DETERMINANTS OF COOPERATION WITH INSTITUTIONAL PARTNERS AND INNOVATION -PERFORMANCE OF POLISH MANUFACTURING ENTERPRISES. RESEARCH OUTCOMES.

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Abstract

The aim of this paper is to assess of the influence of institutional cooperation (with research institutes and universities) on the innovation performance of companies as well as determinants of such cooperation. The analysis was based on data from the Polish version of the *Community Innovation Survey* (CIS) for 2008-2010. The sample consists of 7783 medium-sized and large manufacturing enterprises from sections C to E. Based on the results of a structural equation model it has been concluded that there is a statistically significant relation between institutional cooperation and innovation performance of the researched companies, as well as (in the case of cooperation with Polish companies) in the introduction of product innovations new for the country, Europe or the world. The analysis of critical values between parameters enables the establishment of a hierarchy of company features which determines such cooperation. These include the system of employee incentives for the creation of intellectual property, company size and own R&D -department. The application of the employee incentive system better explains the decision to establish cooperation with Polish companies than with foreign ones. However a feature which is not institutional cooperation friendly is belonging to a larger group of companies. Key words: institutional cooperation, innovation -performance, Polish CIS, Poland

Key words: science and industry cooperation, innovation performance of enterprises

Introduction

At present, due to the rate of change, rising costs and risk of failure, the implementation of complex innovation projects without cooperation is practically impossible. A company requires specialised knowledge which may be gained from partners in the supply chain, competitors or institutional partners [Kessler et al., 2000]. Between 2008 and 2010, every third company cooperated in innovation ventures (the EU average is 25.5%). A slightly higher percentage was registered in medium-sized companies and even

higher among large companies, where six out of ten declared such a cooperation [Eurostat Statistics Database]. Polish -manufacturing companies value most highly cooperation with their suppliers, then customers followed by research institutes, universities, consulting companies, competitors, Polish Academy of Sciences departments and foreign research institutes [Central Statistical Office] Cooperation with institutional partners is classed as least valuable, which may be surprising taking into consideration that the success of cooperation depends not only on the innovativeness of partners, a willingness to participate in projects together but also on the reduction of opportunistic behaviour, which is a more common among institutional partners [Möller, P. Törrönen, 2003].

This type of cooperation, analysed in the context of the innovation performance of a company, is the subject of this paper. The first section includes a review of the literature and the research hypotheses. The second presents the sample, the research methods and variables operationalisation. The third provides the results and the fourth the conclusions.

Institutional cooperation and company innovation performance - theoretical background and research hypotheses

Recent years have seen the growing popularity of the concept of *open innovation*, meaning 'systematic creation, finding, maintaining and application of knowledge inside and outside an organisation as a result of innovation processes' [Lichtenthaler, 2011] and implemented in cooperation with various external institutions [Chesbrough, 2003; H. Chesbrough, et al. 2006; E. Von Hippel, 2005]. The selection of partners for cooperation depends on, among others, the nature of the innovation project, competencies of the parties and their behaviour in mutual relations. This cooperation can be vertical - within the value chain or horizontal (at a particular stage of value creation), among others, with competitors and institutions (research institutions and universities). Literature offers many examples of the positive impact of institutional partner cooperation on company innovation performance. Based on the results of CIS for France and Germany, Robin and Schubert [2013] proved that while institutional cooperation is product innovation friendly, it does not influence process innovation. On the other hand, Monjon and Walbroeck [2003] claim that companies which introduce more radical innovations are more likely to cooperate with universities, whereas less innovative companies avail of ready available solutions to a greater degree. Lööf and Brostrom [2008] proved the existence of a positive link between institutional cooperation and innovation performance in the case of large companies and Miozzo

and Dewick [2004] analysed this relationship amongst companies in the - construction industry. Based on the above, the first research hypothesis is-proposed as:

H1. Innovation cooperation with institutional partners impacts positively on company innovation performance.

Usually the introduction of innovation 'new to the market' is not accidental but reflects strategic operations geared towards the improvement of a company's market position [Hamel and Prahalad, 1989]. Implementation of new solution creation processes (e.g. a new product or technology development) and their commercialisation requires huge financial resources (in particular, in the case of radical breakthrough innovations), and is also linked with the high technical, market and economic risk of such a project's failure [Rutkowski, 2007]. On the other hand, only such projects are potentially able to ensure the company's stronger, more difficult to imitate, effect of differentiation. Institutional partners possess knowledge which encourages the creation of brand new products [Belderbos et al. 2004a, Nieto and Santamaria, 2007]. At the same time they are not directly affected by market changes in the case of innovation project implementation, which lead to the creation of new market segments [Tether, 2002; Monjon and Waelbroeck, 2003], therefore their behaviour is, by nature, less opportunistic than other cooperation partners [Kim and Lui, 2010]. The above deliberations lead to the next research hypothesis:

H2a. Innovation cooperation with institutional partners encourages the introduction of new market innovations or the creation of new market segments.

Institutional cooperation determinants in the area of innovation activity

Research proves that success in introducing innovation that stems from cooperation, largely depends on a company's absorptive capacity, which is the result of company resources and competences [Cohen, Levinthal, 1989 and 1990]. The more a company invests in R&D the better it is prepared to absorb knowledge from outside, including that from cooperation. Literature stresses the growing importance of intangible resources for the creation of a company's competitive potential [Grant, 1991; Sulikowska-Formanowicz, 2002], in particular knowledge, regarded by many researchers as a strategic resource [Kogut, Zander, 1992]. The development of employee competences and the stimulation of the ability to undertake particular tasks as well as attitudes towards external institutions increase the importance and value of intangible resources [de Wit, Meyer,

2007]. Taking the above into consideration, the following research hypotheses is-proposed as:

H3. The internal resources of an innovative company encourage innovation cooperation with institutional partners.

H4. The employee incentive system to create intellectual property in an innovative company encourages innovation cooperation with institutional partners.

Many previous researches highlights the importance of company size on innovation cooperation. This stems from the fact that large companies, by their very nature, have greater resources, a greater absorptive capability of knowledge from outside and therefore can draw greater benefits from cooperation. The majority of research points to the positive relationship between company size and a willingness to cooperate [Leiponen, 2002] including this with institutional partners [Laursen and Salter, 2004; Fontana et al., 2006; Serrano-Bedia et al., 2010,], therefore the next research hypothesis is placed as:

H5. The size of an innovative company influences positively cooperation in innovations with institutional partners.

Being a part of a capital group gives access to the resources of other group members which affects a company's standing and transaction security thereby making it easier to gain new cooperation partners. However, the resources within the group of companies may fulfil the individual company's needs, decreasing its incentive to look for external cooperation partners. Taking into consideration the fact that literature on the subject points mainly to the positive relationship between belonging to a capital group and establishing cooperation in innovation with institutional partners [Tether, 2002; Mohnen and Hoareau, 2003; Belderbos et al., 2004b], though the opposite view is also expressed in certain papers [Veugelers and Cassiman, 2005], the final hypothesis is proposed as:

H6. Being a innovative member of a capital group encourages cooperation in innovations with institutional partners.

Research sample, methods, variables applied in the structural model

Analysis was conducted on a representative sample of 7783 medium-sized and large Polish companies from the research GUS PNT-02

for the years 2008-2010, belonging to the sections from C to E (according to PKD 2007) [53], Table 1.

Table 1. The features of research analysis

Features of sample *		Sample in the model N=745		*Non-Innovators* N=4988		*-Innovators* N=2795		Complete sample N=7783	
		N	%	N	%	N	%	N	%
Product innovation		745	100	0	0a	2055	73.5b	2055	26.4
Process innovation		619	83.1	0	0a	2169	77.6b	2169	27.9
Organisational innovation		530	71.1	458	9.2a	1349	48.3b	1807	23.2
Marketing innovation		45.1	60.5	402	8.1a	1107	39.6b	1509	19.4
Company size	Medium-	397	53.3	4356	87.3a	1885	67.4b	6241	80.2
	Large	348	46.7	632	12.7a	910	32.6b	1542	19.8
Technology level	Not classified	0	0	655	13.1a	272	9.7b	927	11.9
	Low	170	22.8	2232	44.7a	843	30.2b	3075	39.5
	Medium	525	70.5	2026	40.6a	1558	55.7b	3584	46
	High	50	6.7	75	1.5a	122	4.4b	197	2.5
Capital group	Polish	165	22.1	406	8.1a	478	17.1b	884	11.4
	Foreign	179	24.0	527	10.6a	615	22.0b	1142	14.7
	Independent firm	401	53.8	4055	81.3a	1702	60.9b	5757	74
Target market	Local	201	27.0	1667	33.4a	661	23.6b	2328	29.9
	National	344	46.2	1981	39.7a	1359	48.6b	3340	42.9
	EU	173	23.2	1165	23.4a	654	23.4a	1819	23.4
	Other markets	27	3.6	175	3.5a	121	4.3a	296	3.8

* Based on estimated boundary average. The difference in variables is significant at .05 level. Index a/b – Benferroni correction for multiple comparisons. Each letter in the lower index indicates a cluster which features differ significantly at .05 level.

Source: Own research based on the PNT-02 questionnaire. *Report on innovations in industry for 2008-2010,* www.stat.gov.pl/formularze.

[53] The selection for the research was done using Polish Classification of Business Activities (PKD) 2007 adhering to the EU Statistical Classification of Business Activity (NACE Rev. 2). In 2011 research on innovation in industry (sections B to E) and in services sector (sections H to M) were conducted on the complete sample. For more details see : *Działalność innowacyjna przedsiębiorstw w latach 2008-2010*, GUS, Urząd Statystyczny w Szczecinie, Warszawa 2012, p. 15. Stand alone basis was obtained thanks to the R 082-06/12 contract dated 19.02.2012 on the access of individual, non-identifiable data gained from the PNT-02 research on innovation in industry for 2008-2010 for Poland.

In order to indicate statistically significant differences between innovative and non-innovative companies, Chi-square with column proportions (Bonferroni method) was used In the research sample, the majority are *Non--Innovators*, N=4988, meaning those which, between 2008 and 2010, did not introduce neither process nor product innovation. and Innovators , N=2795, which mainly introduced process innovation (77.6%), followed by product innovation (73.5%), organisational (48.3%) and marketing innovation (39.6%). The analysed sample is dominated by medium-sized companies (67.4%) from medium -technology sectors (55.7%)(according to EUROSTAT, 2008), mainly independent (not part of any capital group) (60.9%) and for which Poland is the most significant target market (48.6%). Based on institutional partner cooperation indication, from the -*Innovators c*luster for the structural model, N=745 companies were qualified (see details in Table 1).

Research method

In order to assess the cause relationship between variables, an analysis of structural equations was applied. It analysed the structure and strength of linear –relationship between at least one independent variable and one or more dependent variables [Bedyńska, Książek, 2012]. The aim of this modelling is to find a model which will, reflect reality in the best way [Perek-Białas, Pleśniak, 2013]. The analysis refers not only to the direct relationships between variables but also those that are indirect and combined [Gaul, Machowski, 1987]. Using a structural model we can differentiate *observable variables (visible)*, measured during the research and marked with rectangles, and *unobservable variables (hidden, latent)*, marked with ellipses, which are not directly measured during the research but are introduced theoretically and may have an impact on the expected cause and effect relationships depicted by path coefficients ascribed to the particular arrows [Książek, 2012]. Residue variables are introduced to the model to represent the influence of variables not covered by the analysis, these are marked with a circle. In order to determine the hierarchy of the influence of particular variables an analysis of the critical values between parameters was also conducted.

Variables applied in the structural model

Like other researchers [Veugelers and Cassiman 2004, Mothe et al, 2010], we assume as a filter variable, the question whether a company between 2008-2010 introduced new or significantly improved products or processes. On this basis, 2795 companies were classified as *Innovative*. The level of a company's innovation -performance (*SprInno*) will be

measured by such variables as: the introduction of product innovation new for the market (*InnoProdNR*), the introduction of product innovation first in the country, and/or Europe, and /or the world (*InnoProdNKEŚ*) and the introduction of process innovation new for the market (*InnoProcNR).*

Institutional cooperation (*WspInst*) will be operationalised with observable variables such as indication of the cooperation partner: Polish Academy of Sciences, a research institute, a public foreign R&D institution, a university from Poland and/or abroad. The variables will create 2 subcategories: institutional cooperation with Polish partners (*WspInstKr*) and institutional cooperation with foreign partners (*WspInstZ).*

The remaining variables signify the importance of a company's own resources, including R&D department (*WłZasPrz*), the existence of an employee incentive system for the creation of intellectual property (*SystZachPrac)*, company size (*WielPrz*) and belonging to a capital group (*GrupKap*). The details of the construction of variables are included in Table 2.

Table 2. Variable applied in the structural model of institutional cooperation of Polish manufacturing companies.

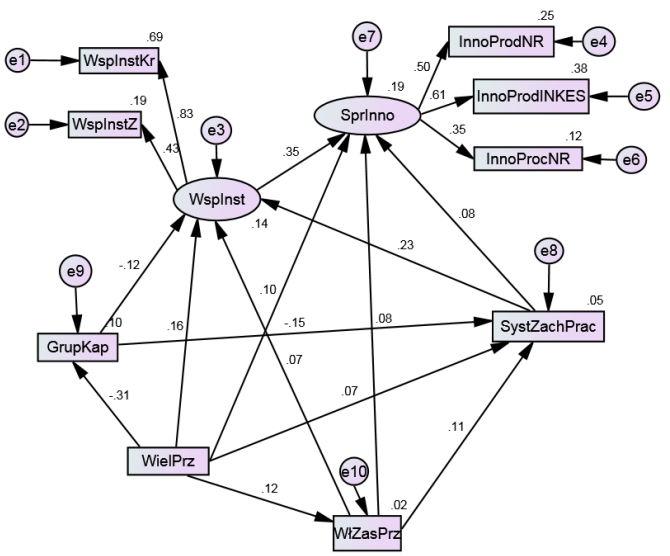
Variable	Variable construction
PIA	***Filter variable – "Innovation active company"***
PIAProd	„1" if a company introduced a product innovation; „0" if it did not
PIAProc	„1" if a company introduced a process innovation; „0" if it did not
SproInno	***Latent dependent variable – "Company innovation -performance"***
InnoProdNR	„1" if a company introduced a product innovation new for the market; „0" if it did not
InnoProdNKEŚ	A count, if a company introduced a product innovation first in the country, Europe, the world
InnoProcNR	„1" if a company introduced a process innovation new for the market; „0" if it did not
WspInst	***Latent dependent variable – "Cooperation with institutional partners"***
WspInstKr	A count, if a company declares cooperation with the Polish Academy of Sciences, Polish research institutes, Polish universities.
WspInstZ	A count, if a company declares cooperation with foreign research institutes and universities
WłZasPrz	***Independent variable – "Company's own resources"*** If indicated "3" ("very important") for the importance ofown R&D resources, management, marketing services
SystZachPrac	***Independent variable – "Employee incentive system"***

	„1" if a company declares having an employee incentive system to create intellectual property; „0" if it did not
WielPrz	***Independent variable – "Company size"***
	„1" if a company employs over 250 people; "0" if less
GrupKap	***Independent variable – "Belonging to acapital group"***
	„1" if a company does not belong to a capital group; „0" if it does

Source: Own work based on PNT-02 questionnaire Report on innovation in industry for 2008-2010, www.stat.gov.pl/formularze.

The results of the research- the analysis of structural model paths of institutional cooperation in innovation activity and the hierarchy of variable

The structural model was done by the Asymptotically Distribution-Free method (ADF) and turned out to fit well to the data (χ^2 (10) = 29,02; p = 0,048; CFI = 0,96; RMSEA = 0,029). The graph below presents the generated model.



Graph 1. Visual presentation of the structural model of Polish manufacturing companies institutional cooperation and cooperation determinants

Source: Own research based on the data from PNT-02 questionnaire. Model generated by AMOS 19. In the upper-right corner of variables there is information on the percentage

of explained variation of a particular variable. The remaining values are a standardised -estimates of a particular relationship.

Table 3 presents the values of standardised -estimates for the interdependence paths shown in Graph 1 and the hierarchy of variable interdependencies in particular groups.

The majority of analysed paths are statistically significant, being at least at the level $p < 0,05$; in the case of two relationships (*WielPrz -> SystZachPrac*; *WielPrz -> SprInno*) the results of the statistical tendency stood at ($p < 0,09$). Two paths (*SystZachPrac -> SprInno* and *WlZasPrz -> SprInno*) turned out to be statistically insignificant ($p > 0,05$).

Table 3. Standardised -estimates for the structural model of institutional cooperation and the hierarchy of variables in particular dependence groups

Variables			Standardised estimates	Statistical significance (p)
The hierarchy of variables that determine company innovation =performance*				
SprInno	<---	*WspInst* (**H1**)	0.351a	0.001
SprInno	<---	*WielPrz*	0.097b	0.067
SprInno	<---	*SystZachPrac*	0.082b	0.124
SprInno	<---	*WlZasPrz*	0.079b	0.127
The hierarchy of variables that determine institutional cooperation				
WspInst	<---	*SystZachPrac* (**H4**)	0.229a	0.001
WspInst	<---	*WielPrze* (**H5**)	0.164a	0.003
WspInst	<---	*GrupKap* (**H6**)	-0.119b	0.011
WspInst	<---	*WlZasPrz* (**H3**)	0.069c	0.046
The hierarchy of variables that determine an employee incentive system				
SystZachPrac	<---	*GrupKap*	-0.154a	0.001
SystZachPrac	<---	*WlZasPrz*	0.109b	0.001

SystZachPrac	<---	*WielPrz*	0.065b	0.081
Innovation performance and types of innovations				
InnoProdNKEŚ	<---	*SprInno*	0.613	0.001
InnoProdNR	<---	*SprInno*	0.500	0.001
InnoProcNR	<---	*SprInno*	0.346	0.001
Institutional cooperation and types of cooperation				
WspInstKr	<---	*WspInst*	0.831	0.001
WspInstZ	<---	*WspInst*	0.432	0.001
Other dependencies				
WlZasPrz	<---	*WielPrz*	0.125	0.001
GrupKap	<---	*WielPrz*	-0.311	0.001

* Note: the averages with other ascribed indices (in the column) (in dependency groups) vary significantly statistically at at least $p < 0.05$ level.

Source: Own research, based on the structural model of institutional cooperation of Polish industrial companies <--- (dependency direction).

When analysing the hierarchy of variables which explain **the innovation performance of a company** it has been proven that the best indicator is the establishment of institutional cooperation (*WspInst*), which provides the best explanation of the variants of this variable, followed by the size of the company (*WielPrz*). **Thus the first hypothesis (H1) has been verified positively.**

The analysis of the hierarchy of variables that **-explain institution cooperation** shows that employee incentive system (*SystZachPrac*) and company size (*WielPrz*) better explain the likelihood of establishing institutional cooperation than being a member of a capital group (*GrupKap*), having their own R&D department or other innovation friendly resources (*WlZasPrz*). It has been proven that belonging to a capital group of companies (*GrupKap*) has more impact on the establishment of institutional cooperation than having own R&D resources (*WlZasPrz*), however belonging to a group of companies has a negative influence on institutional cooperation. Moreover, it has been proven that the analysed

indicators explain more clearly the variants of establishing a national cooperation (69.0%) than a foreign one (18.6%). **Thus hypotheses H3, H4 and H5 have been verified positively. Hypothesis H6 has not been confirmed. F**urthermore, it has been indicated that belonging to a group of companies has a negative effect on institutional cooperation.

It was observed that belonging to a capital group (*GrupKap*) is the best indicator, yet having a negative effect, of employee incentive system implementation (*SystZachPrac*) and enables a clear explanation of the variability of *SystZachPrac* depending on the possession of innovation friendly resources (*WlZasPrz*) and company size (*WielPrz*).

Having divided introduced innovation into three types (see Table 4), it was observed that important indicators for implementing product innovation new for the market (*InnoProdNR*) are company size (*WielPrz*) and employee incentive system (*SystZachPrac*) (they explain more clearly the variability of the dependant variable than other indicators). In addition, company size (*WielPrz*) and establishing cooperation within domestic partners (*WspInstKr)* are significantly better indicators than the other variables included in the model, explaining the introduction of product innovation first in Poland, Europe and the world (*InnoProdNKEŚ*). **Thus, the hypothesis H2 has been confirmed, however only in the case of institutional cooperation with Polish partners (*WspInstKr)*.**

Table 4 The values of standardised estimates for variables explaining the introduction of particular types of innovations and variable hierarchy

	Innovation performance(standardised estimates) for innovations:					
	InnoProdNR		*InnoProdKEŚ*		*InnoProcNR*	
	Beta	p	Beta	p	Beta	p
WielPrz	0.106a	0.009	0.185a	0.000	0.099a	0.014
WspInstKr	0.008b	0.841	0.108a,b (**H2**)	0.003	0.023a	0.542
WspInstZ	0.015b	0.703	0.052b	0.166	0.065a	0.098
SystZachPrac	0.085a,b	0.025	0.018b	0.616	0.034a	0.364
WlZasPrz	-0.012b	0.739	0.087b	0.016	-0.021a	0.563

Source: Own research, based on the structural model of institutional cooperation of Polish manufacturing companies.

Note: the averages with other ascribed indices (in the column) vary significantly statistically at at least $p < 0.05$ level.

The size of a company (*WielPrz*) is a stronger indicator of product innovation introduction new for the country, Europe or the world (*InnoProdNKEŚ*) than process innovation new to the market (*InnoProcNR*) ($p< 0,05$); whereas company size has no impact on product innovation new for the market (*InnoProdNR*). The overall model using the variability of institutional cooperation (*WspInst*), company size (*WielPrz*), incentive system (*SystZachPrac*) and their resources (*WłZasPrz*) explains 37.6% of –the variants of product innovation introduction first for the country, Europe or the world (*InnoProdNKEŚ*); 25% of the variants of product innovation introduction new for the market (*InnoProdNR*) and11.9% of the variants of process innovation new for the market (*InnoProcNR*).

Table 5 The values of standardised estimates for variables, explaining the establishment of institutional cooperation in general and institutional cooperation divided into national and foreign

Variable	The values of standardised -estimates for cooperation:			
	With Polish partners *WspInstKr*		With foreign partners *WspInstZ*	
	Beta	p	Beta	p
SystZachPrac	0.202a	0.000	0.084a,b	0.024
WielPrz	0.141a,b	0.000	0.131a	0.001
GrupKap	-0.106b	0.004	-0.026b	0.500
WłZasPrz	0.063b	0.076	0.017b	0.651

Note: the averages with other ascribed indices vary significantly statistically at at least $p < 0.05$ level.

Source: Own research based on the structural model of institutional cooperation of Polish manufacturing companies.

When dividing institutional cooperation into national and foreign, it has been proven that, regardless of the type of institutional cooperation, employee incentive system (*SystZachPrac*) and company size (*WielPrz*),have the highest impact, while *SystZachPrac* explains more clearly establishing national cooperation (*WspInstKr*) rather than foreign (*WspInstZ*). Belonging

to a capital group (*GrupKap*) has, in the case of national cooperation, a negative impact. See details in Table 5.

Summary

The conducted analysis highlights the positive and statistically significant relationship between institutional cooperation and the general innovation performance of medium-sized and large Polish manufacturing - enterprises (measured by the introduction of a product and/or process innovation new for the market and product innovation new for the country, Europe or the world). As for the introduction of product innovations new for Poland, Europe or the world, it points to the significant impact of institutional cooperation with Polish institutional partners.

A number of determinants were established which significantly affect the start up of cooperation, such as employee incentive system for the creation of intellectual property, company size and resources, including R&D. An important feature, though negatively affecting cooperation, is belonging to a capital group. The rejection of hypothesis 6 may indicate that those analysed companies which belong to a larger group do not require the introduction of such cooperation, perhaps due to the possibility of using the knowledge resources possessed by other group members.

Therefore H1, H3, H4 and H5 have been confirmed. The hypothesis H2 was confirmed only in the case of cooperation with a Polish partner, while H6 has been rejected (see details in Table 6).

An important conclusion is the indication of the influence of the incentive system for the creation of intellection property on institutional cooperation. This may be a meaningful indicator for companies willing to stimulate their employees and influence directly effective innovation cooperation with institutional parties.

It is worth noting that the empirical part of the research is based on the representative sample from the Central Statistical Office of large and medium-sized industrial companies from sections C to E and, while the constructed model of structural equations shows a high covergence with the empirical data (CFI = 0,96, RMSEA= 0,029), the presented results reflect to a higher degree the actual interdependencies occurring inbusiness practices.

The volume of the work does not allow us to conduct more in-depth analysis or answer whether and to what degree the presented relationships depend on such company features as the technology level or the intensity and geographic range of their operations. An interesting topic that requires more profound analysis is whether and to what degree similar dependencies occur

in cooperation with supply chain partners, competitors or other institutions with which innovation companies establish cooperation.

Table 6. Research hypotheses verification

Research hypothesis	Hypotheses verification	
H1. *Innovation cooperation with institutional partners impacts positively the company innovation -performance.*	(+)**	Confirmation
H2 *Innovation cooperation with institutional partners encourages the introduction of new market iinnovations or the creation of new market segments.*	(+)**	*Confirmation for WspInstKr*
H3. *The internal resources of an innovative comapny encourage innovation cooperation with institutional partners.*	(+)*	Confirmation
H4. *The employee incentive system to create intellectual property in an innovation company encourages cooperation in innovations with institutional partners.* **H4.** *The employee incentive system to create intellectual property in an innovative company encourages innovation cooperation with institutional partners.*	(+)**	Confirmation
H5. *The size of an innovative company influences positively cooperation in innovations with institutional partners.*	(+)**	Confirmation
H6. *Being a innovative member of a group of companies encourages cooperation in innovations with institutional partners.* **H6.** *Being a innovative member of a capital group encourages cooperation in innovations with institutional partners.*	(-)*	Rejection

Significance at: ***p< 0,001, **p<0,01, * p<0,05; (+) positive relationship between variables; (-) negative relationship between variables.
Source: Own research.

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