Innovation Complementarity, Cooperation Partner Proximity and Exporting

Evidence from European enterprises

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ABSTRACT

Our research is focused on the links between innovation and export, cooperation and export, as well as the links between firm's cooperation and innovativeness. We also pay attention to the various types of innovation (product, process, marketing innovation) and different types of partners taking into account their geographical proximity (local, foreign and both types). The study is based on the micro data from Community Innovation Survey (CIS) 2012-2014 for the sample of 98 809 enterprises from 15 European countries. The results of the Path Analysis carried out for 18 models covering six different combinations of innovations and three different cooperation modes show, that introducing various types of innovations at the same time in the case of exporting does not bring better results than the introduction of only product innovation. What is more, cooperation with foreign partners significantly helps in exporting, whereas innovativeness is enhanced to the higher extent thanks to the innovation cooperation with local partners. These results bring the conclusion, that the best possible outcomes could be obtained by the enterprises embedded in the local networks being at the same time very much focused on the introduction of product innovation as an export driver.

Key words: innovation; cooperation; international competitiveness; Community Innovation Survey

1. INTRODUCTION

Numerous empirical studies conducted at the firm-level confirm the positive relationship between innovation and internationalization For example, Filippetti, Frenz & Ietto-Gillies (2011) in their research on 32 European countries have found that countries whose firms spend more on innovation are able to compete on international markets and therefore generate higher export sales. Within this field of research very many studies concern the relationship between innovation and exporting (e.g., Basile, 2001; Roper & Love, 2002; Cassiman & Golovko, & Martínez-Ros, 2010). Most surveys focus on the linkage between product or process innovations and exporting in advanced market economies. A limited number of studies take into consideration other types of innovations (e.g. marketing or organizational) (e.g. Mothe, & Nguyen-Thi, 2010, 2012; Pino, Felzensztein, Zwerg-Villegas, & Arias-Bolzmann, 2016), and very few include all types of innovation (product, process, marketing and organizational) (e.g., Cieślik, & Michałek, 2017a; 2018). Particularly rare are studies which investigate the sets of complementary innovations effect on exporting (e.g. Carboni, & Russu, 2018; Lewandowska, Gołębiowski & Szymura-Tyc, 2016). Furthermore, no many of them refer to the context of less advanced economies i.e. transition (e.g. Damijan, Kostevc, & Polanec, 2010) or emerging economies (e.g. Ren, Eisingerich, & Tsai, 2015) or study the issue in differentiated economic settings (Cieślik, & Michałek, 2017b; Filippetti, Frenz, & Ietto-Gillies, 2011).

A review of the relevant literature reveals that innovativeness and internationalization of firms may be enhanced by cooperation with various partners. Research provides an evidence of positive influence of innovation cooperation on innovativeness of firms. Similar results occur in the studies on the internationalization process of firms, which is supported and accelerated by cooperation in inter-organizational networks.

However, the extensive literature referring to the network approach to innovation (Hagedoorn & Schakenraad, 1990, Tether, 2002; Edwards-Schachter, & Tams, 2013), and numerous studies

on the network approach to internationalization (Coviello, 2006; Blomstermo et al., 2004; Sharma, & Blomstermo, 2003) have not yet inspired comprehensive research combining these two streams. Despite the existence of vast empirical research into relationships between innovation and exporting, innovation and cooperation, as well as internationalization and networks, studies that investigate linkages between innovation, cooperation/networks, and exporting/ internationalization are nascent (Chetty, & Stangl, 2010; Leonidou, Katsikeas, & Coudounaris, 2010).

The paper addresses this research gap by linking innovation, innovation cooperation, and exporting in one study. In particular, different types of innovations – product, process, and marketing innovations, and the complementarities between them are tested in the export context. Next, the relationships of innovation cooperation with domestic, foreign and both partners simultaneously with innovations and exporting are explored.

The study embraces enterprises from 15 European countries representing both the mature, economically advanced economies, and the transition economies of the new EU members.

The paper is organized as follows. First, an overview of prior research on complementarities of innovation and relation with exporting is provided. Later we focus on the links between cooperation and exporting and cooperation and innovativeness. Subsequently we develop hypotheses on the relationship between complementarities of innovation and exporting, cooperation and exporting and cooperation and innovativeness. The data, variables operationalization and methods are presented in the next section, followed by the empirical results. Conclusions, limitations and directions for further research make up the final section.

2. THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

In a brief overview of the relevant literature we focus on (i) the link between innovation complementarity and exporting, (ii) the link between innovation cooperation and exporting and (iii) the link between innovation cooperation and innovativeness.

2.1. The link between innovation complementarity and exporting

The Schumpeterian perspective of innovation and complementarity between various types of innovation is widely accepted in the academia and business practice.

The research focus is mainly on technological innovation and indicates that new products and innovative technologies contribute to firm's international competitive advantage which is a prerequisite for export expansion (e.g. Basile, 2001; Dhanaraj, & Beamish, 2003; Roper, & Love, 2002). Later studies similarly indicate a positive relationship of product innovation with export propensity (e.g. Damijan, Kostevc & Polanec, 2010; Becker & Egger, 2013; Van Beveren & Vandenbussche, 2010) and export persistence (Caldera, 2010; Tavassoli, & Karlsson, 2015). Research conducted in last decades reveals that both the propensity and the intensity of exporting are positively influenced by R&D and product innovations (e.g. Cassiman, Golovko & Martinez-Ros, 2010; Ganotakis & Love, 2011; Harris & Li, 2009). Roper, Love & Higon (2006) show the importance of innovation, proxied by R&D performance, on firms' export performance. Lim, Sharkey & Heinrichs (2006) argue that the firm's capability of developing new products is a precondition for export involvement, and for building strong international market position.

In case of process innovation, some researchers show that an isolated influence of process innovations on exporting does not appear (Dohse, & Niebuhr, 2018). On the other hand the studies on innovativeness of firms from transition and emerging economies show strong dependence on the cost-based advantage built on process innovations (Damijan, Kostevc, &

Polanec, 2010; Stojcic, Hashi, & Telhaj, 2011; Lewandowska, & Golebiowski, 2014; Cieslik, Qu, & Qu, 2018).

A number of studies revealed the complementarity between product and process innovation (Ballot, Fakhfakh, Galia, & Salter, 2011; Hervas-Oliver, & Sempere-Ripoll, 2015: Percival, & Cozzarin, 2008). The application of new technological process often determines the possibility of manufacturing of a new product (Kraft, 1990; Martinez-Ros, & Labeaga, 2009).

Higón, & Driffield (2011) revealed that both product and process innovations positively influence firms' export propensity. Ayllon, & Radicic (2019) in their study of Spanish firms suggest the complementarity between technological innovation and exports only through simultaneous effects. Lewandowska, Szymura-Tyc, & Golebiowski (2016) revealed a stronger positive influence on new product exports in firms that introduced a combination of product-process innovation, than in firms that adopted product innovation only.

It this vein we put forward the following hypotheses:

H1a. Product innovation is positively related to exporting.

H1b. Process innovation is positively related to exporting.

H1c. Product-process innovation are positively related to exporting.

Research on innovation complementarities reveals that the firm's innovativeness is determined not only by technological innovations but also comes with new non-technological solutions (e.g. Doran, 2012; Hervás-Oliver, Sempere-Ripoll, Boronat Moll, & Rojas Alvarado, 2018; Mothe, & Nguyen-Thi, 2010, 2012; Schmidt, & Rammer, 2007; Tavassoli, & Karlsson, 2015). Mothe & Nguen-Thi (2010, 2012) indicate the positive influence of non-technological (i.e. marketing and organizational) innovations on technological (i.e. product and process) innovations. Silva, Styles & Lages (2017) have found that both tech-innovation and market-innovation has a positive influence on export performance.

Boso, Adeola, Danso & Assadinia (2019) prove that market responsiveness capability drives export performance when it is deployed together with a product innovation capability, while Junge, Severgnini, & Sørensen (2016) state that product and marketing innovation are complementary inputs and lead to faster productivity growth in skill-intensive firms.

As marketing innovations support new products' sales in export/host markets (Gupta, Malhotra, Czinkota, & Foroudi, 2016; Mathews, Bianchi, Perks, Healy, & Wickramasekera, 2016), it may be considered complementary to product and process innovation, increasing firm's capability to penetrate new markets (e.g. Kotabe, Srinivasan, & Aulakh, 2002; Mothe, & Nguyen-Thi, 2010, 2012; Wang, & Lestari, 2013.

Lewandowska, Szymura-Tyc, & Golebiowski (2016) in their study on the influence of combinations of product-process-marketing innovations on new product exports showed the strongest positive influence in firms that introduced product-process-marketing innovation mode. In the above context we posit the following hypotheses:

H1d. Product-marketing innovations are positively related to exporting.

H1e. Process-marketing innovations are positively related to exporting.

H1f. Product-process-marketing innovations are positively related to exporting.

2.2 .The link between innovation cooperation and exporting

Numerous studies stress the influence of cooperation on exporting referring to the network model of internationalization (e.g. Blomstermo, et al., 2004; Coviello, 2006; Johanson, & Vahlne, 2009; Sharma, & Blomstermo, 2003). Many of these studies concern small and medium-sized firms (e.g. Chetty, & Blankenburg Holm, 2000; Ciravegna, Majano, & Zhan, 2014; Ghauri, Lutz, & Tesfom, 2003). Cooperation and network relationships play an important role in the development of new international ventures and born globals, both in mature and emerging economies (e.g., Yu, Gilbert, & Oviat, 2011; Zhou, Wu, & Luo, 2007).

The debate on the suitability of two types of external knowledge sources – domestic (home-country) and foreign (host-country) – for internationalization of firms yields mixed results. Research ds the positive relationships between foreign partners and further market expansion (e.g., Coviello, 2006; Yu, Gilbert, & Oviat, 2011). On the other hand, the suitability of home-country ties are also emphasized (e.g., Boehe, 2013; Yu, Gilbert, & Oviat, 2011; Zhu, Wu, & Luo, 2007) for foreign market access. Some empirical studies explicitly assert the importance of collaborative links with both home-country and host-country partners (e.g., Ricci, & Trionfetti, 2012).

The empirical studies on innovation cooperation partners and export are nascent. In a study of Japanese manufacturing firms, Tomiura (2007) demonstrates that internal R&D is positively related to exporting, especially among small-sized firms and in the science-based sector. Inter-firm collaboration on joint projects and operations of foreign subsidiaries is strongly related to the exporting activity of large firms, while small firms are more likely to export when they are affiliated with business associations. Isaac, Borini, Raziq & Benito (2019) prove that foreign subsidiaries' relational embeddedness with the external local network is positively associated with local innovation, which is transformed into global innovation, especially when innovation is developed in the subsidiary´s functional areas with previous reverse knowledge transfers. Chetty & Stangl (2010) suggest that firms with radical innovation and diverse network links are more likely to pursue radical internationalization. Conversely, small and young firms that have few network ties and innovate incrementally are more likely to internationalize incrementally.

Taking into account the above review of scarce literature sources, the following hypotheses are formulated:

H2a. Innovation cooperation with domestic partners is positively related to export.

H2b. Innovation cooperation with foreign partners is positively related to export.

H2c. Innovation cooperation with both domestic and foreign partners is positively related to export.

2.3 Innovation cooperation and innovation

The motives of undertaking cooperation in innovations are the subject of many research studies (Hagedoorn & Schakenraad, 1990;Tether, 2002; Edwards-Schachter & Tams, 2013). Sakakibara (1997) divided motives for cooperation in innovation into those directly related to the innovation process and those related to it indirectly. Direct motives are primarily a desire to increase the productivity of R&D activities through joint actions and the ability to control the principles of protection of intellectual property and the effects of innovative activities. Indirect ones include increasing access to the sales and supply market and better prospects of obtaining public financing.

The results of many studies on the link between cooperation and innovation, are based on Community Innovation Survey (CIS) database for several European countries (Tether, 2001, 2002; Mohnen & Hoareau, 2003; Becker & Dietz, 2004; Tether & Tajar, 2008; Laursen, Reichstein & Salter, 2011; Carvalho et al., 2018; Pennacchio et al. 2018).

Although the development of ICT promotes cooperation on a global scale (Prahalad, Krishnan, 2008, Kotler et al., 2009), the importance of geographic proximity to the innovative activity of firms is still stressed (Malmberg & Maskell, 2006). This proximity is not a sufficient condition for the effectiveness of innovation processes, but it can play an important role in shaping innovative capabilities. Geographical proximity allows direct contacts, which in the transfer of hidden knowledge is particularly important (Rallet & Torre, 1999). It also strengthens other dimensions of closeness, analyzed in the cognitive, organizational, geographical, social and institutional dimensions (Boschma, 2005). Jaklic, Damijan & Rojec (2008) indicate a positive impact of cooperation with local partners on the level of innovativeness of Slovenian

enterprises, while they do not show such a relationship in the case of cooperation with foreign partners.

D'Este & Iammarino (2010) indicate that in the case of research conducted by faculties of higher education related to engineering knowledge, the frequency of contacts, and thus geographic proximity were of great importance for cooperation with enterprises.

Laursen, Reichstein & Salter (2011) based on the CIS 4 results for almost 9000 British enterprises, indicate that geographic proximity is important in the case of cooperation with renowned universities, while in the case of less reputable institutional partners, proximity has negative effects. Robin & Schubert (2013) based on CIS results for France and Germany proved that institutional cooperation favors product innovations, but has no impact on process innovation.

Even though the presented above results are ambiguous, we posit the following hypothesis:

H3. Innovation cooperation with domestic partners enhances product innovation (H3a); process innovation (H3b); product-process innovation (H3c); product-marketing innovation (H3d); process-marketing innovation (H3e). product-process-marketing innovation (H3f).

Emerging and transforming economies do not offer an attractive business environment as developed countries, which may reduce interest in cooperation with domestic partners. Additionally Boschma (2005) suggests, building on the localization theory, that too strong relations with local partners, especially in a situation of strong geographical concentration, may result in a certain type of "spatial lock-in" that can be overcome by initiating cooperation with the more distant partners. Several studies show that collaboration with foreign agents, due to the globalization trends, in majority of cases is more conducive to innovation than collaboration with domestic partners (Fitjar & Rodriguez-Poze, 2014) and also helps to maximize innovation by combining knowledge drawn from different external (foreign) knowledge sources.

Based on the above, we posit the following hypothesis:

H4. Innovation cooperation with domestic partners enhances product innovation (H4a); process innovation (H4b); product-process innovation (H4c); product-marketing innovation (H4d); process-marketing innovation (H4e). product-process-marketing innovation (H4f).

Similarity or complementarity of both types of cooperation (domestic and foreign) for the efficiency of innovative enterprises are the subject of many empirical studies. Lööf & Heshmati (2002) showed that both types of cooperation - with local partners and with geographically remote partners - play a positive role in the process of increasing the innovative efficiency of enterprises. In turn, Miotti & Sachwald (2003) proved that in the case of French enterprises there is a positive relationship between cooperation with foreign partners and innovative efficiency, while in the situation of cooperation with local partners such a relationship has not been demonstrated. The results of the analysis carried out for Irish industrial enterprises participating in the CIS 2004-2006 study by Doran, Jordan & O'Leary (2012) indicate that involvement in cooperation with local and foreign partners separately has a positive effect on the likelihood of introducing innovation. On the other hand the results of the study do not indicate the existence of complementarity between the two forms of cooperation.

Sastre (2015) analyzed industrial enterprises and those from the services sector, declaring cooperation in innovations with foreign and domestic partners. The results for industrial enterprises indicate that there is a positive relationship between cooperation with domestic partners and innovation efficiency, while in the service sector enterprises such a relationship was demonstrated in cases of cooperation with both types of partners. The results indicate that while enterprises from the services sector skillfully use the synergy effect, in the case of industrial enterprises the level of their innovative efficiency was not higher than in those that did not cooperate at all.

Summing up, the literature review, although bringing mixed results, allows us to bring the following hypothesis:

H5. Innovation cooperation with domestic partners enhances product innovation (H5a); process innovation (H5b); product-process innovation (H5c); product-marketing innovation (H5d); process-marketing innovation (H5e). product-process-marketing innovation (H5f).

The conceptual model that gathers all the posited hypotheses from H1 to H5 is presented as Figure 1.

INSERT FIGURE 1 ABOUT HERE

3. RESEARCH METHODOLOGY

3.1. Context of the research

The quantitative analysis is based on anonymous firm-level micro data from Community Innovation Survey (CIS), covering years 2012-2014 from selected European Union member states. CIS is a survey on innovation activity of enterprises covering EU member states and candidate countries, Iceland and Norway, based on a common survey questionnaire and methodology, with reference to the Oslo Manual, ed. 2005. CIS is designed to obtain information on firms' innovation activities, it also contains data on the introduction of organizational and marketing innovations. Target population are small, medium and large enterprises from NACE sections A to N. Data were obtained based on the individual research proposal submitted to Eurostat.

This is the latest CIS currently available. It has to be remembered however, that although the CIS questionnaire covers all 28 Member States and candidate countries, not all of them are

revealed for the research purposes on the micro level, that is why the full coverage of all EU countries cannot be expected.

3.2. Data collection and sample characteristics

The whole initial sample consisted of 98 809 enterprises, including 26 168 from NACE section A, 25 408 from section B, 12 810 from section C and 3231 from section D. The rest of the sample (31 192) comes from the rest of NACE sections, and include also service enterprises.

The total sample of N=98 809 covered fifteen countries, namely: Bulgaria, Cyprus, Czech Republic, Germany, Estonia, Greece, Spain, Croatia, Hungary, Lithuania, Latvia, Norway, Portugal, Romania, Slovakia. See Table 1. for details. Share of EU new member states (mostly CEE countries) amounted to 47,8% of the initial sample.

We decided not to exclude any of the sections, as our goal was to depict the whole economy and try not to bias the results. It should be noted however, that not all firms in the sample answered all questions. The details of the split of the sample are presented in Table 1.

INSERT TABLE 1 ABOUT HERE

3.3. *Operationalization and measurement of variables*

As we carry out our research based on the data from the standardized questionnaire, this determined the selection of our variables.

In order to obtain the models that are comparable, we decided to use only binary variables in case of all variables: cooperation, innovation and export. In case of export as dependent variable we look at data from both 2012 and 2014.

The details on the operationalization and measurement of variables are presented in Table 2.

INSERT TABLE 2 ABOUT HERE

3.4. Methods applied

The relationship between the research variables was tested with the use of the Path Analysis

(Wright, 1921; 1934), that can be viewed as similar to structural equation modelling (SEM) – one in which only single indicators are employed for each of the variables in the causal model. Path Analysis examines strength of the linear direct and indirect relationship between a dependent variable and two or more independent variables. Path Analysis is acknowledged as a statistical technique, but also as an approach towards building theory in social sciences (Konarski, 2010). It guides exploratory and confirmatory research in a manner combining self-insight and modelling skills with theory. It often suggests novel hypotheses that were not considered (Kline, 2011). Next, the bootstrapping – a method for assigning measures of accuracy to sample estimates (Efron, 1979) – followed by correction Bootstrap for Goodness-of-Fit Measures (Bollen-Stine, 1992) were applied.

4. RESULTS

The statistical approach to testing the hypotheses employed path analysis, method - Generalized Least Squares (GLS), with the module AMOS 23, program PS IMAGO. Because of the number of distinct sample moments are equal to the number of distinct parameters to be estimated, the model is saturated and the quality of fitted model to the data is untestable. The 18 obtained models were bootstrapped (10 000 repeating), what additionally supported the obtained results. In order to compare the results of the models, standardized estimates that are statistically significant at least at the level of $p < 0.05$ were analyzed.

The results of six models with six different sets of innovation and cooperation with local partner only are presented in Table 3.

INSERT TABLE 3 ABOUT HERE

The results of six models with six different sets of innovation and cooperation with foreign partner only are presented in Table 4.

INSERT TABLE 4 ABOUT HERE

The results of six models with six different sets of innovation and cooperation with domestic and foreign partners are presented in Table 5.

INSERT TABLE 5 ABOUT HERE

As there is a large number of hypotheses as well as large number of models, we presented three Figures (3, 4 and 5) that combine all the results together.

Our analysis regarding the influence of various types of innovation and their combinations on export indicates the strongest impact of product innovation on export (H1a). Considering the influence of cooperation on exporting we revealed the strongest impact on export of cooperation with foreign partners (H2b), slightly weaker impact of cooperation with local and foreign partners (H2c), and lacking influence on export of cooperation with local partners (H2a was rejected).

The analysis of impact of process innovation on export (H1b) shows that this influence is, in general, weaker than in case of a product and process innovation combined, as well as in case of product innovation. The impact of innovation cooperation on export is the strongest in firms that cooperate with foreign partners (H2b), slightly weaker in firms that collaborate with both domestic and foreign (H2c) partners, and the weakest for collaborative linkages with domestic partners (H2a).

A combination of product innovation and process innovation (H1c) results in the strongest impact on export in firms that collaborate in export with foreign partners (H2b). slightly weaker in firms that collaborate with both domestic and foreign partners (H2b), and significantly weaker for linkages with domestic partners (H2a).

The analysis of impact on export of a combination of product innovation and marketing innovation (H1d) shows that this influence is, in general, significantly weaker than in above presented variations/combinations of innovation modes. Again, the impact of innovation

cooperation on export is the strongest in firms that cooperate with foreign partners (H2b), slightly weaker in firms that collaborate with both domestic and foreign partners (H2c), and significantly weaker for collaborative linkages with domestic partners (H2a).

The analysis of impact on export of a combination of process innovation and marketing innovation (H1e) reveals very similar results as in case of process innovation. It indicates that marketing innovation (in this combination of innovation modes) does not reinforce the impact of process innovation on export.

Besides, we revealed that the impact on export of a combination of product innovation, process innovation, and marketing innovation (H1f) is similarly weak as in case of a combination of product and marketing innovation. Once again, the impact of innovation cooperation on export is the strongest in firms that cooperate with foreign partners (H2b), slightly weaker in firms that collaborate with both domestic and foreign partners (H2c), and significantly weaker for collaborative linkages with domestic partners (H2a).

The results of 18 Path Models (all sets of innovation and all types of partners) that take into account two paths from models: the relation between the introduction of innovation on export in 2014 and relation between innovation cooperation and export in 2014 are presented in Figure 3.

INSERT FIGURE 3 ABOUT HERE

The results also show, that in the case of all analyzed combinations of innovation, the role of the local partner in enhancing innovation is statistically significant (H3a-H3f) and stronger, when compared with foreign (H4a-H4f) and mixed partner (H5a-H5f).

The results of 18 Path Models (all sets of innovation and all types of partners) that take into account two paths from models: the relation between the introduction of innovation on export

in 2014 and relation between innovation cooperation and introduction of innovation are presented in Figure 4.

INSERT FIGURE 4 ABOUT HERE

In the case of the combination of the influence of cooperation on export and cooperation on innovation it is very easily visible, that cooperation with local partners has a great impact on innovativeness, whereas the cooperation with foreign partners has a significant influence on exporting. The results of 18 Path Models (all sets of innovation and all types of partners) that take into account two paths from models: the relation between the innovation cooperation and export in 2014 and relation between innovation cooperation and introduction of innovation are presented in Figure 5.

INSERT FIGURE 5 ABOUT HERE

5. DISCUSSION

We do believe, that the results of our study give an interesting insight to the recent literature. These results seems to follow the studies suggesting that product innovation is more important in building firms' export propensity than process innovation (e.g. Becker, & Egger, 2013; Cieslik, Qu, & Qu, 2018; Clausen, & Pohjola, 2009; Higón, & Driffield, 2011). Yet, firms in many emerging and transition economies still strongly depend on cost-based advantage (from process innovations), but their re-orientation towards differentiation-based advantage (ensuing from R&D and product innovations) is to be noted (Cieslik, Qu, & Qu, 2018; Lewandowska, & Golebiowski, 2014; Stojcic, Hashi, & Telhaj, 2011).

What is more, past comparative studies conducted in mature and emerging economies on both product and process innovations showed that in a long-term the factors related to differentiation (e.g. product innovation) are more influential for building firms' international competitiveness

than the cost-related factors, such as process innovation (Dosi, Pavitt, & Soete, 1990; Fagerberg, 2002; Verspagen, & Wakelin, 1997). Our results seems to support these findings.

On the other hand DiMaria, & Ganau (2013) suggest that while the decision to enter new foreign markets is driven by new products or products that can be adapted to target market needs, export intensity is more influenced by process innovation, which contradicts our findings.

Numerous studies indicate the positive relationship of marketing innovations based on marketing competencies in market-driven firms with firms' performance and competitive advantage (e.g. Day, 1994; Gupta, Malhotra, Czinkota, & Foroudi, 2016; Junge, Severgnini, & Sørensen, 2016; Singh, 2004; Song, Droge, Hanvanich, & Calantone, 2005; Tan, & Sousa, 2015). Weerawardena (2003) indicates that marketing capabilities influence both the innovation intensity and sustained competitive advantage of the firm. DiMaria, & Ganau (2013) revealed that apart from product and process dynamism the explicit marketing strategy and firm's export commitment positively influence export intensity.

Results of our research do not support these findings, on the contrary, adding marketing innovation to product and / or process innovation, significantly diminish exporting.

We suggest that technological innovations have stronger impact on export than marketing (a non-technological) innovation. This impact on export is the strongest for product innovation followed by a combination of complementary product and process innovation, and process innovation.

It is argued that exporting calls for specific inputs, namely foreign target market knowledge and internationalization knowledge. As the initial internal knowledge of exporters tends to be insufficient, they build complementary relationships with external knowledge sources to achieve success in foreign markets (e.g., Haahti, Madupu, Yavas, & Babakus, 2005; Prashantham, & Birkinshaw, 2015). Our research seems to follow this line of arguments. Moreover, we reveal that regardless of the innovation mode or their combination, innovation

cooperation with foreign partners has the strongest impact on export, followed by the cooperation with domestic and foreign partners, whereas the impact on export of innovation cooperation with domestic partners only is by far weaker.

We also found a large discrepancy between the impact of local and foreign partners on innovativeness of studied enterprises. To some extent it contradicts the findings of Laursen, Reichstein & Salter (2011), who argue, that the importance of geographic proximity is no longer relevant when the quality of knowledge provided by the partner is taken into account, but only in the case of enterprises investing heavily in R&D. The authors suggest, therefore, which may be the case of our research, that the importance of geographic proximity is more important in the case of firms with a low capability of knowledge absorption. This debate was followed by Belderbos & Somers (2015). In their research focused on technology leaders, located in areas where it is possible to cooperate with local partners, they found out that the existing asymmetry regarding knowledge possessed compared to local partners is an element inhibiting the willingness to cooperate, because the lost knowledge is probably more valuable than the one obtained during cooperation.

It is also argued, that emerging and transition economies, do not provide an attractive business environment, which may result in limited innovation cooperation with domestic partners (e.g. Lewandowska, Szymura-Tyc & Gołębiowski, 2016). Some studies indicate that, in emerging economies, strong ties with domestic partners of SMEs and/or young firms may be detrimental to international expansion if domestic partners are focused on the home market and have limited international experience (Milanov & Fernhaber, 2014; Prashantham & Birkinshaw, 2015). Although the arguments of researchers are ambiguous, we follow the argument that suitability of cooperation partners is primarily determined by their resources, experience, innovation and openness to cooperation (a functional proximity), not just geographical proximity (Cooke, 2006; Ricci & Trionfetti, 2012).

6. CONCLUSIONS

The major contribution of this paper is the empirical test conducted in one study on the impact on exporting of different modes of innovation (i.e. product, process, and marketing innovations, and their complementarity), combined with the analysis of the impact on export of innovation cooperation with domestic, foreign and both types of partners simultaneously, as well as integrated with exploring of the influence of innovation cooperation on firms' innovativeness in the export context. Applying this approach we addresses the research gap in the studies on the impact of innovation on firms' export performance through integrating its various determinants.

The study is based on the sample of firms from 15 European countries representing both the mature, economically advanced economies, and the transition economies of the new EU members.

The results of our study seems to prove, that the best possible results are obtained by enterprises focused strongly on product innovation as the driver of exporting.

In the context of the sample structure, taking into account that majority are the firms from transforming economies, the week importance of process innovation can be surprising, as numerous studies on competitiveness and competitive strategies of firms provide evidence for the predominance of cost/price-based strategies. However, attempts at strategic reorientation focused on product quality improvement, increased market responsiveness and innovations, are visible in business practice. It has to be remembered, that the range of different types of innovation depend not only on the level of economic development and the country's innovativeness, but also on the characteristics of firms that determine their innovation strategies (Doran, 2012).

Another important aspect of our findings is the role of cooperation in exporting and innovativeness. An interesting outcome is the fact, that although in exporting foreign partners

seems to have a very important role, the best possible results in exporting are obtained by firms that cooperate in innovation with their local partners. This is especially the case, when the home country builds up the competitiveness of local firms by developing an attractive milieu (i.e. strong competitors, competitive innovative suppliers and service providers, a strong national base in factors of production, and demand conditions) and creates opportunities for innovation cooperation. The question here stays unanswered, if this is a case of all the surveyed economies?

Our study leads to managerial implications. The most general one is that the export performance based on innovation requires multifaceted approach to innovation looking for complementarities among various innovation types, analyzing suitability of innovation cooperation with domestic and foreign partners, as well as considering influence of innovation cooperation on various innovation modes in the export context. Recommendations resulting from this study may include better coordination of activities regarding various aspects of innovation and firm internationalization strategy, as well as promotion of innovation cooperation both at the national level and within EU network.

Considering the objectives of the study we are aware of several limitations. Some of them are caused by the structure of CIS data, in particular by lacking information on enterprises' age, full ownership structure, strategic motives for exporting, missing information on qualitative aspects of cooperation that is necessary to assess the strength of internal and external embeddedness. Finally, in our simple model we did not considered the possible influence of numerous factors including those related to home- and host-country specific environment (such as those affecting the level of national innovativeness).

Therefore, additional variables such as mentioned above should be included in the future research in models explaining the various determinants and aspects of innovativeness and their impact on export of European firms.

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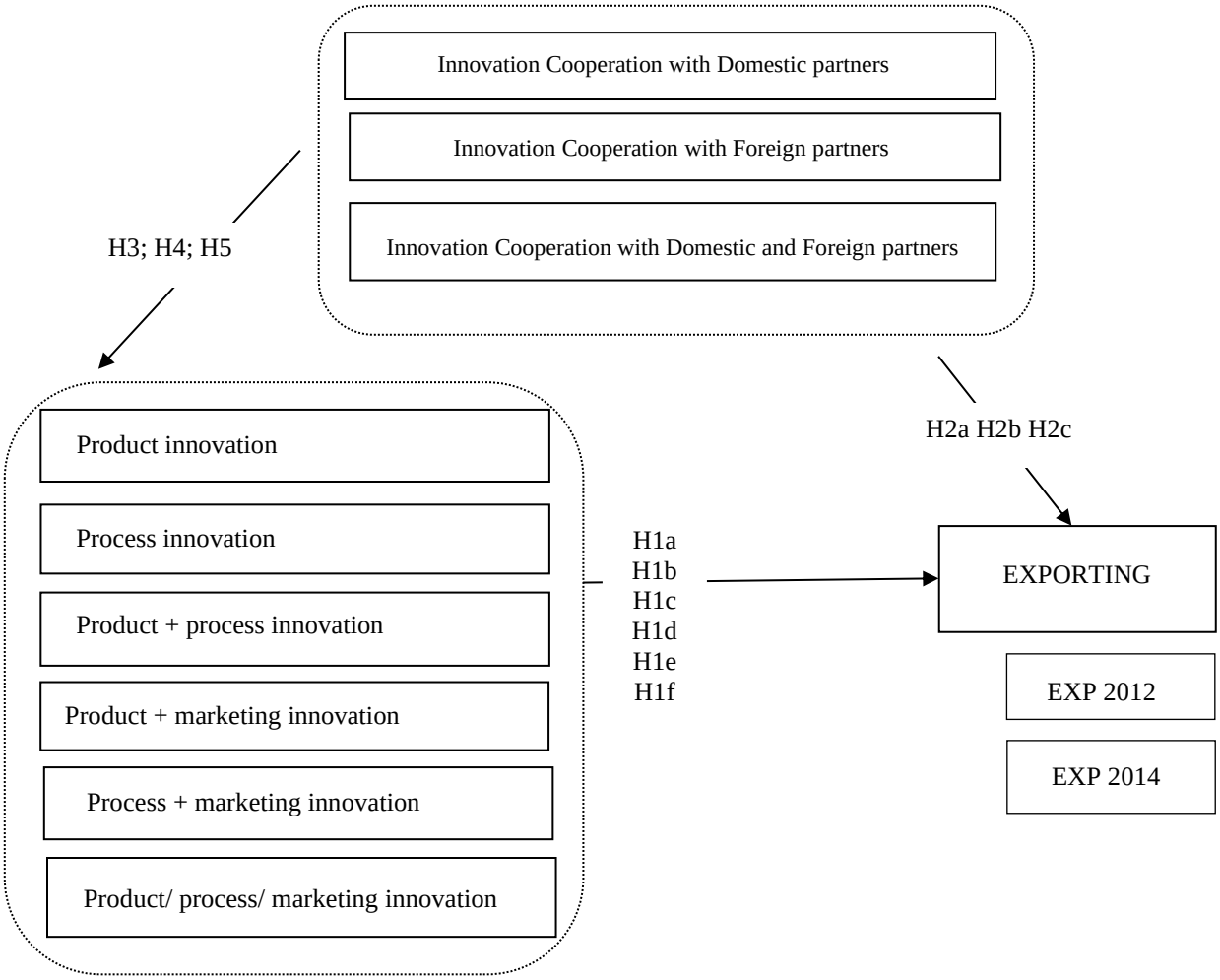
Figure 1. Research model for the relationship between innovation sets, innovation cooperation modes, and export



Notes: Solid line indicates hypothesized relationship.

Table 1. Split of the sample of European Union enterprises that was introduced to 18 Path Models

Country abbr	Country	New / old Member States	Sample	Sample split
BG	Bulgaria	New Member State	14 255	14.4
CY	Cyprus	Old Member State	1 346	1.4
CZ	Czech Republic	New Member State	5 198	5.3
DE	Germany	Old Member State	6 282	6.4
EE	Estonia	New Member State	1 760	1.8
EL	Greece	Old Member State	2 507	2.5
ES	Spain	Old Member State	30 333	30.7
HR	Croatia	New Member State	3 265	3.3
HU	Hungary	New Member State	6 817	6.9
LT	Lithuania	New Member State	2 421	2.5
LV	Latvia	New Member State	1 501	1.5
NO	Norway	European economy	5 045	5.1
PT	Portugal	Old Member State	7 083	7.2
RO	Romania	New Member State	8 206	8.3
SK	Slovakia	New Member State	2 790	2.8
Total		9 New MS / 5 Old MS	98 809	100.0

Source: own calculations in SPSS 21.

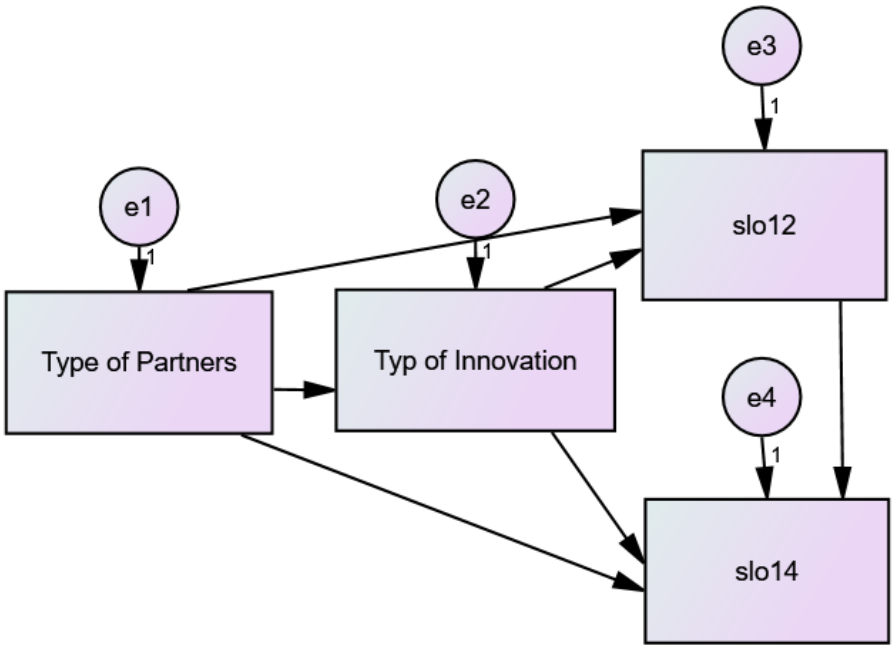
Table 2. Description and operationalization of variables

Predictor variable - Introduction of product, process or marketing innovation	
	Product innovation. Binary variable.
NEWMKT	"1" if introduction of a new or significantly improved product onto market before competitors (it may have already been available in other markets), "0" otherwise
NEWFRM	"1" if introduction of a new or significantly improved product that was already available from competitors in the market), "0" otherwise
	Process innovation. Binary variable.
INPSPD	"1" if introduction of new or significantly improved methods of manufacturing for producing goods or services, "0" otherwise
INPSLG	"1" if introduction of new or significantly improved logistics, delivery or distribution methods for your inputs, goods or services, "0" otherwise

INPSSU	"1" if introduction of new or significantly improved supporting activities for your processes, such as maintenance systems or operations for purchasing, accounting, or computing, "0" otherwise
	Marketing innovation. Binary variable.
MKTDGP	"1" if introduction of significant changes to the aesthetic design or packaging of a good or service (excluding changes that alter the product's functional or user characteristics – these are product innovations), "0" otherwise
MKTPDP	"1" if introduction of new media or techniques for product promotion (i.e. first time use of a new advertising media, a new brand image, introduction of loyalty cards, etc.), "0" otherwise
MKTPDL	"1" if introduction of new methods for product placement or sales channels (i.e. first time use of franchising or distribution licenses, direct selling, exclusive retailing, new concepts for product presentation, etc.), "0" otherwise
MKTPRI	"1" of introduction of new methods of pricing goods or services (i.e. first time use of variable pricing by demand, discount systems, etc.), "0" otherwise
Predictor variable – Innovation Cooperation. Binary variable.	
Domestic partner	"1" if a firm made one or more declarations of cooperation with home country actors (Suppliers of equipment, materials, components, or software (Co21); Clients or customers from the private sector (Co311); Clients or customers from the public sector (Co321); Competitors or other enterprises in sector (Co41); consultants or commercial labs (Co51) ; Universities or other higher education institutes (Co61), Government, public or private research institutes (Co71), "0" otherwise.
Foreign partner	"1" if a firm made one or more declarations of cooperation with Other Europe*: USA; China, India; All other countries actors (Suppliers of equipment, materials, components, or software (Co22; 23; 24; 25); Clients or customers from the private sector (Co312; 313; 314; 315); Clients or customers from the public sector*(Co322; 323; 324; 325); Competitors or other enterprises in sector (Co42; 43; 44; 45); consultants or commercial labs (Co52 ; 53 ; 54 ; 55) ; Universities or other higher education institutes (Co62; 63; 64; 65), Government, public or private research institutes (Co72; 73; 74; 75), "0" otherwise.
Domestic and Foreign partner	"1" If partners from Domestic and Foreign group mentioned at the same time, "0" otherwise.
Dependent variable – Export. Binary variable.	
SLO 2012	"1" if there was indication for export as a percent in total turnover from sales to clients outside own country in 2012, "0" otherwise.
SLO 2014	"1" if there was indication for export as a percent in total turnover from sales to clients outside own country in 2014, "0" otherwise.

* Include European Union (EU) and associated countries.
Source: own elaboration based on microdata from CIS 2012-2014. Abbreviations are taken directly from CIS questionnaire.

Figure 2. General Path Model to identify the relation between innovation complementarity, cooperation and export



"Type of partners" – cooperation with domestic / foreign / domestic and foreign partners
"Type of innovation" – introduction of different innovation sets
"SLO12" – Export in 2012
"SLO 14" – Export in 2014

Source: own elaboration in SPSS 21 based on CIS 2012-2014 micro data.

Table 3. Six Path Models for different innovation sets and local cooperation partners

Model: product innovation / domestic partners``			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Product_Innovation	<---	Domestic_Partners	H3a	.374	.169	.001	126.698	***
Exp 2014	<---	Product_Innovation	H1a	.050	.022	.002	14.665	***
Exp 2014	<---	Domestic_Partners	H2a	.010	.002	.001	2.997	.003
Exp 2012	<---	Product_Innovation	H1a	.012	.005	.001	5.364	***
Exp 2012	<---	Domestic_Partners	H2a	-.001	.000	.000	-.584	.560
Exp 2014	<---	Exp 2012		.749	.719	.002	355.593	***
Model: process innovation / domestic partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Process_Innovation	<---	Domestic_Partners	H3b	.352	.158	.001	118.031	***
Exp 2014	<---	Process_Innovation	H1b	.015	.007	.002	4.414	***
Exp 2014	<---	Domestic_Partners	H2a	.024	.005	.001	6.999	***
Exp 2012	<---	Process_Innovation	H1b	.003	.001	.001	1.118	.264
Exp 2012	<---	Domestic_Partners	H2a	.002	.000	.000	1.037	.300
Exp 2014	<---	Exp 2012		.750	.719	.002	356.130	***
Model: product and process innovation / domestic partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
ProdProcess_Innovation	<---	Domestic_Partners	H3c	.373	.137	.001	126.363	***
Exp 2014	<---	Prod Process_Innovation	H1c	.022	.012	.002	6.390	***
Exp 2014	<---	Domestic_Partners	H2a	.021	.004	.001	6.092	***
Exp 2012	<---	Prod Process_Innovation	H1c	.004	.002	.001	1.799	.072
Exp 2012	<---	Domestic_Partners	H2a	.002	.000	.000	.747	.455
Exp 2014	<---	Exp 2012		.750	.719	.002	356.074	***

Model: product and marketing innovation / domestic partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Prod Mark_Innovation	<---	Domestic_Partners	H3d	.330	.113	.001	109.742	***
Exp 2014	<---	Prod Mark_Innovation	H1d	.010	.006	.002	3.007	.003
Exp 2014	<---	Domestic_Partners	H2a	.026	.005	.001	7.631	***
Exp 2012	<---	Prod Mark_Innovation	H1d	.002	.001	.001	.684	.494
Exp 2012	<---	Domestic_Partners	H2a	.003	.001	.000	1.217	.224
Exp 2014	<---	Exp 2012		.750	.719	.002	356.157	***
Model process and marketing innovation / domestic partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Process Mark_Innovation	<---	Domestic_Partners	H3e	.317	.161	.002	105.213	***
Exp 2014	<---	Mar Process_Innovation	H1e	.014	.005	.001	4.092	***
Exp 2014	<---	Domestic_Partners	H2a	.025	.005	.001	7.362	***
Exp 2012	<---	Mar Process_Innovation	H1e	.003	.001	.001	1.356	.175
Exp 2012	<---	Domestic_Partners	H2a	.002	.000	.000	1.019	.308
Exp 2014	<---	Exp 2012		.750	.719	.002	356.134	***
Model: product, process, marketing innovation / domestic partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Prod Proc Mark_Innovation	<---	Domestic_Partners	H3f	.329	.097	.001	109.520	***
Exp 2014	<---	Prod Proc Mark_Innovation	H1a	.002	.001	.002	.635	.525
Exp 2014	<---	Domestic_Partners	H2f	.028	.006	.001	8.415	***
Exp 2012	<---	Prod Proc Mark_Innovation	H1f	.000	.000	.001	-.044	.965
Exp 2012	<---	Domestic_Partners	H2a	.003	.001	.000	1.456	.145
Exp 2014	<---	Exp 2012		.750	.719	.002	356.178	***

Table 4. Six Path Models for different innovation sets and foreign cooperation partners

Model: product innovation / Foreign partners``			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Product_Innovation	<---	Foreign_Partners	H4a	.239	.111	.001	77.260	***
Exp 2014	<---	Product_Innovation	H1a*	.045	.020	.001	13.916	***
Exp 2014	<---	Foreign_Partners	H2b	.036	.007	.001	10.982	***
Exp 2012	<---	Product_Innovation	H1a*	.011	.005	.001	5.272	***
Exp 2012	<---	Foreign_Partners	H2b	.001	.000	.000	.493	.622
Exp 2014	<---	Exp 2012		.749	.718	.002	355.370	***
Model: process innovation / Foreign partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Process_Innovation	<---	Foreign_Partners	H4b	.221	.103	.001	71,128	***
Exp 2014	<---	Process_Innovation	H1b*	.014	.006	.001	4,203	***
Exp 2014	<---	Foreign_Partners	H2b	.044	.009	.001	13,425	***
Exp 2012	<---	Process_Innovation	H1b*	.003	.001	.001	1,219	,223
Exp 2012	<---	Foreign_Partners	H2b	.003	.001	.000	1,480	,139
Exp 2014	<---	Exp 2012		.750	.719	.002	355,856	***
Model: product and process innovation / Foreign partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Prod Process_Innovation	<---	Foreign_Partners	H4c	.255	.097	.001	82.998	***
Exp 2014	<---	Prod Process_Innovation	H1c*	.019	.010	.002	5.776	***
Exp 2014	<---	Foreign_Partners	H2b	.042	.009	.001	12.755	***
Exp 2012	<---	Prod Process_Innovation	H1c*	.004	.002	.001	1.843	,065
Exp 2012	<---	Foreign_Partners	H2b	.003	.001	.000	1.264	,206
Exp 2014	<---	Exp 2012		.750	.719	.002	355.813	***

Model: product and marketing innovation / Foreign partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Prod Mark_Innovation	<---	Foreign_Partners	H4d	.221	.078	.001	71.215	***
Exp 2014	<---	Prod Mark_Innovation	H1d*	.009	.005	.002	2.668	,008
Exp 2014	<---	Foreign_Partners	H2b	.045	.009	.001	13.762	***
Exp 2012	<---	Prod Mark_Innovation	H1d*	.002	.001	.001	.773	,440
Exp 2012	<---	Foreign_Partners	H2b	.003	.001	.000	1.577	,115
Exp 2014	<---	Exp 2012		.750	.719	.002	355.883	***
Model: process innovation and marketing / Foreign partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Process Mark_Innovation	<---	Foreign_Partners	H4e	.195	.102	.002	62,500	***
Exp 2014	<---	Mark Process_Innovation	H1e*	.013	.005	.001	3,991	***
Exp 2014	<---	Foreign_Partners	H2b	.044	.009	.001	13,655	***
Exp 2012	<---	Mark Process_Innovation	H1e*	.003	.001	.001	1,450	,147
Exp 2012	<---	Foreign_Partners	H2b	.003	.001	.000	1,476	,140
Exp 2014	<---	Exp 2012		.750	.719	.002	355,858	***
Model: product. process. marketing innovation / Foreign partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Prod Proc Mark_Innovation	<---	Foreign_Partners	H4f	.230	.070	.001	74,189	***
Exp 2014	<---	Prod Proc Mark_Innovation	H1f*	.001	.001	.002	,233	,816
Exp 2014	<---	Foreign_Partners	H2b	.047	.010	.001	14,267	***
Exp 2012	<---	Prod Proc Mark_Innovation	H1f*	.000	.000	.001	,051	,959
Exp 2012	<---	Foreign_Partners	H2b	.004	.001	.000	1,732	,083
Exp 2014	<---	Exp 2012		.750	.719	.002	355,901	***

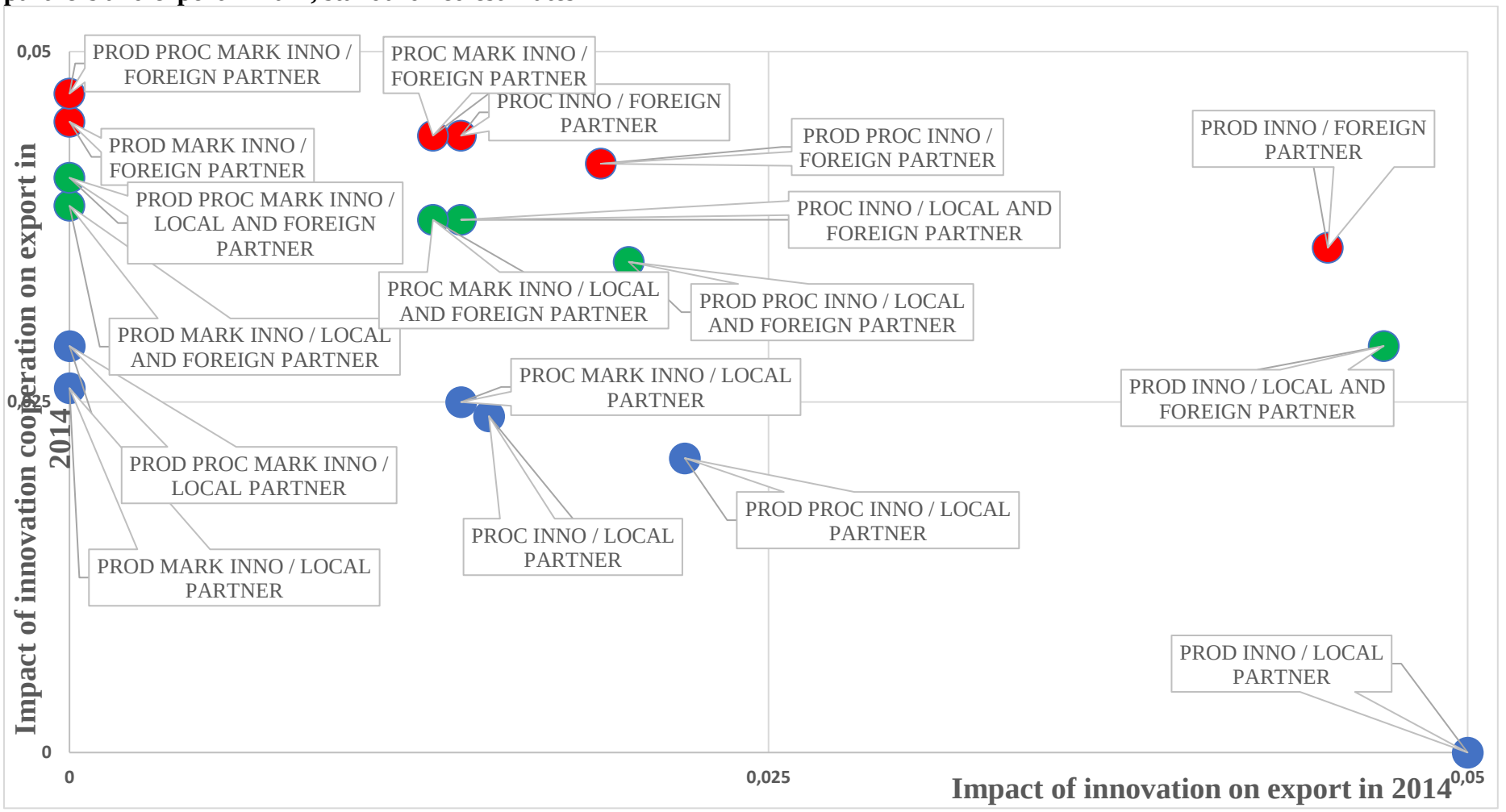
Table 5. Six Path Models for different innovation sets and domestic and foreign cooperation partners

Model: product innovation / Domestic and Foreign partners``			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Product_Innovation	<---	Domestic and Foreign_Partners	H5a	.260	.072	.001	84.782	***
Exp 2014	<---	Product_Innovation	H1a**	.047	.021	.001	14.155	***
Exp 2014	<---	Domestic and Foreign_Partners	H2c	.029	.004	.000	8.768	***
Exp 2012	<---	Product_Innovation	H1a**	.011	.005	.001	5.238	***
Exp 2012	<---	Domestic and Foreign_Partners	H2c	.001	.000	.000	.460	.645
Exp 2014	<---	Exp 2012		.750	.719	.002	355.453	***
Model: process innovation / Domestic and Foreign partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Process_Innovation	<---	Domestic and Foreign_Partners	H5b	.241	.066	.001	78,148	***
Exp 2014	<---	Process_Innovation	H1b**	.014	.006	.001	4,365	***
Exp 2014	<---	Domestic and Foreign_Partners	H2c	.038	.005	.000	11,453	***
Exp 2012	<---	Process_Innovation	H1b*	.003	.001	.001	1,165	,244
Exp 2012	<---	Domestic and Foreign_Partners	H2c	.003	.000	.000	1,544	,123
Exp 2014	<---	Exp 2012		.750	.719	.002	355,951	***
Model: product and process innovation / Domestic and Foreign partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Prod Process_Innovation	<---	Domestic and Foreign_Partners	H5c	.279	.063	.001	91.443	***
Exp 2014	<---	Prod Process_Innovation	H1c**	.020	.011	.002	5.978	***
Exp 2014	<---	Domestic and Foreign_Partners	H2c	.035	.004	.000	10.705	***
Exp 2012	<---	Prod Process_Innovation	H1c**	.004	.002	.001	1.785	,074
Exp 2012	<---	Domestic and Foreign_Partners	H2c	.003	.000	.000	1.308	,191
Exp 2014	<---	Exp 2012		.750	.719	.002	355.907	***

Model: product and marketing innovation / Domestic and Foreign partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Prod Mark_Innovation	<---	Domestic and Foreign_Partners	H5d	.256	.046	.001	83.099	***
Exp 2014	<---	Prod Mark_Innovation	H1d**	.001	.001	.002	.323	,746
Exp 2014	<---	Domestic and Foreign_Partners	H2c	.041	.005	.000	12.375	***
Exp 2012	<---	Prod Mark_Innovation	H1d**	.000	.000	.001	-.020	,984
Exp 2012	<---	Domestic and Foreign_Partners	H2c	.004	.000	.000	1.822	,068
Exp 2014	<---	Exp 2012		.750	.719	.002	355.999	***
Model: process and marketing innovation / Domestic and Foreign partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
MarProcess_Innovation	<---	Domestic and Foreign_Partners	H5e	.213	.066	.001	68,529	***
Exp 2014	<---	Mark Process_Innovation	H1e**	.013	.005	.001	4,132	***
Exp 2014	<---	Domestic and Foreign_Partners	H2c	.038	.005	.000	11,711	***
Exp 2012	<---	Mark Process_Innovation	H1e**	.003	.001	.001	1,403	,161
Exp 2012	<---	Domestic and Foreign_Partners	H2c	.003	.000	.000	1,539	,124
Exp 2014	<---	Exp 2012		.750	.719	.002	355,954	***
Model: product. process. marketing innovation / Domestic and Foreign partners			Hypotheses	Stand. Estimate	Estimate	S.E.	C.R.	P
Prod Proc Mark_Innovation	<---	Domestic and Foreign_Partners	H5f	.245	.051	.001	79,305	***
Exp 2014	<---	Prod Proc Mark_Innovation	H1f**	.009	.005	.002	2,784	,005
Exp 2014	<---	Domestic and Foreign_Partners	H2c	.039	.005	.000	11,814	***
Exp 2012	<---	Prod Proc Mark_Innovation	H1f**	.002	.001	.001	,711	,477
Exp 2012	<---	Domestic and Foreign_Partners	H2c	.004	.000	.000	1,649	,099
Exp 2014	<---	Exp 2012		.750	.719	.002	355,980	***

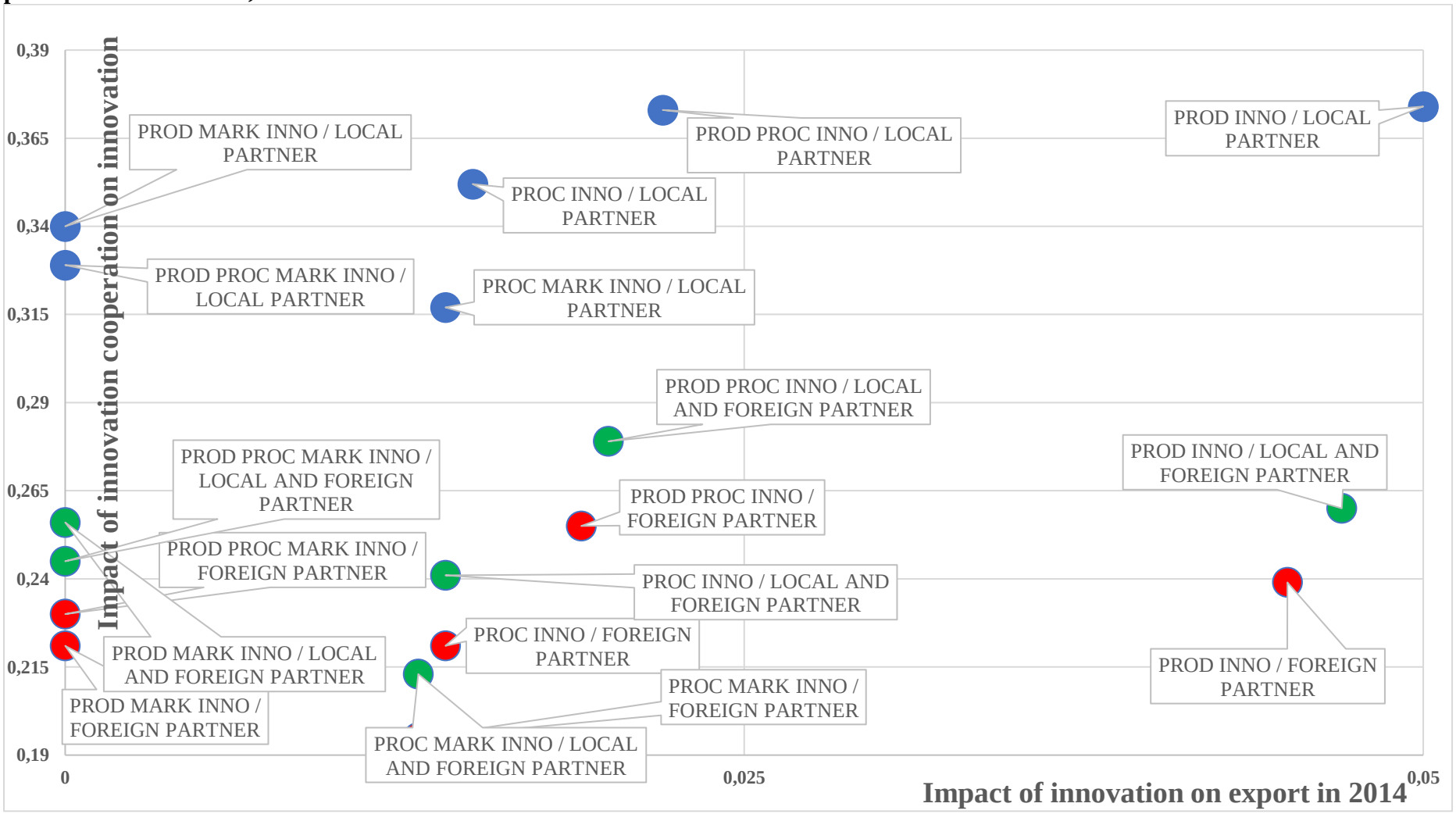
Source for Tables 3, 4, 5: results of path analysis, method - (GLS), AMOS 23, PS IMAGO.

Figure 3. Results of Path Analysis (18 models) for the relation of different modes of innovation and export in 2014 and different cooperation partners and export in 2014, standardized estimates



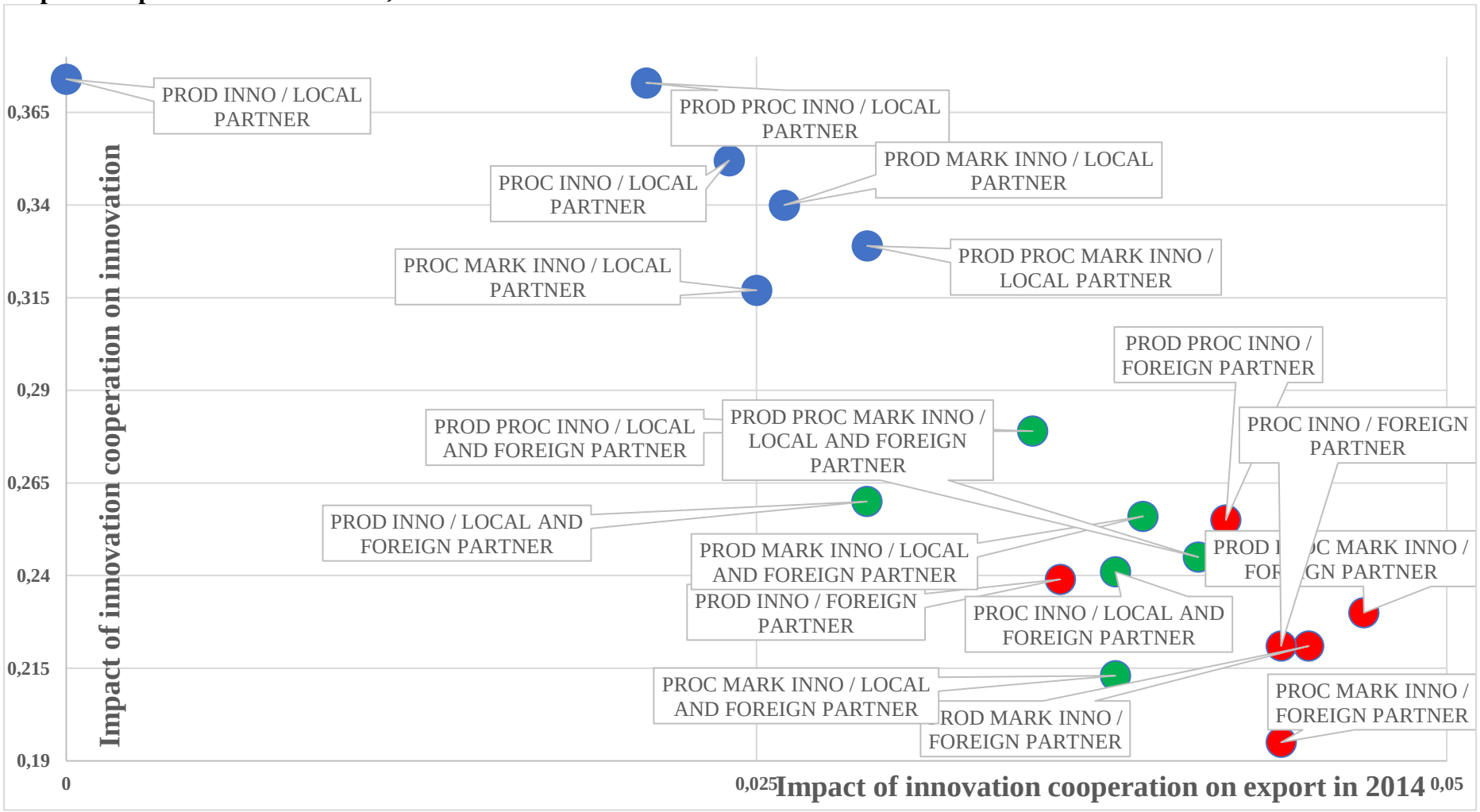
Attention: Blue – models when cooperation with local only; Red – models when cooperation with foreign only; Green – models when cooperation with both types.

Figure 4. Results of Path Analysis (18 models) for the relation of different modes of innovation and export in 2014 and different cooperation partners on innovation, standardized estimates



Attention: Blue – models when cooperation with local only; Red – models when cooperation with foreign only; Green – models when cooperation with both types.

Figure 5. Results of Path Analysis (18 models) for the relation of different modes of innovation cooperation and export in 2014 and different cooperation partners on innovation, standardized estimates



Attention: Blue – models when cooperation with local only; Red – models when cooperation with foreign only; Green – models when cooperation with both types.