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Success factors in innovation cooperation of Polish exporters

Although a growing number of studies refer to innovation practices of firms in emerging markets, less numerous studies on innovation networking have been conducted in CEE countries, including Poland. Our study was focused on the assessment of the significance of success factors in innovation cooperation specific for process-, product-, marketing and organizational innovation. We analyzed a sample of 209 Polish exporters. Descriptive statistics, factor analysis and correlation analysis were applied to answer the research questions. The analysis provides evidence of varying importance of success factors depending on type of innovation. The interrelation between perceived success factors was proven and different underlying factors influencing the cooperation in innovations were discovered. A correlation between the perception of those underlying factors and the cooperation intensity and sustainability was also observed.

Czynniki sukcesu kooperacji w innowacjach podejmowanych przez polskich eksporterów

Podczas gdy rośnie liczba badań innowacyjnych zachowań przedsiębiorstw z tzw. rynków wschodzących, nieliczne analizy współpracy w innowacjach dotyczą krajów Europy Środkowo--Wschodniej, w tym Polski. W naszym badaniu skupiliśmy się na ocenie znaczenia czynników sukcesu w kooperacji w innowacjach, specyficznych dla innowacji procesowych, produktowych, marketingowych i organizacyjnych. Przeanalizowana została próba 209 polskich eksporterów. W celu uzyskania odpowiedzi na pytania badawcze zastosowano zarówno analizę opisową, czynnikową, jak i analizę korelacji. Wykazano zróżnicowane znaczenie poszczególnych czynników sukcesu w zależności od typu innowacji. Stwierdzono współzależności między postrzeganymi czynnikami sukcesu oraz zidentyfikowano ukryte czynniki wpływające na kooperację w przypadku poszczególnych typów innowacji. Zaobserwowano także korelację między postrzeganiem czynników sukcesu i intensywnością oraz trwałością współpracy.

Keywords: innovation, cooperation, success factors, Polish exporters

Introduction

The studies on competitive strategies of Polish firms provide evidence that these firms aim both at maintaining their traditional, cost- and productivity-related competitive advantage, and at increasing differentiation-related competitiveness, based on product innovation and growing market responsiveness [Gorynia, 2002; Stankiewicz, 2002; Pierścionek, Jurek-Stępień, 2006; Hoshi et al., 2007; Gołębiowski et al., 2008; PARP, 2010; Weresa, 2011]. Although both literature and business practice indicate that innovation is one of the most important sources of firms' international competitiveness [see e.g. Halpern, 2007, for literature review], Poland is still ranked below the EU27 in terms of propensity to innovate[1] and belongs to the group of the moderate innovators with a below average performance (but with an above average rate of improvement). Taking into account composite indicators of innovation performance, Poland's relative strengths are in human resources, financing and support, firm investments and economic effects, whereas relative weaknesses are in open, excellent and attractive research systems, firms linkages and entrepreneurship, intellectual assets and innovators [EIS, 2011].

As the inter-organizational linkages in the innovation context are listed among the weaknesses of Polish firms, we aim in this paper to analyse of selected managerial aspects of innovation cooperation practices of Polish exporters.

1. Theoretical background

Theoretical concepts of firm competitiveness emphasize the importance of both internal and external sources of competitive advantage[2]. Sourcing of external resources/knowledge is necessary to build and sustain competitive advantage in the context of rapidly emerging new technologies, globalization of R&D, shortening technology life cycles and intense competition. Firms are being forced to move from the traditional approach focused on self-interest and transactions to a relationship-based approach characterized by collaboration rather than conflict/confrontation with business partners, by joint involvement and interdepend-

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[1] Poland was in 2008 among the EU Member States with the lowest propensity to innovate. Only 28% of Polish firms declared innovation, as compared to 80% of German firms. *Eurostat Yearbook 2011*, ch. 13: *Science and Technology.*

[2] See e.g. Wernerfelt, 1984; Barney, 1991; Grant, 1991; Collis, Montgomery, 1997 – for resource-based theory, and for relationships/networks approach see e.g.: Thorelli, 1986; Bleeke, Ernst, 1993; Kanter, 1994, Hakansson, Snehota, 1995; Dyer, Singh, 1998; Donaldson, O'Toole, 2007; Lui et al. 2009. Recently promoted concept of open innovation is also based on collaboration with external sources of knowledge; see e.g. Chesbrough et al., 2006; Lichtenthaler, 2011.

ence. Competitive advantage from relationships results from relationship-specific assets, joint learning, combining complementary resources, and lower transaction costs due to reduced opportunistic behavior of partners. Therefore, the application of relationships is suitable in many dimensions of business activity and has strategic potential for a firm.

The literature emphasizes the importance of cooperation/networking in innovation activities [Freeman 1991; Bell, 2005] and provides evidence that there are many motives (expected benefits) of firms' engagement in innovation cooperation, both in process-, product-, marketing- and organizational innovations [Hagedoorn, 1993; Sakakibara, 1997; Sydow, Duschek, 2003; Pittaway et al., 2004; Cassiman, Veugelers, 2006; Breschi, Malerba, 2007]:

– strengthening the firm's innovative potential resulting from access to partners' complementary or synergistic knowledge and skills;
– acquisition and creation (or co-creation) and transfer of new knowledge; learning through monitoring technology and market trends necessary to develop innovations; internalization of spillovers;
– sharing/reducing of costs and risks among partners in innovation projects;
– reducing possible duplication of R&D and other innovation projects;
– shortening innovation cycles;
– benefits from scale or scope economies in innovation projects;
– dealing with regulatory standards, creating (technical) standards, and responding to government policies;
– increasing the level of control over cooperation partners (including competitors), building the interdependence and sustainable relationships.

Achievement of these benefits, which are the direct goals of innovation cooperation, can be defined as a success of this activity. Determination and measurement of these goals is difficult, because of lack of quantitative tools and subjective character of expected benefits from cooperation (especially related to organizational learning – gaining experience and knowledge). Even if the defined objectives cannot be reached, the cooperation may be called successful, when new business ideas are generated or when there are personal feelings among collaborating partners of satisfaction with the results [Marxt, Link 2002].

The ultimate success measure of innovation cooperation is the firm's (and collaborative network's) economic performance. Improved innovativeness – a result of benefits listed above should contribute to firm competitiveness due to cost- or differentiation-based competitive advantage, and eventually should positively affect firm technological and business performance (measured by total sales or an increase in export new product sales (exports), new market entries, profitability etc.). Majority of studies on firms' international competitiveness proves a positive relationship between innovation and firms' propensity to export and its intensity

[Halpern, 2007]. Although less attention has been paid to the impact of coopera-
tion, open innovation practices on firms' international competitiveness, the stu-
dies support the hypothesis that innovation cooperation (especially in product
innovations) can be used to improve firms' export performance [Clausen, Pohjola,
2009; Laursen, Salter, 2006]. However, it is difficult to assess to what extent the in-
novation cooperation contributes to the overall economic success.

Appropriate management of collaborative projects and processes is necessary
in order to reach the above listed direct benefits from innovation cooperation.
A comprehensive management model of cooperative ventures, which includes
the determination and classification of success factors in innovation cooperation,
has been presented by Marxt and Link [2002]. Inter-firm cooperation should be
understood as a process, which can be divided in the following phases: initiation,
partner selection, setup, realization, and termination/relaunch. According to
Marxt and Link's model, the partners should provide both strategic and operatio-
nal fit in the collaborative venture at each stage of the process. Partners should
take care of appropriate structuring of the collaboration process which includes
defining of the goals and determining necessary resources, setting collaboration
framework, determining partners' accountabilities and responsibilities, effective
coordination and controlling, optimal formalization etc. Besides, issues related to
organizational culture (commitment to partnership, communication forms and
intensity, trust building, conflict solving etc.), as well as risk management related
issues (risk awareness, risk/reward sharing, mutuality of benefits, partners' inter-
dependence etc.) should be considered in order to secure the success of the coo-
peration – see Table 1 for a detailed list of success factors.

Table 1. Success factors in innovation cooperation

Phases	Project structure related factors	Organizational culture related factors	Risk related factors
Initiation	SWOT analysis for intended project Commitment to cooperation Clearly defined goals of the intended project	Development of coopera-tion culture Experience in collaboration Positive attitude forwards intended project	Risk awareness Willingness to bear / share risks Intended project risk analysis
Partner selection	Required profile of partners Partners' strategic fit Similarity / compatibility of partners Past experience in relation-ships with partners	Compatibility of corporate cultures Similarity of values shared Commitment to partnership Trust, openness and honesty Confidence in capabilities	Partner's readiness for risk and information sharing Similar premises of security and risk Partner risk analysis

Project setup	Win-win situation Detailed project objectives agreed by all parties Initial collaboration agreement	Information transfer from top management Build up of trust Bridge of cultural differences	Mutual benefits and interdependence Joint project risk analysis Formalized risk/reward sharing agreement
Project realization	Accountabilities, ground rules and responsibilities Experience and social skills Effective controlling Collaboration champion	Commitment of top management Communication and intensity Team spirit, good interpersonal relationships Efficient conflict solving	Systematic risk management Controlling to identify risks Avoidance of outlearning
Project termination	Analysis of the cooperation as a whole Project-to-project know-how transfer	Good interpersonal relationships Willingness to develop cooperation	Learning about risk and project failure or success

Source: Based on [Marxt, Link, 2002].

Among the most frequently identified success factors in collaborative relationships in other studies are: partners' suitability, convergence of partners' objectives in the project, complementarity of resources, specific investment to the project, sufficient distribution of partner inputs and power as well as responsibilities, mutual benefits, interdependence between partners, managing asymmetries, communication, integration and proper institutionalization of the relationships, experience from previous collaborative projects, building partnering skills and capabilities, mutual trust, management commitment and support, managing cultural differences, managing conflict and risk[3].

As there is a gap in the Polish literature, we focused in our study on an analysis of success factors in innovation cooperation in Polish business practice. We addressed in our study of Polish exporters the following research questions:

1. Which success factors are indicated as the most important by the firms in innovations undertaken in collaboration?
2. What differences appear in the perception of specific success factors depending on type of innovation?
3. Is there any significant dependency between the export intensity and the perception of success factors in innovation?
4. Is there any significant dependency between the intensity of cooperation and the perception of success factors in innovation?
5. Is there any significant dependency between the sustainability of cooperation and the perception of success factors in innovation cooperation?

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[3] For the literature review and discussion on determination and classification of success factors in collaborative ventures (incl. innovation cooperation) see also: [Maheshwari et al., 2006; Casey, 2008].

2. Method

2.1. Research design

We used a sample of the large and medium-sized firms operating in Poland in the following sectors: food processing industry, chemical and pharmaceutical industry, automotive industry and electronics industry.

The study began with a draft questionnaire and having it pre-tested on 10 firms. No problems were detected at this stage; this is why we decided to continue the data collection using the first version of the questionnaire.

A five-point Likert scale was used to assess both the perception of the success factors in innovation cooperation (1 = absolutely not important, 5 = absolutely important), cooperation intensity (1 = absolutely not intense, 5 = absolutely intense) and sustainability (1= absolutely not sustainable, 5 = absolutely sustainable) in all types of innovation.

We grouped the exporters in two clusters: with the export share in total sales in the last three years lower than 30% in the first cluster, and with above 30% share of exports in total sales - in the second one.

2.2. Data Collection

The data were collected in May 2010 by the Indicator Centre for Marketing Research (Centrum Badań Marketingowych) with computer-assisted telephone interviews (CATI) method. A similar quota of interviewed firms representing each industry was selected at random from the Indicator database. The database does not cover the whole population of the firms operating in Poland.

The research sample covered 209 companies operating in Poland, including 108 medium-sized enterprises and 101 large enterprises from the food processing industry (54 firms), the chemical and pharmaceutical industry (52 firms), automotive industry (51 firms) and the electronics industry (52 firms). The sample included 148 Polish domestic, 29 Polish firms with foreign capital, and 32 foreign owned firms. All of the firms under study were engaged in innovation cooperation. The firms represented in the sample varied in in exports share in total sales in the last three years ($\leq$30%, 51.7% and $\geq$30%, 48.3%). They varied widely also in the share of new/modernized products in total sales in the last three years ($\leq$30%, 59.3%; 30-50%, 26.3%; $\geq$50%, 14.4%). 156 of the firms introduced process innovation, 120-product innovation, 89-marketing innovation and 86-organisational innovation.

All of the respondents were holding managerial positions in their firms.

2.3. Data analysis

The character of our study is rather explorative, which influenced the types of the data analysis methods. To answer the research questions we applied the descriptive analysis, exploratory factor analysis and the correlation analysis. The descriptive analysis was to provide an overview of the respondents' perception of the factors influencing success in innovation cooperation. To explore the data and to determine the number and the nature of underlying factors (constructs) we applied the exploratory factor analysis. Finally, the correlation analysis allowed us to investigate the relationships between the perceived factors influencing the success of innovation cooperation and both the cooperation intensity and sustainability as well as export intensity.

The Statistical Package for Social Sciences (SPSS) version 19.0 computer software was used for data analysis.

3. Analysis and discussion

3.1. Descriptive statistics

All the factors influencing the cooperation for innovation seemed to be quite significant for the respondents. The mean varied between 3.45 in case of the perceived influence of *interpersonal relations* on marketing innovation cooperation and 4.62 in case of the *perceived influence of clear, feasible project goals shared by all parties* on cooperation for product innovation.

The factors of the biggest importance for the success in innovation cooperation were: *clear, feasible project goals shared by all parties, careful selection of appropriate partner and clear division of partners' responsibilities*. These three factors reached the highest mean in all types of innovation except for organizational innovation, in which case the *appointment of collaborative project champion* as well as the *settlement of detailed cooperation rules* belonged to the highly ranked factors instead of the *clear division of the partners' responsibilities.* Of the least importance in all the types of innovation were *interpersonal relations, acquaintance with partner(s)* and *sense of balance of partners' power*, which reached the lowest mean. In case of these factors we deal with a relatively strong standard deviation, which indicates high differences in perception of these factors (see: Table 2).

Table 2. Descriptive statistics

Success factors	Process innovation, n=156		Product innovation, n=120		Marketing innovation, n=89		Organizational innovation, n = 86	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
(Careful) selection of appropriate partner	4.61	.658	4.56	.754	4.28	.853	4.33	.900
Clear, feasible project goals shared by all parties	4.60	.679	4.62	.700	4.33	.823	4.44	.820
Interpersonal relations, acquaintance with partner (s)	3.51	1.092	3.62	1.014	3.45	1.000	3.51	1.125
Mutual trust	4.47	.722	4.42	.836	4.13	.894	4.27	.900
Complementarity of assets (including human resources) and competencies	4.28	.769	4.38	.663	4.11	.832	4.07	1.015
(Sense of) balance of partners' power	3.58	1.090	3.83	.947	3.64	1.014	3.84	1.050
Mutual benefits / symmetry of benefits	4.02	.940	4.18	.847	3.93	.986	4.03	1.045
Experience from previous cooperation projects	4.25	.832	4.27	.847	4.03	.872	4.06	.925
Settlement of detailed cooperation rules	4.45	.814	4.52	.809	4.19	.903	4.33	.975
Clear division of the partners' responsibilities	4.56	.764	4.57	.764	4.27	.850	4.31	1.009
Top management commitment of collaborating firms	4.09	.953	4.10	.911	3.92	.968	4.06	1.044
Commitment of all management levels in collaborating partners	4.04	.990	4.07	.950	3.87	.991	3.93	1.060
Appointment of collaborative project champion	4.40	.801	4.44	.828	4.12	.951	4.35	.878

3.2. Factor analysis

We conducted the factor analysis using Varimax rotation with Kaiser normalization [Kaiser, 1958] for all the types of innovation separately to identify the underlying factors influencing the perceived success factors in innovation cooperation and to find out what differences appear in tch perception of specific success factors depending on the type of innovation.

To determine the number of significant underlying factors, we based on the Kaiser criterion (components are considered significant where the eigenvalues are equal or greater than 1). We considered the loadings with the value over 0.4 as relevant.

The Bartlett's test of sphericity [Bartlett, 1954] was applied to test the null hypothesis that the variables are uncorrelated in the population. The large test values of the test statistic in case of all the types of innovation allowed us to reject the null hypothesis. We used also the Kaiser-Meyer-Olkin (KMO) test to measure the sampling adequacy. The values of the KMO statistics for all the types of innovation are bigger than 0.5, so the satisfactory factor analysis can be proceeded according to Kaiser [Kaiser, 1970, 1974]. The results of the Bartlett's test and the KMO test are presented in Table 3.

Table 3. KMO and Bartlett's test – Cooperation in process, product, marketing and organizational innovation

Test		Process innovation	Product innovation	Marketing innovation	Organizational innovation
Kaiser-Meyer-Olkin Measure of sampling adequacy		.837	.793	.850	.870
Bartlett's test of sphericity	Approx. Chi-Square	774.027	698.492	866.854	657.524
	Df	78	78	78	78
	Sig.	.000	.000	.000	.000

The reliability of the factor analysis results was proven with the Cronbach's á [Cronbach, 1951].

The determined underlying factors have been named to the nature of the items (variables) in each factor and the most important variables in each factor.

We discuss the results for every type of innovation, showing the structure of the underlying factor and the factor loadings in the following sections.

3.2.1. Factor analysis of success factors in the process of innovation cooperation

The factor analysis of 13 success factors in the process of innovation cooperation allowed us to determine 3 underlying factors, which explain 59.683% of the variance. The eigenvalue of all this factors was greater than 1 (see Table 3).

The first factor named **partnerships' concept and organization** explains 25.926% of variable with Cronbach's á of 0.854, the second one (**commitment**) – 19.031% with Cronbach's á of 0.769 and the third one (**relations' characteristics***)* – 14.726% with Cronbach's á of 0.577. Because of the low value of the Cronbach's α in case of the factor **relation' characteristics** we should be cautious about the result for this scale (see Table 4).

Table 4. Results of factor analysis – Process innovation

Factor	Extraction sums of squared loadings			Rotation sums of squared loadings		
	Eigenvalue	Explained variance (%)	Accumulative explained variance (%)	Eigenvalue	Explained variance (%)	Accumulative explained variance (%)
1	5.053	38.866	38.866	3.370	25.926	25.926
2	1.548	11.910	50.776	2.474	19.031	44.957
3	1.158	8.906	59.683	1.914	14.726	59.683

The factor **partnerships' concept and organization** consists of 4 items: *clear, feasible project goals shared by all parties, settlement of detailed cooperation rules, clear division of partners' responsibilities, careful selection of appropriate partner*. The second factor (**commitment**) comprises 2 items: *commitment of all management levels in collaborating partners* and *top management commitment of collaborating firms*. The third factor (**relation's characteristics**) includes 2 items: *interpersonal relations, acquaintance with partner* (*s*) *and sense of balance of partners' power*. 5 items (*experience from previous cooperation projects, mutual trust, complementarity of assets, including human resources) and competencies, mutual benefits / symmetry of benefits and appointment of collaborative project*) could not be included into any of underlying factors because of low loading values or similar loading values for different underlying factors (see Table 5).

Table 5. Rotated factor matrix – Process innovation

	Factor		
	1	2	3
Clear, feasible project goals shared by all parties	.802		
Settlement of detailed cooperation rules	.780		
Clear division of partners' responsibilities	.760		
(Careful) selection of appropriate partner	.758		
Commitment of all management levels in collaborating partners		.839	
Top management commitment of collaborating firms		.768	
Interpersonal relations. acquaintance with partner (s)			.740
(Sense of) balance of partners' power			.658

Rotation converged in 8 iterations.

3.2.2. Factor analysis of success factors in product innovation cooperation

We extracted 3 underlying factors which explain 61.637% of the variance. The eigenvalue of these factors is greater than 1 (see Table 6). The first factor named **commitment/past experience** consists of 4 items (*top management commitment of collaborating firms, commitment of all management levels in collaborating partners, appointment of collaborative project champion and experience from previous cooperation projects*) and explains 23.341% of the variance (Cronbach's α of 0.781). The second factor – **concept fit** comprises 3 items (*clear, feasible project goals shared by all parties, careful selection of appropriate partner(s)* and *complementarity of assets, including human resources, and competencies*) and explains 20.317% of the variance (Cronbach's α of 0.726), and the third one – **mutuality** consists of 4 items (*sense of balance of partners' power, mutual benefits / symmetry of benefits, mutual trust and interpersonal relations, acquaintance with partners*)and explains 17.979% of the variance (Cronbach's α of 0.692). Two items: *settlement of detailed cooperation rules* and *clear division of partners' responsibilities* were not included into any of the underlying factors because their loading values were very similar for factor 1 and 2 (see Table 7).

Table 6. Results of factor analysis – Product innovation

Factor	Extraction sums of squared loadings			Rotation sums of squared loadings		
	Eigenvalue	Explained variance (%)	Accumulative explained variance (%)	Eigenvalue	Explained variance (%)	Accumulative explained variance (%)
1	5.175	39.806	39.806	3.034	23.341	23.341
2	1.576	12.126	51.932	2.641	20.317	43.658
3	1.262	9.705	61.637	2.337	17.979	61.637

Table 7. Rotated factor matrix- Product innovation

	Factor		
	1	2	3
Top management commitment of collaborating firms	.782		
Commitment of all management levels in collaborating partners	.750		
Appointment of collaborative project champion	.747		
Experience from previous cooperation projects	.562		
Clear, feasible project goals shared by all parties		.834	
(Careful) selection of appropriate partner		.799	
Complementarity of assets (including human resources) and competencies		.470	

(Sense of) balance of partners' power			.821
Mutual benefits / symmetry of benefits			.682
Mutual trust			.647
Interpersonal relations. acquaintance with partner (s)			.557

Rotation converged in 7 iterations.

3.2.3. Factor analysis of success factors in marketing innovation cooperation

Two factors were extracted with the accumulative explanatory variance of 65.037%. The eigenvalue of both factors was bigger than 1 (see Table 8).

Table 8. Results of factor analysis – Marketing innovation

Factor	Extraction sums of squared loadings			Rotation sums of squared loadings		
	Eigenvalue	Explained variance (%)	Accumulative explained variance (%)	Eigenvalue	Explained variance (%)	Accumulative explained variance (%)
1	7.138	54.911	54.911	6.310	48.537	48.537
2	1.316	10.126	65.037	2.145	16.500	65.037

Table 9. Rotated factor matrix – Marketing innovation

	Factor	
	1	2
Clear division of partners' responsibilities	.915	
Clear, feasible project goals shared by all parties	.884	
Settlement of detailed cooperation rules	.872	
(Careful) selection of appropriate partner	.849	
Complementarity of assets (including human resources) and competencies	.789	
Experience from previous cooperation projects	.741	
Appointment of collaborative project champion	.717	
Top management commitment of collaborating firms	.684	
Mutual trust	.662	
(Sense of) balance of partners' power		.815
Interpersonal relations. acquaintance with partner (s)		.795

Rotation converged in 3 iterations.

The first underlying factor named **cooperation concept/organization with regard to partners' specificity** consists of 9 items (*clear division of partners' responsibilities, clear, feasible project goals shared by all parties, settlement of detailed cooperation*

rules, *careful selection of appropriate partner*, *complementarity of assets, including human resources, and competencies*, *experience from previous cooperation projects*, *appointment of collaborative project champion*, *top management commitment of collaborating firms* and *mutual trust*) with the explained variance of 48.537% (Cronbach's α of 0.936). The second factor called **relations' characteristics** comprises 2 items (*sense of balance of partners' power* and *interpersonal relations. acquaintance with partner(s)*) with the explained variance of 16.500% (Cronbach's α of 0.612).

Two items (*mutual benefits / symmetry of benefits* and *commitment of all management levels in collaborating partners*) were not included in any of the underlying factors because of similar loading values for both the underlying factors (see Table 9).

3.2.4. Factor analysis of success factors in organizational innovation cooperation

A total of 3 factors were extracted with accumulative explanatory variance reaching 68.27%. Each of these three factors had an eigenvalue greater than 1 (see Table 10).

Table 10. Results of factor analysis – Organizational innovation

Factor	Extraction sums of squared loadings			Rotation sums of squared loadings		
	Eigenvalue	Explained variance (%)	Accumulative explained variance (%)	Eigenvalue	Explained variance (%)	Accumulative explained variance (%)
1	6.452	49.634	49.634	3.020	23.228	23.228
2	1.273	9.796	59.430	2.959	22.763	45.991
3	1.149	8.840	68.270	2.896	22.279	68.270

The first underlying factor named **balance of partners' power and commitment** comprises 4 items (*sense of balance of partners' power, top management commitment of collaborating firms, commitment of all management levels in collaborating partners* and *mutual benefits / symmetry of benefits*) with the explained variance of 23.228% (Cronbach's α of 0.863). The second factor – **cooperation organization** consists of three items (*settlement of detailed cooperation rules, clear division of partners' responsibilities* and *appointment of collaborative project champion*) with the explained variance of 22.763% (Cronbach's α of 0.832). The third extracted factor named **relations based on previous experience** comprises 5 items (*interpersonal relations, acquaintance with partner(s), experience from previous cooperation projects, careful selection of appropriate partner, mutual trust, complementarity of assets, including human resources, and competencies*) and explains 22.279% of the variance (Cronbach's α of 0.731).

The item *clear, feasible project goals shared by all parties* is not included into any of the factors because the loadings values are similar for the second and the third factor (see Table 11).

Table 11. Rotated factor matrix – Organizational innovations

	Factor		
	1	2	3
(Sense of) balance of partners' power	.858		
Top management commitment of collaborating firms	.772		
Commitment of all management levels in collaborating partners	.740		
Mutual benefits / symmetry of benefits	.715		
Settlement of detailed cooperation rules		.881	
Clear division of partners' responsibilities		.813	
Appointment of collaborative project champion		.576	
Interpersonal relations. acquaintance with partner(s)			.722
Experience from previous cooperation projects			.711
(Careful) selection of appropriate partner			.640
Mutual trust			.638
Complementarity of assets (including human resources) and competencies			.624

Rotation converged in 7 iterations

3.3. Correlation analysis

The analysis of the relationship between the export intensity and the perception of success factors in innovation cooperation does not indicate any significant relations (see the results of the correlation analysis in Table 12).

In the case of cooperation intensity, the result of the correlation analysis is significant at least at the 0.05 level for five of the 10 success factors revealed in the factor analysis. The analysis also revealed a significant correlation between 4 underlying factors and the cooperation sustainability. The underlying factors correlated with the intensity of cooperation in product innovation are: **partnerships' concept and organization** and **commitment**. The underlying factors correlated with the intensity of the cooperation in product innovation are: **concept fit** and **mutuality,** and in marketing innovation: **cooperation concept/organization,** respectively. The sustainability of the cooperation for process innovation is correlated with the **partnerships' concept and organization** and the sustainability of the cooperation for product innovation is correlated with all of the three underlying factors influencing this type of cooperation (see Table 13).

Table 12. Correlation analysis – Export intensity

			Spearman's rho		
		Underlying factor	Correlation coefficient	Sig. (2-tailed)	N
Type of Innovation	Process	partnerships' concept and organization	.068	.397	156
		commitment	.040	.618	156
		relations' characteristics	.068	.400	156
	Product	commitment/past experience	.069	.455	120
		concept fit	.016	.864	120
		mutuality	-.060	.513	120
	Marketing	cooperation concept/organization	.038	.724	89
		relations' characteristics	-.020	.854	89
	Organizational	balance of partners' power and commitment	-.121	.266	86
		relations based on previous experience	.013	.904	86
		cooperation organization	-.066	.544	86

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Table 13. Correlation analysis – Cooperation intensity and sustainability

			Spearman's rho					
			Intensity			Sustainability		
		Underlying factor	Correlation coefficient	Sig. (2-tailed)	N	Correlation coefficient	Sig. (2-tailed)	N
Type of Innovation	Process	partnerships' concept and organization	.206*	.010	156	.162*	.044	156
		commitment	.158*	.050	156	.132	.099	156
		relations' characteristics	.147	.067	156	-.024	.763	156
	Product	commitment/past experience	.076	.409	120	.185*	.043	120
		concept fit	.218*	.017	120	.244**	.007	120
		mutuality	.226*	.013	120	.282**	.002	120
	Marketing	cooperation concept/organization	.256*	.015	89	.138	.197	89
		relations' characteristics	.183	.086	89	.098	.360	89
	Organizational	balance of partners' power and commitment	.147	.176	86	-.003	.975	86
		relations based on previous experience	.130	.233	86	.102	.348	86
		cooperation organization	.147	.176	86	.076	.484	86

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Conclusions

The following factors: *clear, feasible project goals shared by all parties, careful selection of appropriate partner* and *clear division of the partners' responsibilities* are perceived as the factors of the biggest importance for the success of innovation cooperation. Although the descriptive analysis does not indicate big differences in the perception of those factors depending on the type of innovation, the factor analysis proved that the perception of the factors influencing the success of cooperation in process, product, organizational and marketing innovation is different. We identified the underlying factors influencing the success of the cooperation of all the types of innovation. The underlying factors in the case of the cooperation in process innovation are: partnerships concept and organization, commitment and relations' characteristics. In product innovation cooperation we deal with the following underlying factors: commitment/past experience, concept fit and mutuality. In marketing innovation the underlying factors influencing the success of cooperation are: cooperation concept/organization and relations' characteristics (this factor comprises the same items as the factor relations' characteristics in case of process innovation) and the underlying factors in the organizational innovation cooperation are: balance of partners' power and commitment, relations based on previous experience and cooperation organization. The determined factors are important criteria for grouping the firms cooperating in different types of innovation.

The perception of the success factors is correlated not significantly with the export intensity. According to our analysis, there are some significant correlations between the determined underlying success factors of the innovation cooperation and the cooperation intensity and sustainability. The significant correlations were discovered mainly in cooperation, in the most frequently indicated types of innovation: process and product innovation.

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