

The impact of enterprises' internationalisation on their innovation activity

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ABSTRACT

Objective: The objective of the article is to verify the impact of internationalisation processes on the innovativeness of companies in the Małopolska and Silesian Voivodeships.

Research Design & Methods: In the study of the impact of different ways of internationalisation of companies on their innovation activity, I used structural equation modelling (SEM), which I estimated using the partial least squares method (PLS). I obtained data for the study from a survey conducted in 2024.

Findings: The greatest innovation activity is demonstrated by companies that expand into foreign markets through export. Companies oriented towards export or import are more prone to innovation than companies oriented towards foreign direct investment (FDI). The moderating variable representing market conditions significantly increased the strength of the influence of internationalisation through export on innovation, while in the case of companies oriented towards FDI there was no such strengthening.

Implications & Recommendations: The article indicates which paths of internationalisation of enterprises activate innovation activity to the greatest extent. Innovation advantage was most often gained by companies that engage in foreign trade, and especially undertake export activity. This information may be useful for managers planning expansion into foreign markets.

Contribution & Value Added: The article presents an original analysis of the impact of various internationalisation methods on enterprise innovation. What is new is the broad research perspective adopted, which considers various forms of internationalisation and types of innovation, allowing for the examination of multidirectional relationships between these categories. The use of SEM is also unique in this approach. The study was conducted on a sample of companies from Southern Poland, a region with a high density of technology parks and economic activity zones. The studied region can serve as a reference point for comparative analyses of other regions of Central and Eastern Europe with similar economic profiles.

Article type: research article

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INTRODUCTION

Economic progress would not be possible without innovation. Innovation drives every economy. The literature emphasises that enterprise innovation is one of the key mechanisms that increase enterprises' efficiency, flexibility, and adaptability to a changing market environment. Implementing innovations generally improves product quality, streamlines internal processes, reduces operating costs, and enables better tailoring of offerings to customer needs in various markets (Genc *et al.*, 2019). Consequently, innovative enterprises increase their productivity and resource efficiency, which improves international competitiveness (Genc *et al.*, 2019; Hilmersson *et al.*, 2023). Furthermore, we may view innovations as strategic resources and competencies that create an advantage difficult for

foreign competitors to replicate (Vuorio *et al.*, 2020). Poland's membership in the EU creates vast opportunities for Polish companies to expand into European foreign markets. Internationalisation of enterprises gives them access to new technologies, markets, and resources outside their home country. Through internationalisation, companies achieve a competitive advantage, among other things, by optimising costs and maximising revenues.

How internationalisation links to companies' innovativeness depends on the forms of expansion into external markets. According to Salomon and Jin (2010), the expansion of companies into foreign markets provides an opportunity to reach customers with diverse needs, which puts pressure on companies to intensify their innovative activity in the product and process areas. Cooperation with foreign companies that share knowledge also increases companies' capacity to innovate (Frenz & Ietto-Gillies, 2009). However, the development of companies' innovative activity may face limitations despite their participation in the internationalisation process.

These include, among other things, reduced efficiency of know-how transfer due to cultural and language barriers, possible flow of technological knowledge to competitors, as well as the need to limit investment in research and development activities, *e.g.*, when funds shift to operations to manage activities across many countries. Consequently, not every method of internationalisation leads to the expected increase in the innovativeness of companies in a specific industry.

Since the consequences of companies' internationalisation for their innovative activity are not always obvious and depend on various conditions, the relationships between these categories require continuous research for specific economies or industries. In Polish scientific literature, this type of research is not common. I aimed to examine the impact of internationalisation processes on innovation, using the example of companies in the Małopolska and Silesian Voivodeships. I selected companies from this region because it represents one of the most dynamic areas of economic development in Poland, with a diverse industry structure and a high share of innovative companies. The results of such research have broader implications than just local ones, as the mechanisms of the relationship between innovation and internationalisation are largely universal across the post-transition economies of Central and Eastern Europe. This article examines various forms of company internationalisation and various types of innovation activity, providing a new research perspective not only for the Polish economy. I used structural equation models to achieve this goal.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

According to the literature, internationalisation is a state, *e.g.*, the current level of internationalisation, or a process, *i.e.*, moving through successive levels of internationalisation (Johanson & Vahlne, 1977; Zweig, 2002). Here, we can consider the evolutionary internationalisation of business activities, starting from non-capital forms (direct and indirect export sales, selling licenses abroad, franchising, management contracts) to capital forms (creating subsidiaries and joint ventures). This approach is consistent with the Uppsala model (Welch & Luostarinen, 1988). Knowledge and innovation are currently the main factors motivating companies to operate internationally, but the company's involvement in internationalisation processes can also encourage it to innovate. Innovations determine a company's competitive position in international markets, which in turn often determines further innovation activity. A key component of this relationship is the companies' desire to improve their efficiency. Increased efficiency resulting from the implementation of technological, organisational, and process innovations is widely recognised as one of the main predictors of their international activity (Genc *et al.*, 2019). Higher efficiency fosters various forms of internationalisation, from exports, through strategic alliances, to direct investments, which in turn stimulate the further development of their innovation potential. This is because international activity provides access to new sources of knowledge, technologies, and organisational experience, which can strengthen companies' ability to generate further innovations (Vuorio *et al.*, 2020). Thus, a feedback loop exists between innovation, efficiency, and internationalisation: innovation increases efficiency, which in turn fosters internationalisation, which can then stimulate further innovation processes.

Numerous trends and theories in management and economics attempt to explain the relationship between internationalisation and innovation. Based on the literature review, Du *et al.* (2023) found that current research in this area focuses on the following trends: organisational learning theory (Piperopoulos *et al.*, 2018), institution theory/institution-based view (Xie & Li, 2018), network theory (including embeddedness perspective) (Isaac *et al.*, 2019), knowledge-based view (Hsieh *et al.*, 2018), and resource-based view (Michailova & Zhan, 2015). Most of these approaches predict a beneficial effect of internationalisation on enterprise innovation (*e.g.*, Piperopoulos *et al.*, 2018; Xie & Li, 2018). However, there are views in the literature pointing to negative outcomes of internationalisation mainly due to potentially high costs resulting from increased uncertainty and complexity (Kafourous & Buckley, 2008).

The mutual relationships between companies' internationalisation and innovation have also long been the subject of empirical scientific research. Based on a meta-analysis of 99 studies, Ding *et al.* (2021) showed that the effects of internationalisation on innovation are varied but generally positive. Their meta-regressions indicate that some differences in the assessment of the impact of internationalisation on the innovative activity of companies may stem from the type of internationalisation considered, the type of data used in the studies (panel data vs. cross-sectional data), the level of technological advancement of the industry (high-tech manufacturing vs. industries not specified). Interestingly, they did not observe significant differences in the effects they examined when taking into account many other criteria, such as model specifications (non-linear model vs. linear model), countries (developed countries vs. developing countries), firm size (Ding *et al.*, 2021). Many authors discuss the impact of innovation on the internationalisation of enterprises (Hilmersson *et al.*, 2023; Ji & Mou, 2023; Gómez-Bolaños *et al.*, 2022), but although it is part of the feedback mechanism between these categories, I will not discuss it in detail here as it lies outside this article's main research stream.

Haddoud *et al.* (2023) studied bidirectional cause-and-effect relationships between internationalisation and innovation of Moroccan companies. Their research shows that innovations stimulate export intensity and that foreign technology licenses and R&D expenditure improve the innovation activity of companies. The literature offers studies examining the impact of specific internationalisation activities of companies on their innovative solutions in product or organisational areas, and sometimes on their entire business models. However, a more general perspective that considers the simultaneous impact of different forms of internationalisation on different types of innovation activity is lacking. Therefore, the question of which form of internationalisation contributes most to corporate innovation remains open. This requires more in-depth research that considers various forms of internationalisation and innovation.

When examining the causal relationships between internationalisation and innovation, researchers use various tools from the field of multivariate statistical analysis. These are primarily linear single- and multi-equation econometric models, usually estimated using OLS estimators (McCarthy & Aalbers, 2016), GMM (Tse *et al.*, 2017), 2SLS (Hashai, 2018), GLS (Xie & Li, 2018). Some researchers also use structural equation modelling (SEM) (Efrat *et al.*, 2018; Ding *et al.*, 2021). Other econometric tools are used much less frequently (Ding *et al.*, 2021).

Polish scientific literature on entrepreneurship also devotes considerable attention to the innovativeness of companies and their internationalisation. Unfortunately, few scientific works examine the cause-effect relationships between these categories using the example of Polish companies. Among them, we can point to the scientific monograph written by Mińska-Struzik (2014), who showed that export is a key factor supporting product innovations for Polish companies from the industrial processing sector. However, narrowing the study to a group of high-tech companies, Mińska-Struzik showed that the impact of export on the product and process innovativeness of companies is moderate at best. Szymura-Tyc (2015) also considers these issues in the context of the networking of companies in Poland.

Based on Mińska-Struzik's results, we may state that the relationship between the internationalisation and innovativeness of an enterprise is positive but weak. In turn, the networking of Polish companies is also weakly and positively related to their internationalisation and innovative activity. Other works also discuss the internationalisation and innovativeness of Polish enterprises (Głodowska *et al.*,

2019; Grzegorzewska & Stasiak-Betlejewska, 2022). When the scope of internationalisation of enterprises is territorially limited to the EU, we can talk about the Europeanisation of enterprises. A comprehensive study of the Europeanisation of enterprises based on a sample of over 300 companies in the Małopolska province was conducted by Wach (2012). Although he obtained many new and valuable results, he did not directly examine the impact of Europeanisation on innovativeness.

Therefore, there is a gap in the area of research on the innovation-internationalisation relationship of Polish enterprises. This article attempts to fill this research gap. I aimed to examine the impact of the internationalisation process on the innovative activity of enterprises operating in the Małopolska and Silesian voivodeships. I chose these voivodeships because both regions offer excellent conditions for the development of entrepreneurship; they have large scientific, research, and educational potential with many universities, modern technology parks, and innovation centres, and prestigious scientific institutes. The excellent communication infrastructure of both regions is also significant.

In this study, I considered the most common forms of internationalisation and types of innovation, allowing for the examination of multidirectional relationships between these categories. This approach is novel not only in research conducted for the Polish economy.

The analysis of the research sample indicates that companies expanding into external markets through foreign trade dominate. The literature review suggests that this form of internationalisation may stimulate innovation more than others (Aghion *et al.*, 2018; Cumming *et al.*, 2022). However, this requires verifying appropriate research hypotheses. Therefore, to achieve the main objective of the study, I put forward the following hypotheses:

H1: Export-oriented companies are more prone to innovation than FDI-oriented companies.

H2: Introducing the moderating variable *market conditions* will strengthen the interaction between different forms of internationalisation of companies and their innovativeness.

The structural equation modelling I used enabled the verification of both hypotheses.

RESEARCH METHODOLOGY

I analysed the impact of internationalisation of enterprises on their innovativeness using structural equation models estimated with partial least squares (PLS). Thus far, SEM has been used to study these categories for enterprises, among others, in China (Efrat *et al.*, 2018), Greece (Makri *et al.*, 2017), or in the study of various groups of countries (Ding *et al.*, 2021). The method optimises the variance of latent variables. Due to the two types of relationships occurring in the SEM, I distinguished a structural model (1) and a measurement (external) model (2).

$$Y_{[Px1]} = B^T Y_{[Px1]} + \zeta_{[Px1]} \quad (1)$$

$$X_{[Jx1]} = C^T Y_{[Px1]} + \varepsilon_{[Jx1]} \quad (2)$$

in which:

Y - vector containing P latent variables;

X - vector containing J indicator variables;

C - matrix of dimensions $P \times J$ containing loadings;

B - matrix of dimensions $P \times P$ containing path coefficients;

ε - vector of residual indicator variables;

ζ - vector of residuals of latent variables.

The Y and X matrices in PLS models are related via the matrix of component weights $W_{[JxP]}$:

$$Y_{[Px1]} = W^T X_{[Jx1]} \quad (3)$$

Latent variables in this study represent the internationalisation of enterprises or their innovativeness. Enterprises expand into foreign markets mainly through export, import, and foreign direct investment (Wach, 2012; Róžański & Voytovych, 2023). This is evidenced by numerous theories of internationalisation, as well as concepts and models of international entrepreneurship (*e.g.*, Dunning's OLI paradigm (Dunning, 1988), the Uppsala model (Johanson & Vahlne, 1977), resource-based view (Bar-

ney, 1991). Hence, including latent variables related to foreign trade and FDI was fully justified. Theoretical constructs representing export appear in many SEM works on internationalisation, such as Papadopoulos and Martín (2010), while the construct containing FDI was used in structural models by, for example, Grandinetti and Mason (2012).

Other forms of internationalisation include outsourcing, foreign franchising, and licensing. I include these variables in the article as separate constructs.

Notably, we may consider enterprise innovation at the product, process, marketing, or organisational level. The ecological and sustainable development aspects also merit consideration. Enterprises increasingly consider this aspect when planning their innovation activities (Figueroa-García *et al.*, 2018). Currently, it is difficult for enterprises to compete in the global economy if they do not implement digital innovations (Del Giudice *et al.*, 2021). Therefore, the proposed construct with the latent variable INN refers to the above-mentioned types and dimensions of innovation. Considering such diverse areas of innovation is consistent with different ways of measuring innovation from the perspective of inputs, outputs, and efficiency (Nasir & Zhang, 2024).

Notably, the innovation activity of companies and their relationship with internationalisation are largely determined by external market conditions and such a latent variable is also used in SEM (García-Machado *et al.*, 2023). In this study, I introduced it to the model as a moderating variable. Below, I list the latent variables and their indicators, adopted in the initial form of the theoretical model.

Table 1. Constructs and observable variables in measurement models

Indicator	Description	Scale	
		High	Low
Export (EX)			
EX1	Export is an important tool for entering foreign markets in your company's operations.	7	1
EX2	What is the intensity of your export activity? a) continuous b) cyclical c) sporadic d) none	4	1
EX3	The share of exports in the total production of goods/services of your company should be higher	7	1
Import (IM)			
IM1	Import is an important tool for engaging your company in foreign markets	7	1
IM2	What is the intensity of your import activity a) continuous b) cyclical c) sporadic d) none	4	1
IM3	Your company intends to increase the scale of import of goods/services	7	1
Foreign trade (TR)			
TR1	Participation in foreign trade in the case of your company is a fundamental form of its activity on foreign markets	7	1
TR2	Engagement in foreign trade has increased the competitiveness of your company	7	1
Foreign direct investment (FDI)			
FDI1	FDI is an important form of your company's activity on foreign markets	7	1
FDI2	Greenfield investments are an important tool for entering foreign markets in your company's operations.	7	1
FDI3	Brownfield investments are an important tool for entering foreign markets in your company's operations.	7	1
FDI4	Creating a joint venture is an important tool for entering foreign markets in your company's operations.	7	1
FDI5	The creation of subsidiaries is an important tool for entering foreign markets in your company's activities.	7	1
FDI6	Establishing foreign branches is an important tool for entering foreign markets in your company's operations.	7	1
FDI7	Mergers and acquisitions are an important tool for entering foreign markets in my company's operations	7	1
FDI8	Thanks to FDI, the competitiveness of your company has increased significantly	7	1
Other forms of company internationalisation (OT)			
OT1	Franchising is an important tool for entering foreign markets in your company's operations.	7	1
OT2	Licensing is an important tool for entering foreign markets in your company's operations.	7	1
OT3	Using other internationalisation tools (e.g., outsourcing, R&D contracts) allows your company to expand its operations in foreign markets	7	1

Indica- tor	Description	Scale	
		High	Low
Innovation (INN)			
INN1	The introduction of product innovations is important for your company and significantly in- creases its competitiveness	7	1
INN2	Introducing innovations in the area of production methods or service provision is important for your company and significantly increases its competitiveness	7	1
INN3	Introducing innovations in the area of marketing is important for your company and signifi- cantly increases its competitiveness	7	1
INN4	The introduction of innovations in the area of organisational methods in the functioning of the enterprise and its structure is important for your company and significantly increases its competitiveness	7	1
INN5	In recent years, your company has been introducing product innovations a) very often b) from time to time c) very rarely d) not at all	4	1
INN6	In recent years, your company has been introducing process innovations a) very often b) from time to time c) very rarely d) not at all	4	1
INN7	In recent years, your company has been introducing marketing innovations a) very often b) from time to time c) very rarely d) not at all	4	1
INN8	In recent years, your company has been introducing organisational innovations a) very of- ten b) from time to time c) very rarely d) not at all	4	1
INN9	In recent years, your company has been introducing digital innovations a) very often b) from time to time c) very rarely d) not at all	4	1
INN10	In recent years, your company has been introducing pro-ecological innovations: a) very often, b) from time to time, e) very rarely, d) not at all	4	1
Market conditions (MC)			
MC1	The markets in which your company operates are characterised by political and legal stability	7	1
MC2	Your company operates in an environment of increasing international competition	7	1

Source: own study.

In the created construct, I defined exports (EX) as the value of sales of goods or services produced in the enterprise's home country to foreign markets (both exports to European Union countries (intra-EU) and exports outside the EU (extra-EU). In turn, imports (IM) were the value of goods or services purchased from abroad by a domestic enterprise. Foreign trade (TR) was a broader concept encompassing the value of the total flow of goods and services between the enterprise's home country and abroad.

The path diagram below illustrates the relationship between latent variables and their indicator variables.

Research Sample Description

I conducted the study on a random sample of over 600 companies operating in the Małopolska and Silesian Voivodeships. Southern Poland constitutes a particularly attractive research area, reflecting the characteristics of many post-industrial European regions undergoing transformation towards a knowledge-based economy. I selected enterprises from the Małopolska and Silesian Voivodeships for the study due to their particular importance for innovation processes and internationalisation in Poland. They are characterised by a relatively high density of thriving technology parks and economic activity zones, which facilitate the opening of new businesses. They form a region that can serve as a benchmark for comparative analyses of other regions of Central and Eastern Europe with similar economic profiles. The strong innovative position of companies from these voivodeships is evident, among other things, in their high share of R&D expenditures, and their strong internationalisation activity is reflected in numerous reports and statistical analyses. Therefore, enterprises operating in the Małopolska and Silesian Voivodeships constituted an adequate sample to achieve the research objective. I drew the representatives of the research sample from the REGON database maintained by the Central Statistical Office, with the sample including only companies that pursued at least one possible form of internationalisation. I used simple random sampling, which gave each unit of the finite population an equal chance of inclusion. This is one of the key criteria for sample representativeness.

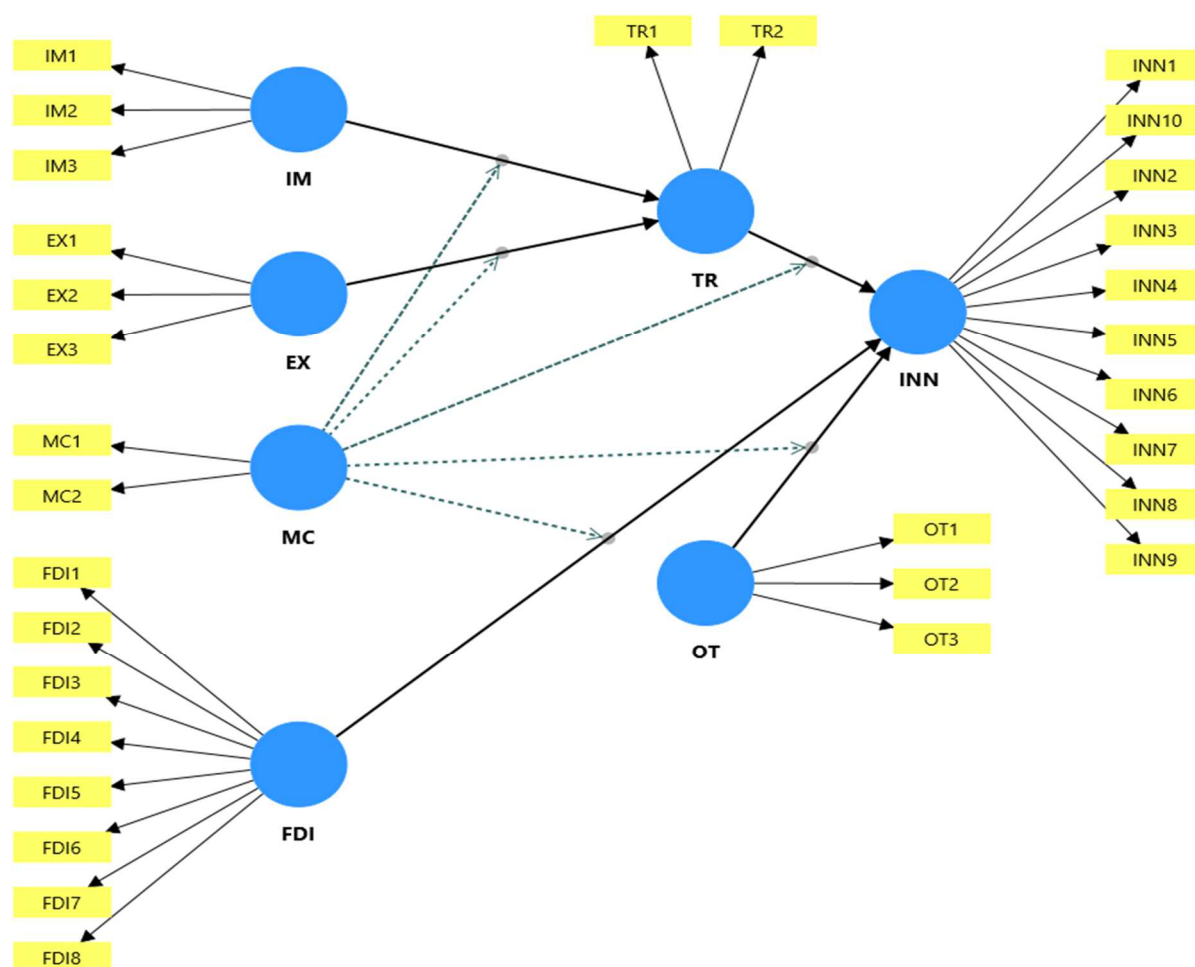


Figure 1. Scheme of relationships between variables in the SEM

Source: own elaboration.

I conducted the study in the last quarter of 2024. Individuals knowledgeable about the company's operations, strategy, and situation completed the surveys: owners or co-owners (in the case of small enterprises), and in medium-sized and large enterprises, by individuals in management positions or authorised to provide information on behalf of the enterprise. The survey return rate was 56%. After verifying completed surveys and rejecting incomplete ones, I qualified 342 companies representing various industries for further analysis. A sample of this size is sufficient if statistical inference is conducted with a maximum error of 5.3% at a standard confidence coefficient of 0.95.

Companies from the communications and IT sectors made up the largest share of the sample (95 companies), followed by companies from the industrial processing sector (65). Moreover, there were 60 companies from the financial and insurance services sector, and 48 companies from the retail sector. The remaining sectors were more fragmented in the sample. The sectoral structure of the sample indicates a clear representation of knowledge-intensive industries and internationalised industries, or industries with high innovation activity. The relatively high share of communications and IT enterprises in the sample reflects that these industries are among the most dynamically developing sectors of the economy and have a strong position in the economic structure of the surveyed regions. Nearly 50% of the surveyed companies were microenterprises employing up to nine employees. Companies with 10-49 employees constituted approximately 21.6% of the sample, while the share of companies employing 50-249 people was approximately 17%. The smallest group consisted of companies employing over 250 employees (14%).

RESULTS AND DISCUSSION

I estimated the measurement and structural models using the SmartPLS package. Figure 2 presents the path model containing estimates of path coefficients between latent variables, factor loadings for individual constructs, and coefficients of determination for endogenous variables. Almost all constructs had a majority of outer loadings with values above 0.7 (for the FDI construct, half of all outer loadings), and the average variance extracted (AVE) values exceeded 0.5 (except for the FDI construct), which indicated satisfactory convergent validity (Hair *et al.*, 2014). Simultaneously, the coefficients of determination of 0.816 for the TR variable and 0.753 for the INN variable indicated a high explanation of the variance of latent variables by their observable variables.

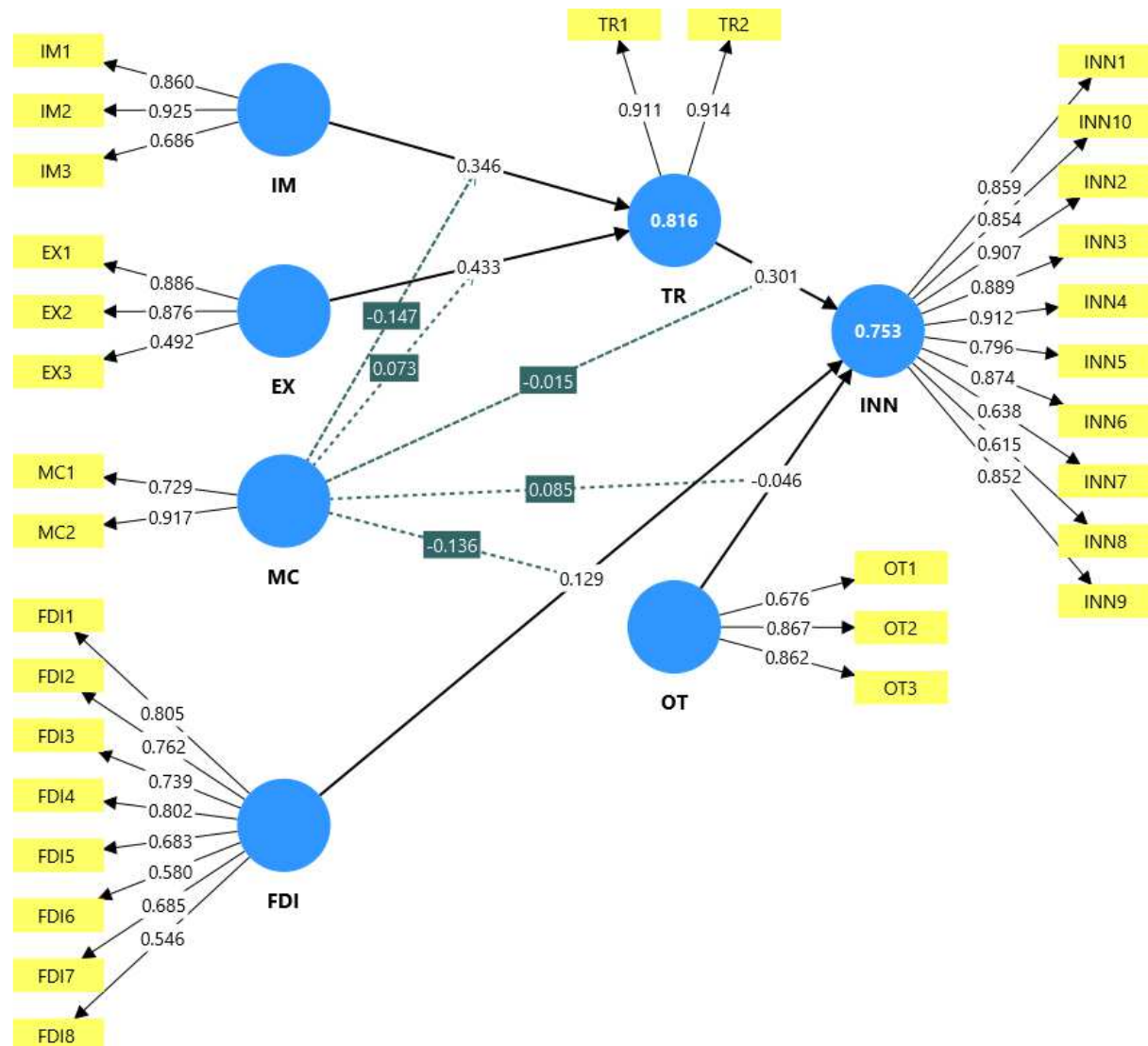


Figure 2. Debugged explanatory PLS-SEM model

Source: own elaboration.

I assessed the reliability and validity of the measurement model using Cronbach's Alpha, composite reliability, the results of which, together with the average variance extracted (AVE), are presented in Table 2. Cronbach's alpha values exceeded the reference value of 0.7 for all latent variables except for the constructs EX and MC. Similarly, the composite reliability indicators exceeded the threshold of 0.7 except for the latent variable EX, which generally indicates high reliability and credibility of the constructs.

Table 2. Construct validity and reliability

Latent variable	Constructs	Outer loadings	Cronbach's alpha	Composite reliability (rho_a)	Average variance extracted (AVE)
Import (IM)	IM1 <- IM	0.860	0.774	0.840	0.688
	IM2 <- IM	0.925			
	IM3 <- IM	0.686			
Foreign direct investment (FDI)	FDI1 <- FDI	0.805	0.853	0.866	0.498
	FDI2 <- FDI	0.762			
	FDI3 <- FDI	0.739			
	FDI4 <- FDI	0.802			
	FDI5 <- FDI	0.683			
	FDI6 <- FDI	0.580			
	FDI7 <- FDI	0.685			
	FDI8 <- FDI	0.546			
Export (EX)	EX1 <- EX	0.886	0.658	0.771	0.598
	EX2 <- EX	0.876			
	EX3 <- EX	0.492			
Innovation (INN)	INN1 <- INN	0.859	0.946	0.955	0.682
	INN10 <- INN	0.854			
	INN2 <- INN	0.907			
	INN3 <- INN	0.889			
	INN4 <- INN	0.912			
	INN5 <- INN	0.796			
	INN6 <- INN	0.874			
	INN7 <- INN	0.638			
	INN8 <- INN	0.615			
	INN9 <- INN	0.852			
Market conditions (MC)	MC1 <- MC	0.729	0.568	0.678	0.687
	MC2 <- MC	0.917			
Other forms of company internationalisation (OT)	OT1 <- OT	0.676	0.733	0.779	0.650
	OT2 <- OT	0.867			
	OT3 <- OT	0.862			
Foreign trade (TR)	TR1 <- TR	0.911	0.799	0.800	0.833
	TR2 <- TR	0.914			

Source: own study.

Regarding the heterotrait-monotrait ratio (HTMT) index, in four cases out of 21 pairs of constructs, the index values exceeded 0.8, which may indicate potential problems with discriminant validity (Gold *et al.*, 2001; Henseler *et al.*, 2015). These are the following pairs of latent variables: EX <-> IM, EX <-> FDI, TR <-> IM, TR <-> EX. For over 80% of construct pairs, the index results were satisfactory.

In summary, the obtained SEM model was characterised by a satisfactory level of convergent validity, coherence, reliability and discriminant validity. It could therefore serve as the basis for further statistical inference based on bootstrap analysis conducted using 5 000 runs (bootstrapping with 5 000 samples in SmartPLS). This allowed me to assess the statistical significance of the obtained results and verify the research hypotheses. Table 3 presents the results of the estimation of total effects (including the assessment of path coefficients). The results show that companies that were oriented towards foreign trade showed greater innovative activity ($\beta = 0.301$, $p < 0.01$) than companies that internationalised through foreign direct investment ($\beta = 0.129$, $p < 0.05$). For standardised loadings, this means that an increase in the level of internationalisation of a company through foreign trade by one standard deviation caused an increase in its innovativeness by about 0.301 standard deviations on average, *ceteris paribus*, while a unit increase in internationalisation through FDI contributed to an increase in the innovativeness of a company by about 0.129 standard deviations on average. In turn, the expansion of companies into foreign markets through foreign trade was most strongly influenced by the export ac-

tivity of companies ($\beta=0.433$, $p<0.01$). The interaction of MC and FDI variables significantly weakened the innovativeness of enterprises (a decrease in the level of innovation by 0.136 standard deviations *ceteris paribus* with a unit increase in the MC×FDI variable). The moderating variable also reversed the direction of the influence of internationalisation through import on innovation from positive to negative (direct effect coefficient -0.044; $p<0.05$), while the interaction of market conditions and export did not significantly affect innovation. Noteworthy, the interaction of market conditions and internationalisation in a way other than foreign trade and FDI strengthened the impact on innovation: an increase in the MC×OT variable by one standard deviation caused a significant increase in the level of innovation by about 0.085 *ceteris paribus*, while the influence of the OT variable on innovation was negative.

Table 3. Results of the total effects estimation in bootstrap analysis

Relationships between latent variables	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
IM -> INN	0.104	0.103	0.030	3.446	0.001
IM -> TR	0.346	0.347	0.053	6.538	0.000
FDI -> INN	0.129	0.132	0.063	2.039	0.041
EX -> INN	0.130	0.128	0.033	3.945	0.000
EX -> TR	0.433	0.433	0.053	8.206	0.000
MC -> INN	0.604	0.607	0.044	13.740	0.000
MC -> TR	0.209	0.208	0.033	6.415	0.000
MC x IM -> INN	-0.044	-0.042	0.019	2.303	0.021
MC x IM -> TR	-0.147	-0.144	0.056	2.611	0.009
MC x FDI -> INN	-0.136	-0.135	0.060	2.274	0.023
MC x EX -> INN	0.022	0.021	0.018	1.252	0.211
MC x EX -> TR	0.073	0.072	0.055	1.320	0.187
MC x OT -> INN	0.085	0.081	0.041	2.096	0.036
MC x TR -> INN	-0.015	-0.013	0.055	0.277	0.782
OT -> INN	-0.046	-0.046	0.037	1.252	0.211
TR -> INN	0.301	0.296	0.069	4.350	0.000

Source: own study.

Table 4 presents the constructed path model, which also included a moderating variable, and the results of conditional effects considering its impact on the relationships between latent variables.

Table 4. Results of conditional effects assessments including the moderating variable

Relationships between latent variables	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (O/STDEV)	P values
FDI -> INN MC at zero	0.129	0.132	0.063	2.039	0.041
FDI -> INN MC at one	-0.007	-0.004	0.054	0.128	0.898
OT -> INN MC at zero	-0.046	-0.046	0.037	1.252	0.211
OT -> INN MC at one	0.039	0.036	0.041	0.949	0.342
TR -> INN MC at zero	0.301	0.296	0.069	4.350	0.000
TR -> INN MC at one	0.286	0.283	0.074	3.851	0.000
IM -> TR MC at zero	0.346	0.347	0.053	6.538	0.000
IM -> TR MC at one	0.199	0.203	0.083	2.399	0.016
EX -> TR MC at zero	0.433	0.433	0.053	8.206	0.000
EX -> TR MC at one	0.506	0.505	0.085	5.929	0.000
IM -> TR -> INN MC at zero	0.104	0.103	0.030	3.446	0.001
IM -> TR -> INN MC at one	0.057	0.059	0.031	1.820	0.069
EX -> TR -> INN MC at zero	0.130	0.128	0.033	3.945	0.000
EX -> TR -> INN MC at one	0.145	0.142	0.042	3.438	0.001
MC -> TR -> INN MC at zero	0.063	0.062	0.018	3.477	0.001
MC -> TR -> INN MC at one	0.060	0.059	0.019	3.114	0.002

Source: own study.

The influence of market conditions as a moderating variable (MC) on the relationship between internationalisation of the enterprise through foreign trade and innovation was statistically significant, but weakened the strength of the relationship. With the moderating variable active, a one-standard-deviation increase in internationalisation through foreign trade raised innovation by 0.286 standard deviations *ceteris paribus* (i.e., by 0.015 less than without the moderating variable). On the other hand, the influence of market conditions on the relationship between FDI and innovation was negative and statistically insignificant. The moderating variable also had no significant influence on the relationship between other ways of internationalisation (OT) and enterprise innovation.

The active moderating variable also strengthened internationalisation through foreign trade among export-oriented firms and reduced internationalisation among import-oriented firms. The results of moderation of these two relationships were statistically significant at the 0.05 significance level. Including the mediating variable TR in the indirect effects, the moderating variable (MC) strengthened the effect of internationalisation through export on innovation: with market conditions active, a one-standard-deviation increase in internationalisation through export raised innovation by 0.145 standard deviations, *ceteris paribus* (in the absence of the moderating variable, this increase was 0.13). The moderating variable did not significantly affect the indirect relationship between internationalisation through import and innovation.

To detail how individual components of the internationalisation constructs affect elements of the innovativeness construct, I calculated a matrix of Spearman's rank correlation coefficients.

Table 5. Spearman's rank correlation coefficients for indicators creating constructs representing internationalisation and innovation of companies

Indicator	INN1	INN2	INN3	INN4	INN5	INN6	INN7	INN8	INN9	INN10
IM1	0.618	0.514	0.397	0.405	0.496	0.503	0.541	0.373	0.579	0.592
IM2	0.590	0.517	0.472	0.452	0.503	0.561	0.587	0.412	0.616	0.644
IM3	0.324	0.251	0.272	0.205	0.272	0.303	0.324	0.243	0.354	0.389
EX1	0.540	0.473	0.345	0.382	0.428	0.471	0.526	0.335	0.539	0.528
EX2	0.557	0.430	0.390	0.357	0.421	0.509	0.525	0.376	0.525	0.546
EX3	0.317	0.236	0.216	0.265	0.265	0.271	0.287	0.119	0.324	0.357
TR1	0.674	0.625	0.475	0.480	0.510	0.560	0.585	0.386	0.635	0.629
TR2	0.561	0.544	0.467	0.494	0.538	0.578	0.620	0.400	0.668	0.694
FDI1	0.490	0.479	0.437	0.420	0.464	0.497	0.531	0.321	0.566	0.588
FDI2	0.512	0.445	0.336	0.358	0.416	0.438	0.466	0.248	0.497	0.485
FDI3	0.371	0.277	0.196	0.330	0.405	0.370	0.385	0.274	0.389	0.384
FDI4	0.478	0.381	0.296	0.325	0.379	0.418	0.411	0.246	0.477	0.493
FDI5	0.576	0.499	0.372	0.402	0.452	0.476	0.521	0.355	0.522	0.542
FDI6	0.430	0.333	0.253	0.242	0.306	0.362	0.292	0.147	0.382	0.479
FDI7	0.417	0.380	0.324	0.322	0.352	0.383	0.415	0.264	0.442	0.480
FDI8	0.220	0.228	0.150	0.219	0.258	0.271	0.225	0.187	0.277	0.348
OT1	0.411	0.352	0.263	0.289	0.325	0.357	0.437	0.248	0.430	0.461
OT2	0.423	0.380	0.305	0.333	0.330	0.416	0.484	0.322	0.471	0.446
OT3	0.398	0.355	0.293	0.304	0.308	0.386	0.431	0.309	0.433	0.468

Source: own study.

All correlation coefficients presented in Table 5 were statistically significant at the 0.01 significance level. A detailed analysis of Table 5 shows that companies' greater involvement in foreign trade had a particularly strong impact on digital and ecological innovations, and supported organisational innovations to the least extent. Although imports and exports had a similar impact on innovation overall, imports tended to show slightly higher Spearman coefficients than exports. This stems from the fact that companies that import advanced products, components, or technologies learn from foreign suppliers: they acquire new production processes, quality standards, design, technological innovations, and can effectively translate this knowledge into their own innovations, for example, by improving

products, processes, or introducing new functionalities. Among FDI-oriented companies, greenfield investors and companies with subsidiaries had a particularly strong impact on most types of innovation. In contrast, companies pursuing FDI through their foreign branches generally had the least impact on innovation. Among forms of internationalisation other than foreign trade and FDI, foreign licensing had the strongest impact on innovation activity.

CONCLUSIONS

The research shows that foreign trade, and export in particular, is the form of internationalisation that most strongly supports the innovation activities of the surveyed enterprises. Enterprises oriented towards foreign trade are more prone to innovation than those oriented towards FDI. Including market conditions as a moderating variable does not increase the strength of the influence of latent variables on innovation, except for export. Export-oriented enterprises must cope with international competition, and one of the tools for effective competition is innovative goods, services, or entire business models.

Thus, hypothesis H1 was supported in the light of the present research results, *i.e.*, export-oriented companies are more prone to innovation than FDI-oriented companies. Meanwhile, hypothesis H2 was only partially confirmed, because the moderating variable of market conditions significantly strengthened only one relationship: export->foreign trade->innovation. The obtained conclusions did not contradict the results obtained by conclusions align with the results of other researchers (Wach, 2012; Róžański & Voytovych, 2023), who indicate export as the basic form of internationalisation of Polish companies. Greater innovativeness of companies that internationalise through foreign trade results, among other things, from their greater flexibility, speed of adjustment to changing market conditions, diversity of these markets and constant pressure from competitors. Empirical studies of firms' learning by exporting support these results. For example, using panel data of US manufacturing firms, Salomon and Shaver (2005) demonstrated that participation in export markets increases firms' innovative activity. Liang *et al.* (2024) also confirmed the learning-by-exporting effect, implying a positive impact of exports on the innovation performance of Chinese firms. They demonstrated that the learning effect remains significant and consistent, even with the spread of FDI. Silva *et al.* (2012) obtained less conclusive results. They combined the results of numerous empirical studies from developing and developed countries. Their analysis showed that simply entering foreign markets does not always result in a sustained increase in innovation and productivity. Differences are caused by factors such as industry and the level of competition. Mińska-Struzik (2014) reached a similar conclusion for Polish companies, showing that the strength of the impact of internationalisation of companies on innovation depends on the industry.

Moreover, foreign trade requires a company to constantly adapt its products and services to the requirements of many different markets, which puts pressure on their innovation activity. For this reason, the moderating variable considering the impact of international market competition significantly strengthened the impact of the internationalisation of such companies on their innovation. Notably, FDI-oriented companies invest a significant part of their financial resources in infrastructure; their decision-making usually takes longer, and their operational rigidity is greater, which may limit the possibilities of investing in innovation in the short term. Such operational inertia of FDI-oriented companies means that their response to changing market conditions is weaker and slower.

Hence, hypothesis H2 was not supported for such companies. Greater flexibility of export-oriented companies and greater inertia of FDI-oriented companies seem to be key factors explaining the result of the verification of the research hypotheses. The obtained conclusions are consistent with the results of much research (Filipescu *et al.*, 2013; Aghion *et al.*, 2018; Cumming *et al.*, 2022). The presented results and research method have their limitations. The SEM model proposed in this article cannot determine which types and levels of innovation are most supported by different forms of internationalisation. This requires further detailed studies based on SEM models or other econometric tools. In this article, I partially addressed this limitation by conducting a correlation analysis between the components of the relevant constructs. Furthermore, the adopted constructs of latent variables may not contain all the important indicator variables. In future studies based on structural modelling, one can try to expand the list of these indicators. Further, broader survey studies will also be necessary. Despite

many advantages of the PLS estimation method of structural and measurement models, its serious limitation is the required linearity of relations between variables, which does not always hold and limits the possibility of modelling more complex, nonlinear dependencies. The study covers an economically vibrant region with numerous companies engaged in international and innovative activities. Therefore, the results can serve as a benchmark for other similar economic activity zones, particularly in Central and Eastern European countries.

REFERENCES

- Aghion, P., Bergeaud, A., Lequien, M., & Melitz, M.J. (2018). The impact of exports on innovation: Theory and evidence (p. 678). Cambridge, MA: National Bureau of Economic Research. <https://doi.org/10.2139/ssrn.3171084>
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120. <https://doi.org/10.1177/014920639101700>
- Cumming, D.J., Xue, S., & Zhou, S. (2022). From Export to Innovation: Evidence from Chinese Listed Firms. Available at SSRN 3755234. <https://doi.org/10.2139/ssrn.3755234>
- Del Giudice, M., Scuotto, V., Papa, A., Tarba, S.Y., Bresciani, S., & Warkentin, M. (2021). A self-tuning model for smart manufacturing SMEs: Effects on digital innovation. *Journal of Product Innovation Management*, 38(1), 68-89. <https://doi.org/10.1111/jpim.12560>
- Ding, S., McDonald, F., & Wei, Y. (2021). Is internationalization beneficial to innovation? Evidence from a meta-analysis. *Management International Review*, 61(4), 469-519. <https://doi.org/10.1007/s11575-021-00451-0>
- Du, J., Zhu, S., & Li, W.H. (2023). Innovation through internationalization: A systematic review and research agenda. *Asia Pacific Journal of Management*, 40(3), 1217-1251. <https://doi.org/10.1007/s10490-022-09814-z>
- Dunning, J.H. (1988). The Eclectic Paradigm of International Production: A Restatement and Some Possible Extensions. *Journal of International Business Studies*, 19(1), 1-31. <https://doi.org/10.1057/palgrave.jibs.8490372>
- Efrat, K., Hughes, P., Nemkova, E., Souchon, A.L., & Sy-Changco, J. (2018). Leveraging of dynamic export capabilities for competitive advantage and performance consequences: Evidence from China. *Journal of Business Research*, 84, 114-124
- Figueroa-García, G., García-Machado, J.J., & Pérez-Bustamante Yábar, D.C. (2018). Modeling the social factors that determine sustainable consumption behaviour in the community of Madrid. *Sustainability*, 10(8), 2811. <https://doi.org/10.3390/su10082811>
- Filipescu, D.A., Prashantham, S., Rialp, A., & Rialp, J. (2013). Technological innovation and exports: Unpacking their reciprocal causality. *Journal of International Marketing*, 21(1), 23-38. <https://doi.org/10.2307/23488026>
- Frenz, M., & Ietto-Gillies, G. (2009). The impact on innovation performance of different sources of knowledge: Evidence from the UK Community Innovation Survey. *Research Policy*, 38(7), 1125-1135. <https://doi.org/10.1016/j.respol.2009.05.002>
- García-Machado, J.J., Sroka, W., & Nowak, M. (2023). PLS-SEM model on business demand for technological services and R&D and innovation activities. *Technological and Economic Development of Economy*, 29(1), 1-22. <https://doi.org/10.3846/tede.2023.17968>
- Genc, E., Dayan, M., & Genc, O.F. (2019). The impact of SME internationalization on innovation: The mediating role of market and entrepreneurial orientation. *Industrial Marketing Management*, 82(1), 253-264. <https://doi.org/j.indmarman.2019.01.008>
- Głodowska, A., Maciejewski, M., & Wach, K. (2019). Oddziaływanie orientacji przedsiębiorczej na wykorzystanie wiedzy w procesie umiędzynarodowienia na przykładzie przedsiębiorstw z Polski. *Studies of the Industrial Geography Commission of the Polish Geographical Society*, 33(1), 18-35. <https://doi.org/10.24917/20801653.361.1>
- Gold, A.H., Malhotra, A., & Segars, A.H. (2001). Knowledge management: an organizational capabilities perspective. *Journal of Management Information Systems*, 18(1), 185-214. <https://doi.org/10.1080/07421222.2001.11045669>
- Gómez-Bolaños, E., Ellimäki, P., Hurtado-Torres, N.E., & Delgado-Márquez, B.L. (2022). Internationalization and environmental innovation in the energy sector: Exploring the differences between multinational enterprises from emerging and developed countries. *Energy Policy*, 163, 112867. <https://doi.org/10.1016/j.enpol.2022.112867>

- Grandinetti, R., & Mason, M.C. (2012). Internationalization modes other than exporting: The missing determinant of export performance. *European Business Review*, 24(3), 236-254. <https://doi.org/10.1108/09555341211222495>
- Grzegorzewska, E., & Stasiak-Betlejewska, R. (2022). Internationalization strategies and instruments of competition – Polish furniture companies on the foreign market. *Annals of Warsaw University of Life Sciences SGGW Forestry and Wood Technology*, 119. <https://doi.org/10.5604/01.3001.0016.1868>
- Haddoud, M.Y., Kock, N., Onjewu, A.K.E., Jafari-Sadeghi, V., & Jones, P. (2023). Technology, innovation and SMEs' export intensity: Evidence from Morocco. *Technological Forecasting and Social Change*, 191, 122475. <https://doi.org/10.1016/j.techfore.2023.122475>
- Hair, J.F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V.G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, 26(2), 106-121. <https://doi.org/10.1108/EBR-10-2013-0128>
- Hashai, N. (2018). Focusing the high-technology firm: How outsourcing affects technological knowledge exploration. *Journal of Management*, 44(5), 1736-1765. <https://doi.org/10.1177/0149206315623840>
- Henseler, J., Ringle, C.M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43, 115-135. <https://doi.org/10.1007/s11747-014-0403-8>
- Hilmersson, M., Pourmand Hilmersson, F., Chetty, S., & Schweizer, R. (2023). Pace of innovation and speed of small and medium-sized enterprise international expansion. *International Small Business Journal*, 41(2), 181-203. <https://doi.org/10.1177/02662426221085>
- Hsieh, W.L., Ganotakis, P., Kafourous, M., & Wang, C. (2018). Foreign and domestic collaboration, product innovation novelty, and firm growth. *Journal of Product Innovation Management*, 35(4), 652-672. <https://doi.org/10.1111/jpim.12435>
- Isaac, V.R., Borini, F.M., Raziq, M.M., & Benito, G.R.G. (2019). From local to global innovation: The role of subsidiaries' external relational embeddedness in an emerging market. *International Business Review*, 28(4), 638-646. <https://doi.org/10.1057/j.ibusrev.2018.12.009>
- Ji, L., & Mou, J. (2023). The moderating role of host investment environments on the relationship between enterprises' OFDI and green innovation: evidence from China. *Sustainability*, 15(2), 891. <https://doi.org/10.3390/su15020891>
- Johanson, J., & Vahlne, J.-E. (1977). The Internationalization Process of the Firm – A Model of Knowledge Development and Increasing Foreign Market Commitments. *Journal of International Business Studies*, 8(1), 23-32. <https://doi.org/10.1057/palgrave.jibs.8490676>
- Kafourous, M.I., & Buckley, P.J. (2008). Under what conditions do firms benefit from the research efforts of other organizations? *Research Policy*, 37(2), 225-239. <https://doi.org/j.respol.2007.11.005>
- Liang, Y., Shi, K., Tao, H., & Xu, J. (2024). Learning by exporting: Evidence from patent citations in China. *Journal of International Economics*, 150(3), 103933. <https://doi.org/10.1016/j.jinteco.2024.103933>
- Makri, K., Theodosiou, M., & Katsike, E. (2017). An empirical investigation of the antecedents and performance outcomes of export innovativeness. *International Business Review*, 26(4), 628-639. <https://doi.org/10.1016/j.ibusrev.2016.12.004>
- McCarthy, K.J., & Aalbers, H.L. (2016). Technological acquisitions: The impact of geography on post-acquisition innovative performance. *Research Policy*, 45(9), 1818-1832. <https://doi.org/10.1016/j.respol.2016.05.012>
- Michailova, S., & Zhan, W. (2015). Dynamic capabilities and innovation in MNC subsidiaries. *Journal of World Business*, 50(3), 576-583. <https://doi.org/10.1016/j.jwb.2014.10.001>
- Mińska-Struzik, E. (2014). *Od eksportu do innowacji. Uczenie się przez eksport polskich przedsiębiorstw*. Warszawa: Wydawnictwo Difin.
- Nasir, M.H., & Zhang, S. (2024). Evaluating innovative factors of the global innovation index: A panel data approach. *Innovation and Green Development*, 3(1), 100096. <https://doi.org/10.1016/j.igd.2023.100096>
- Papadopoulos, N., & Martín, O.M. (2010). Toward a model of the relationship between internationalization and export performance. *International Business Review*, 19(4), 388-406. <https://doi.org/10.1016/j.ibusrev.2010.02.003>
- Piperopoulos, P., Wu, J., & Wang, C. (2018). Outward FDI, location choices and innovation performance of emerging market enterprises. *Research Policy*, 47(1), 232-240. <https://doi.org/10.1016/j.respol.2017.11.001>
- Różański, J., & Voytovych, N. (2023). *Internacjonalizacja przedsiębiorstw a procesy innowacyjne w globalnej gospodarce*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.

- Salomon, R., & Jin, B. (2010). Do leading or lagging firms learn more from exporting? *Strategic Management Journal*, 31(10), 1088-1113. <https://doi.org/10.1002/smj.850>
- Salomon, R.M., & Shaver, J.M. (2005). Learning by exporting: new insights from examining firm innovation. *Journal of Economics & Management Strategy*, 14(2), 431-460. <https://doi.org/10.1111/j.1530-9134.2005.00047.x>
- Silva, A., Afonso, O., & Africano, A.P. (2012). Learning-by-exporting: What we know and what we would like to know. *The International Trade Journal*, 26(3), 255-288. <https://doi.org/10.1080/08853908.2012.682022>
- Szymura-Tyc, M. (2015). *Internacjonalizacja, innowacyjność i usieciowienie przedsiębiorstw. Podejście holistyczne*. Wydawnictwo Difin, Warszawa.
- Tse, C.H., Yu, L.H., & Zhu, J.J. (2017). A multimediation model of learning by exporting: Analysis of export-induced productivity gains. *Journal of Management*, 43(7), 2118-2146. <https://doi.org/10.1177/0149206315573998>
- Wach, K. (2012). *Europeizacja małych i średnich przedsiębiorstw*. Warszawa: Wydawnictwo Naukowe PWN.
- Welch, L.S., & Luostarinen, R. (1988). Internationalization: Evolution of a concept. *Journal of General Management*, 14(2), 34-55. <https://doi.org/10.1177/030630708801400203>
- Vuorio, A., Torkkeli, L., & Sainio, L.M. (2020). Service innovation and internationalization in SMEs: antecedents and profitability outcomes. *Journal of International Entrepreneurship*, 18(1), 92-123. <https://doi.org/10.1007/s10843-019-00266-z>
- Xie, Z., & Li, J. (2018). Exporting and innovating among emerging market firms: The moderating role of institutional development. *Journal of International Business Studies*, 49(2), 222-245. <https://doi.org/10.1057/s41267-017-0118-4>
- Zweig, D. (2002). *Internationalizing China: Domestic Interests and Global Linkages*. New York: Cornell Studies in Political Economy, Cornell Univ. Press.

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Conflict of Interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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