ratio (by 9% on average).

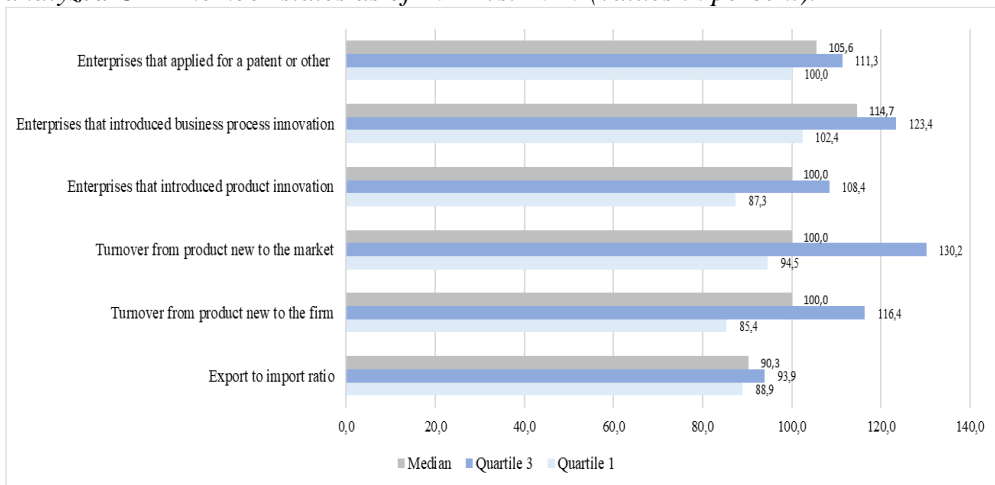
Figure 1. *The values of arithmetic mean and standard deviation of the innovation effects indicators in analyzed CEE member states as of 2022 vs. 2016 (values in percent).*



Source: *Own calculations based on Eurostat database.*

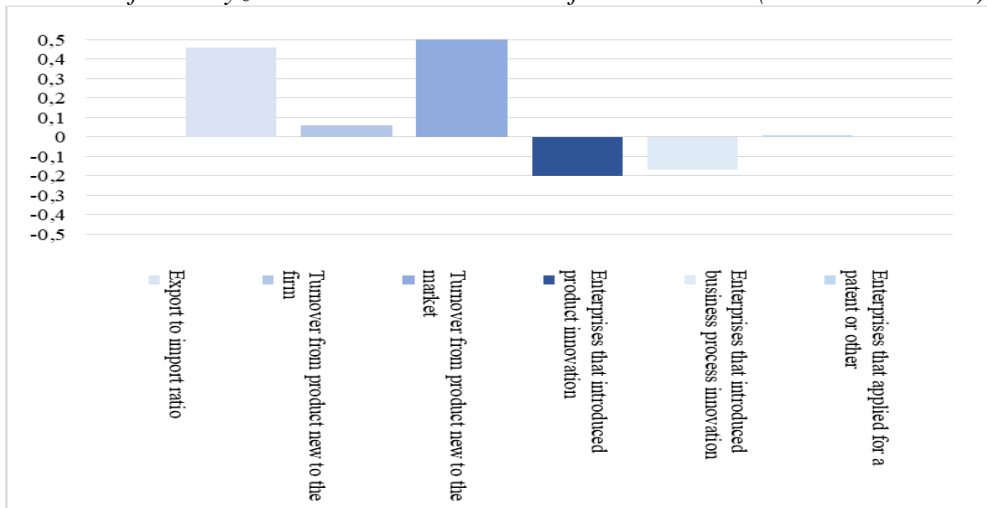
Furthermore, both indicators based on turnover as well as new product implementation revealed highest differentiation. The results of median and quartiles values of analyzed innovation effects indicators for the research group of CEE member states are presented in Figure 2, whereas the values of positional measure of asymmetry are presented in Figure 3.

Figure 2. The values of median and quartiles of the innovation effects indicators in analyzed CEE member states as of 2022 vs. 2016 (values in percent).



Source: Own calculations based on Eurostat database.

Figure 3. The values of positional asymmetry measures of the innovation effects indicators for analyzed CEE member states as of 2022 vs. 2016 (in nominal values).



Source: Own calculations based on Eurostat database.

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The results of further measures increase the perspective of the findings so far. Business process innovations followed by patent applications, industrial design and trade mark revealed the highest median levels in terms of relative growth. Furthermore, in 25% of analyzed member states both turnover measures as well as business process innovations revealed the relative increase higher or significantly higher than 15%.

On the contrary 25% of analyzed member states revealed app. 15% decrease with respect to turnover from products new to the firm and product innovations. Moreover, within the range of variation the majority of CEE member states revealed the score below an average value for the turnover from products new to the market and export to import ratio, whereas, the distribution for the turnover from products new to the firm and patent applications was close to symmetric and adverse for the product and business process innovation.

4. Conclusions

This study was directed to assess the development of selected innovation effects related to enterprises activities as well as to analyze the distribution of this development among transforming member states of Central and Eastern Europe. The considerations supported by the empirical study results led to several conclusions. Firstly, it seems justified to conclude that the development of innovation effects among CEE member states provided ambiguous results.

Business process innovations maintained the strongest and the most coherent effect of enterprises innovation activities (only Romania revealed relative decrease in this category). Furthermore, the turnover from products implementations which were new to the market, also revealed high assessment, however this relation was relevant only for the selected member states such as: Poland, Slovakia, Slovenia, Croatia and Lithuania.

On the contrary, all CEE member states revealed both the highest and the most coherent relative decrease of export to import ratio during the analyzed period, which means that innovative products were rather directed and sold on internal markets. Further commercialization effects driven by implemented process

innovation as well as visible diversification of turnover should therefore maintain the fields for further empirical studies.

Ultimately, limitations of the conducted research should be recognized mainly deriving from limited continuous data concerning emerging member states published by Eurostat within community innovation survey. One should also have in mind, that the results in particularly related to the turnover measures and export to import relation obtained during 2021-2022 could be influenced by the negative effects of covid outbreak.

Despite its limitations, this study makes general contribution with respect to the identification of both the strongest and the weakest innovation development effects as well as its distribution among CEE member states.

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