

**Małgorzata Stefania Lewandowska,  
Tomasz Gołębiowski**

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**Synergy in product and marketing  
innovations of Polish exporters -  
research outcomes**

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**Małgorzata Stefania Lewandowska**

**Tomasz Gołębiowski**

*Institute of International Management and Marketing*

## **Synergy in product and marketing innovations of Polish exporters – research outcomes**

### **Introductory remarks**

According to a widely accepted OECD definition, the innovation is the implementation of a new or significantly improved product (good or service), or a process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations. Therefore, the four types of innovation have been distinguished: product innovation, process innovation, marketing innovation, and organizational innovation<sup>1</sup>.

The paper focuses on the analysis of the relationships between product and marketing innovation<sup>2</sup> and firm international competitiveness measured by the intensity of the firm's export sales and new product sales. The product and marketing innovations are complementary in character and should be coordinated in order to reach synergy effects in the firms' competitive strategies based on differentiation. The further re-orientation of Polish firms toward this type of competitive strategy is critically important in order to sustain their international competitiveness. As both the innovativeness and inter-organizational linkages in the context of innovation are listed among the relative weaknesses of Polish firms, we aim also at the analysis of innovation cooperation practices of Polish firms in selected manufacturing industries.

The presented material is based partly on the authors' working paper *Cooperation in innovations: The case of Polish manufacturing firms* revised by international ghost reviewers and presented at the 37<sup>th</sup> European International Business Academy (EIBA) Annual Conference, "Taking International Business to the Next Level – Emerging Issues, Strategies and Economies", Bucharest, 8–10<sup>th</sup> December 2011.

### **The theory and hypotheses development**

The ability to develop export sales is one of the important indicators of firm international competitiveness. The relationship between innovation and international competitiveness, and the role of innovation in determining export behaviour of firms is widely

discussed in the literature<sup>3</sup>. The general conclusion in these studies has been a positive relationship between innovation and exports. Studies on the firm level provide evidence that both the probability of exporting and the intensity of export are positively influenced by R&D, and successful innovations; the investments in R&D resulting in product innovations have a positive impact on firms' export propensity. New products and technologies resulting from innovative projects contribute to firm's competitive advantage in international market<sup>4</sup>. However, as to the impact of process innovation on export behaviour of firms no such a strong evidence is found<sup>5</sup>.

The theories of firm competitiveness emphasize the importance of both internal and external sources of competitive advantage. The resource-based theory of firm, focusing on internal sources, emphasizes the growing role of intangible resources, the importance of intellectual capital for the firms' innovativeness, competitiveness, and economic performance<sup>6</sup>. The more recent literature suggests that intangible resources include also relational resources i.e. firm's relationships with its stakeholders, and its reputation. Relational resources are unique due to their complexity, which also leads to firm's competitive advantage<sup>7</sup>.

The methods to gain access to external resources range from market (transaction)-based through various forms of collaborative interfirm relationships (bilateral partnerships, alliances and multilateral networks) to the hierarchy-based linkages. The application of relationships is suitable in many dimensions of business activity. Many authors suggest that collaborative relationships contribute to the firm's competitive advantage<sup>8</sup>. Nowadays, many partners have to interact both in collaborative and competitive ways to generate knowledge necessary to build and sustain competitiveness of both individual firms and cooperating networks.

The literature emphasizes the importance of cooperation/networking in innovation activities. It also provides evidence of various benefits of the firms' engagement in innovation cooperation: the access to the partners' complementary or synergistic skills, generating knowledge, sharing/reducing costs and risks of innovation projects, reducing possible duplication of R&D, shortening innovation cycles, benefiting from scale or scope economies, dealing with regulatory standards, and government policies<sup>9</sup>.

The idea of innovation cooperation/networking has found support in recent concept of open innovation<sup>10</sup>. Open innovation is the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and expand markets for external use of innovation. In other words, "open innovation is a systematically performing knowledge exploration, retention and exploitation inside and outside an organization's boundaries throughout the innovation process"<sup>11</sup>. Recently in case of an increased accessibility to valuable external knowledge and increased mobility of knowledge experts, firms find it difficult to appropriate and control their own R&D. Therefore, there is a strategic decline in the importance of internal R&D in the open innovation approach. This requires a different approach toward business, business models, customers, and the ability and willingness to open up the innovation processes.

However, there are not many empirical studies (using large scale quantitative databases) focusing on the impact of open innovation practices, and the use of external knowledge on improving the firms' performance<sup>12</sup>. Clausen and Pohjola in their study of Norwegian, Finnish and Swedish firms have found that firms conducting internal and external R&D have higher export propensity and intensity. They argue that open innovation approach can be used to improve the firms' international competitiveness, in addition to focus on the development of strong internal capabilities. The product innovation has a positive and significant impact on export propensity and intensity. Foreign external cooperation has a strong positive and significant influence on export intensity, whereas domestic external innovation cooperation has a negative influence on export propensity and intensity. The negative interaction between internal R&D and foreign external cooperation in the context of export intensity suggests that foreign sources of knowledge act as substitute for internal R&D<sup>13</sup>.

Basing on above analysis of theoretical concepts and arguments found in empirical studies, we propose the set of hypotheses relating both to internal innovation and innovation cooperation practices of Polish firms:

**Hypothesis 1. Internal innovation is positively related to export intensity of Polish firms.**

- 1a. Internal product innovation is positively related to export intensity.
- 1b. Internal marketing innovation is positively related to export intensity.

**Hypothesis 2. Internal innovation is positively related to new product sales intensity of Polish firms.**

- 2a. Internal product innovation is positively related to new product sales intensity.
- 2b. Internal marketing innovation is positively related to new product sales intensity.

**Hypothesis 3. Innovation cooperation is positively related to export intensity of Polish firms.**

- 3a. Cooperation in product innovation is positively related to export intensity.
- 3b. Cooperation in marketing innovation is positively related to export intensity.

**Hypothesis 4. Innovation cooperation is positively related to new product sales intensity of Polish firms.**

- 4a. Product innovation cooperation is positively related to the new product sales intensity.
- 4b. Marketing innovation cooperation is positively related to the new product sales intensity.

As noted earlier, the open innovation/innovation networking concepts imply the leveraging both internal and external knowledge flows to build firms' innovative capabilities. Numerous studies examine the relationships between innovation activities being undertaken internally and in cooperation. Many of them discuss issue of complementarity or substitutability between internal and external R&D and other innovative activities. Some empirical studies indicate that internal R&D and external technology sourcing are

complementary, suggesting the interrelatedness of both sources of innovation in building innovative performance<sup>14</sup>, whereas other studies have found the substitutability between them<sup>15</sup>. In our paper, we focus only on the potential synergy between internal and external innovation activities. We suggest that internal product innovation is positively related to product innovation introduced in cooperation, and that internal marketing innovation is positively related to collaborative marketing innovation. Besides, we analyse the relationships between product- and marketing innovation.

Marketing innovations increase firms' abilities to develop new competitive products and new solutions that solve complex customers' problems, to reposition the brand or leverage it into new business domains; to redesign customer interactions, create new distribution channels, etc. which results in increased value for customers, and in their increased satisfaction and loyalty. Literature provides evidence for positive impact of marketing competencies (and marketing innovation) on firm performance<sup>16</sup>. The results of a recent study suggest that firms build and consolidate linkages with business partners and customers through their marketing activities, and they gather market information, which enhance their innovative capacity. Marketing and organizational innovation lead to higher propensity to introduce new products. However, they do not lead to higher innovative performance measured by percentage of sales of new products<sup>17</sup>.

The empirical studies provide evidence of a synergistic effect on product innovation of combining technological, customer (marketing) and organizational competencies<sup>18</sup>. These findings support the literature indicating that firms that exploit synergies between marketing and technological capabilities gain competitive advantage due to the increased efficiency<sup>19</sup>.

We argue that product and marketing innovation should be integrated in the market-oriented firms, as the product-related activities and other marketing activities are – *ex definitione* – conceived as the set of interrelated activities aiming at creating, communicating and delivering value to customers. Therefore, one should expect the complementarity of both types of innovation and synergistic effect in these activities both in case of internal innovation and innovation cooperation.

In this context, we propose the following hypotheses:

**Hypothesis 5. Internal product innovation is positively related to product innovation introduced in cooperation.**

**Hypothesis 6. Internal marketing innovation is positively related to marketing innovation introduced in cooperation.**

**Hypothesis 7. Product innovation is positively related to marketing innovation.**

**Hypothesis 7a. Internal product innovation is positively related to internal marketing innovation.**

**Hypothesis 7b. Internal product innovation is positively related to marketing innovation introduced in cooperation.**

**Hypothesis 7c. Product innovation introduced in cooperation is positively related to marketing innovation introduced internally.**

**Hypothesis 7d. Product innovation introduced in cooperation is positively related to marketing innovation introduced in cooperation.**

## Research method

Our paper is based on the results of the pilot study on innovation cooperation of the Polish exporters from manufacturing sectors<sup>20</sup>. The empirical data used in this study were collected with the application of the CATI method from the survey assigned to the Centre of Marketing Research “Indicator” in Warsaw. The interviews were conducted in May 2010. The research survey sample consisted of 209 medium-size and large enterprises, of which 54 represented the food processing industry (C10 - NACE, Rev. 2); 52 firms - the chemical-pharmaceutical industry (C20, C21 - NACE, Rev. 2); 51 firms - the automotive industry (C29 - NACE, Rev. 2), and 52 enterprises - the electronic industry (C26 - NACE, Rev. 2). The sample was chosen randomly from the base owned by “Indicator”, but with the proportions to keep all the samples from each industry of the similar size. The sample structure does not reflect the structure of the whole population. A detailed characteristic of the sample is presented in table 1 (see Appendix).

As one of the objectives in the study was to analyze the differences in innovative activities related to firms’ export intensity and new product sales intensity, the sample was divided into clusters. The dividing criteria were: level of export intensity, with borderline: 30 percent export share in firm’s total sales revenues; level of product innovation intensity, with borderline: 30 percent share of new/improved products in firm’s total sales revenues.

As result four firms’ clusters were identified:

- **LowEx-LowInnpro** (with export share up to 30 percent in the firm’s total sales revenues, and the share of the new/improved products up to 30 percent in the firm’s total sales revenues);
- **LowEx-HiInnpro** (with the export share up to 30 percent in the firm’s total sales revenues, and the share of the new/improved products above 30 percent in the firm’s total sales revenues);
- **HiEx-LowInnpro** (with the export share above 30 percent in the firm’s total sales revenues, and the share of the new/improved products up to 30 percent in the firm’s total sales revenues);
- **HiEx-HiInnpro** (with the export share above 30 percent in the firm’s total sales revenues, and the share of the new/improved products above 30 percent in the firm’s total sales revenues).

In order to justify the division of the sample into the proposed clusters, we tested the relation between the export intensity and new products sales intensity. There is a significant relation between the export intensity and the sales of the new products intensity  $X^2(1)=9,48$ ;  $p<0.01$ , although the relation is not very strong (Cramer's  $V=0.213$ ). See tables 2- 5 in Appendix for details.

We applied the following analytical methods:

- Frequency distribution of the analyzed variables.
- Logistic regression analysis. The dependent variable is dichotomous. The independent variables are various types of innovations (undertaken both internally and in cooperation).
- Spearman correlation analysis to check the hypothesis of positive relationship between internal product innovation and marketing innovation; product innovation cooperation and marketing innovation cooperation<sup>21</sup>.

## Analysis and results

Table 6 presents descriptive statistics for all types of innovation. Table 7 presents indications for product and marketing innovations introduced both internally and in cooperation for the whole sample and by clusters (see Appendix).

The logistic regression analysis is used for the prediction of the probability of occurrence of an event by fitting data to a logic function. We built eight different models to test probability of relation of: internal product innovations and intensity of export; product innovations introduced in cooperation and intensity of export in total sales; internal marketing innovations and intensity of export; marketing innovations introduced in cooperation and intensity of export; internal product innovations and sales intensity of innovative products; product innovations introduced in cooperation and sales intensity of innovative products; internal marketing innovations and sales intensity of innovative products; marketing innovations introduced in cooperation and sales intensity of innovative products.

Based on the data presented in tables 8a – 15 c (see Appendix), we figured out that none of the logistic regression models has verified our hypotheses. In all of them, the significance is beyond 0.05, indicating no influence of independent variables (all types of innovations) on dependent variables – the new products sales intensity and export intensity.

Thus, H1, H2, H3 and H4 were rejected for all types of innovation.

Turning to H5, H6, H7a – H7d we present tables: 16-21 (see Appendix).

The correlation strength will be defined as follows: 0.1-0.2 – "very weak correlation"; more than 0.2-0.3 – "weak correlation"; more than 0.3-0.4 – "moderate correlation"; more than 0.4-0.5 – "strong correlation"; more than 0.5 – "very strong correlation".

For analytical purposes, only strong and very strong correlation will be taken into account to verify our hypotheses.

## Product innovations

The most frequently indicated product innovations performed **internally** by the whole sample (N=209) are: introduction of new product features, introduction of new product design, and introduction of new packaging (see table 7). The most often declared **cooperation** takes place in the context of the most frequently performed product innovations, such as: the introduction of new product features; introduction of new product design; implementation of new packaging (see table 7). We observe very strong correlation between product innovations introduced internally and those implemented in cooperation (see table 16).

In the **LowEx-LowInnpro** cluster the indications for **internal** product innovations such as: new product design and new packaging are above the average for the sample (see table 7). The indications of **cooperation** in product innovation (except for new product application) are below the average, and the lowest among clusters (see table 7). In LowEx-LowInnpro cluster very strong correlation between product innovations introduced internally and those implemented in cooperation is observed (see table 17).

In the **LowEx-HiInnpro** cluster all indications for product innovations implemented **internally** are above the average, and the declarations of introduction of new product design, new packaging and new product applications are the highest among clusters (see table 7). The declarations of **cooperation** in innovation (except for new product application) are above the average, and for the introduction of product new features are the highest among clusters (see table 7). In *LowEx-HiInnpro* cluster, strong correlation between product innovations introduced internally and those implemented in cooperation is observed (see table 18).

The **HighEx-LowInnpro** cluster strongly invest in **internal** product innovations, and the declarations of introduction of new packaging and new product applications are above the average, and those for introduction of new product features are the highest among clusters (see table 7). The declarations of **cooperation** in product innovations - in introducing of new features of products) are below the average and in new product application are even the lowest among clusters (see table 7). In HighEx-LowInnpro cluster, only moderate correlation between product innovations introduced internally and those implemented in cooperation is observed (see table 19).

In the **HighEx-HiInnpro** cluster, the indications for product innovations introduced **internally** are below the average for the sample, and in case of introduction of new product features, and new packaging are the lowest among clusters (see table 7). The indications for product innovation **cooperation** are above the sample average, and in new product application is even the highest among clusters (see table 7). In HighEx-HiInnpro cluster, very strong correlation between product innovations introduced internally and those implemented in cooperation among all clusters is observed (see table 20).



## Marketing innovations

The most frequently indicated marketing innovations performed **internally** by the whole sample (N=209) are: entering new markets; development of new concept or strategy of promotion; and change in the nature of relations with customers (see table 7).

The most often implemented marketing innovations in **cooperation** are: entering new markets or identification of new target groups, application of new logistic solutions, new promotion strategy, and brand repositioning (see table 7). We observe strong correlation between marketing innovations introduced internally and those implemented in cooperation.

In the **LowEx-LowInnpro** cluster, the indications for marketing innovations introduced **internally** are the lowest in the sample in the case of implementation of new sales methods, new logistic solutions and brand image repositioning. However, the declarations of introduction of new promotion strategy and entering new markets are above the average for the sample (see table 7). Indications for **cooperation** in marketing innovation are in most cases below the average for sample (see table 7). In **LowEx-LowInnpro** cluster, strong correlation between marketing innovations introduced internally and those implemented in cooperation is observed.

In **LowEx-HiInnpro** cluster, the indications for marketing innovations introduced **internally** are above the average, while for new methods of sales, new concepts of promotion strategy and change in the nature of customers relations, are the highest among clusters (see table 7). The declarations of marketing innovation **cooperation** are in most cases (except for new concept of promotion strategy) below the average for the group. Indications for cooperation in such innovations as change in product positioning, new methods of sale, new market entry and repositioning are the lowest among clusters (see table 7). There is no correlation between marketing innovations introduced internally and in cooperation.

The **HighEx-LowInnpro** cluster is characterized by fairly high intensity of marketing innovations introduced **internally**, and the consistency between product and marketing innovations is observed. Except for the change in the nature of customers' relations, the indications are above the average, and for the change in brand image are the highest among all clusters (see table 7). Indications for marketing innovation **cooperation** are in most cases (except for repositioning) below the average for this type of innovation, and for introduction of new logistic solutions are far above the average for all clusters (see table 7). In *HighEx-LowInnpro* cluster very strong correlation between marketing innovations introduced internally and those implemented in cooperation is observed.

The **HighEx-HiInnpro** cluster firms are not investing in marketing innovations implemented **internally**. Indications for change in product positioning, entering new market or target group and new concept of promotion strategy are the lowest among clusters. Exception is the introduction of new logistics solutions, which has

the highest score (see table 7). Indications for **cooperation** in marketing innovation are in all cases above the sample average, and for the new market entry, introduction of new sales methods, change in the nature of customers relations and brand repositioning are far above the average (see table 7). In HighEx-HiInnpro cluster very strong correlation between marketing innovations introduced internally and those implemented in cooperation is observed.

For the whole sample we see a strong **correlation between product and marketing innovations** introduced internally. Moderate correlation between product innovations introduced in cooperation and marketing innovations introduced in cooperation is observed.

For **LowEx-LowInnpro** cluster, there is a very strong correlation between product and marketing innovations introduced internally, also the correlation for those two types of innovations introduced in cooperation is strong.

In the **LowEx-HiInnpro** cluster, strong correlation between product and marketing innovations introduced internally is observed.

In the **HighEx-LowInnpro** cluster, we observe moderate correlation only between product and marketing innovations introduced internally.

In the **HighEx-HiInnpro** cluster only moderate correlation between product and marketing innovations introduced both internally and in cooperation is observed.

The summary of Spearman correlations for the whole sample, as well as for clusters is presented in table 21 (see Appendix).

Based on the above results we conclude that: H5 is verified for all types of clusters except for HighEx-LowInnpro; H6 is verified for LowEx-LowInnpro; HiEx-LowInnpro and HighEx-HiInnpro clusters; H7a is verified for LowEx-LowInnpro and LowEx-HiInnpro clusters; H7b and H7c are rejected and H7d is verified for LowEx-LowInnpro cluster only.

## Conclusions

Numerous studies on competitiveness and competitive strategies of Polish firms provide evidence of still dominating cost/price-based strategies. However, the attempts to strategic reorientation focused on product quality improvement, increased market responsiveness and innovations are visible in business practice. Studying the innovation issue we focused on less explored field of cooperation in innovation of Polish firms (Woodward et al, 2010; Wziątek-Kubiak et al, 2009)<sup>22</sup>. Moreover, inter organizational linkages in the context of innovation are listed among relative weaknesses of Polish firms.

We analyzed product and marketing innovations, while most of the research of Polish firms is focused on process and product innovations.

The fact that number of product and marketing innovations introduced internally and in cooperation has no statistically significant influence on export intensity and the share of sales of innovative products in total sales reflects traditional competitive strategies of Polish exporters based mainly on cost advantage not on differentiation.

Our study indicates a positive relation between internal product innovation and collaborative product innovation for the whole sample and the most of clusters. Moreover, a similar positive relation was observed for marketing innovations.

Our results show the relationships between product and marketing innovations introduced internally, whereas, there is no significant relation between those innovations undertaken in cooperation in most of the clusters (exception is LowEx-LowIn-Pro cluster).

It shows that Polish firms under study do not exploit the opportunities of synergies resulting from cooperation in various types of innovation.

We are aware of the fact that our sample is not a representative one, therefore the results can be biased by the sample structure and profiles of identified firm clusters. Innovation behaviour is industry specific, therefore the results obtained in selected industries could not reflect the innovation picture in the national economy. Moreover, the firm size and ownership structure influence their competitive potential and innovation strategies.

TABLE 1. **Sample characteristics**

Number of employees	No of firms	% of the sample
50-249	108	52
More than 249	101	48
% of innovative products sales in total turnover	No of firms	% of the sample
Less than 30%	124	59
30-50%	55	26
More than 50%	30	14
Industry	No of firms	% of the sample
Food processing	54	26
Chemical pharmaceutical	52	25
Automotive	51	24
Electronic	52	25

cd. table 1

Own R&D department	No of firms	% of the sample
Yes	131	63
No	78	37
% of export sales in total turnover	No of firms	% of the sample
Less than 30%	108	52
30-50%	42	20
More than 50%	59	28
Ownership of the firm	No of firms	% of the sample
Polish owned	148	71
Mixed (Polish & foreign) owned	29	14
Foreign owned	32	15

TABLE 2. Relation between export sales intensity and new products sales intensity

Relation between export sales intensity and new products sales intensity			Export sales intensity		Total
			Less then 30%	More then 30%	
New products sales intensity	Less then 30%	Count	75	49	124
		% within r_sales_intensity	60.5%	39.5%	100,0%
		% within r_export_intesity_ok	69.4%	48.5%	59.3%
	More then 30%	Count	33	52	85
		% within r_sales_intensity	38.8%	61.2%	100,0%
		% within r_export_intesity_ok	30.6%	51.5%	40.7%
Total	Count	108	101	209	
	% within r_sales_intensity	51.7%	48.3%	100,0%	
	% within r_export_intesity_ok	100,0%	100,0%	100,0%	

TABLE 3. Chi-Square Tests for clusters

Chi-Square Tests for clusters	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	9.475 <sup>a</sup>	1	.002		
Continuity Correction <sup>b</sup>	8.627	1	.003		
Likelihood Ratio	9.541	1	.002		
Fisher's Exact Test				.003	.002
Linear-by-Linear Association	9.430	1	.002		
N of Valid Cases	209				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 41.08.

b. Computed only for a 2x2 table.

TABLE 4. Symmetric Measures for clusters

Symmetric Measures for clusters		Value	Asymp. Std. Error <sup>a</sup>	Approx. T <sup>b</sup>	Approx. Sig.
Nominal by Nominal	Phi	.213			.002
	Cramer's V	.213			.002
Interval by Interval	Pearson's R	.213	.068	3.135	.002 <sup>c</sup>
Ordinal by Ordinal	Spearman Correlation	.213	.068	3.135	.002 <sup>c</sup>
N of Valid Cases		209			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

c. Based on normal approximation.

TABLE 5. Cluster profiles

Clusters profiles	Low export intensity, low product innovation intensity (LowEx -LowInnpro), n=75	Low export intensity, high product innovation intensity (LowEx -HiInnpro), n=33	High export intensity, low product innovation intensity (HiEx -LowInnpro), n=49	High export intensity, high product innovation intensity (HiEx - HiInnpro), n=52
	% of cluster	% of cluster	% of cluster	% of cluster
50-249 employees	61	55	39	48
More than 249 employees	39	45	61	52
Polish capital	85	88	67	42
Food processing	32	37	19	17
Chemical pharmaceutical	29	27	20	21
Automotive	8	15	41	39
Electronic	31	21	20	23
Own R&D department	57	70	71	58

**TABLE 6. Descriptive statistics of product and marketing innovations introduced internally and in cooperation**

Descriptive statistics	Introduced internally		Introduced in cooperation	
	Product innovations	Marketing innovations	Product innovations	Marketing innovations
Mean	2.21	2.90	1.12	0.98
Std. Error of Mean	0.08	0.14	0.08	0.11
Median	2.00	3.00	1.00	0.00
Mode	3.00	1.00	0.00	0.00
Std. Deviation	1.23	2.09	1.21	1.63
Variance	1.50	4.37	1.48	2.67
Skewness	-0.20	0.31	0.80	2.17
Kurtosis	-0.99	-0.94	0.17	0.17
Minimum	0.00	0.00	0.00	0.00
Maximum	4.00	7.00	4.00	7.00

TABLE 7. Profiles of clusters – all types of innovations introduced internally and in cooperation

Indicators for all types of innovation	Total		Low export intensity				High export intensity			
	N=209		Low InnPro n=75		High InnPro n=33		Low InnPro n=49		High InnPro n=52	
	N	%	n	%	n	%	n	%	N	%
<b>INTRODUCED INTERNALLY</b>										
Product innovation										
New/improved features, functions of products/services	164	78	57	76	26	79	42	86	39	75
New product design	121	58	45	60	21	64	26	53	29	56
New packaging	109	52	38	57	20	61	27	55	24	46
New product application	68	33	18	24	14	42	20	41	16	31
Marketing innovation										
Change in product / services positioning	61	29	21	28	12	36	15	31	13	25
New market (target group)	153	73	56	75	25	76	37	76	35	67
New methods of sales	73	35	24	32	14	42	18	37	17	33
New logistic solutions	74	35	23	31	11	33	17	35	23	44
New concept / strategy of promotion	95	45	35	47	20	61	18	37	22	42
Change in the nature of customers relations	78	37	27	36	16	49	14	29	21	40
Change in the brand image (brand repositioning)	73	35	20	27	13	39	20	41	20	39



Indicators for all types of innovation	Total		Low export intensity				High export intensity			
	N=209		Low InnPro n=75		High InnPro n=33		Low InnPro n=49		High InnPro n=52	
	N	%	n	%	n	%	n	%	N	%
<b>INTRODUCED IN COOPERATION</b>										
Product innovation										
New/improved features, functions of products/services	78	37	25	33	14	42	18	37	21	40
New product design	66	32	23	31	11	33	15	31	17	33
New packaging	62	30	20	27	11	33	14	29	17	33
New product application	29	14	11	15	4	12	4	8	10	19
Marketing innovation										
Change in product / services positioning	21	10	7	9	4	12	4	8	6	12
New market (target group)	52	25	19	25	7	21	12	25	14	27
New methods of sales	24	11	8	11	3	9	5	10	8	15
New logistic solutions	30	14	8	11	2	6	10	20	10	19
New concept / strategy of promotion	26	12	8	11	6	18	5	10	7	14
Change in the nature of customers relations	25	12	10	13	4	12	2	4	9	17
Change in the brand image (brand repositioning)	26	12	7	9	2	6	8	16	9	17

**Logistic regression – internal product innovation/share of export in total sales****TABLE 8A. Model summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	289.500 <sup>a</sup>	.000	.000

**TABLE 8B. Hosmer and Lemeshow Test**

Step	Chi-square	df	Sig.
1	2.673	3	.445

**TABLE 8C. Variables in the Equitation**

Variables in the Equitation		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1 <sup>a</sup>	Product innovations introduced internally	-.003	.113	.001	1	.976	.997	.798	.1.244
	Constant	-.060	.286	.043	1	.835	.942		

a. Variable(s) entered on step 1: Product innovations introduced internally.

From classification table – overall percentage 51.7.

**Logistic regression – product innovation in cooperation/share of export in total sales****TABLE 9A. Model summary**

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	289.424 <sup>a</sup>	.000	.000

**TABLE 9B. Hosmer and Lemeshow Test**

Step	Chi-square	df	Sig.
1	4.505	3	.212

TABLE 9C. Variables in the Equitation

Variables in the Equitation		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 <sup>a</sup>	Product innovations introduced internally	.032	.114	.077	1	.781	1.032	.825	1.291
	Constant	-.103	.296	.296	1	.587	.902		

a. Variable(s) entered on step 1: Product innovations introduced in cooperation.

From classification table – overall percentage 52.2.

### Logistic regression – internal marketing innovation/share of export in total sales

TABLE 10 A. Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	289.452 <sup>a</sup>	.000	.000

TABLE 10 B. Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	11.709	5	.039

TABLE 10 C. Variables in the Equitation

Variables in the Equitation		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1a	Marketing innovations introduced internally	-.015	.066	.049	1	.825	.985	.865	1.122
	Constant	-.024	.237	.010	1	.918	.976		

a. Variable(s) entered on step 1: Marketing innovations introduced internally.

From classification table – overall percentage 51.7.

**Logistic regression – marketing innovation in cooperation/share of export in total sales**

TABLE 11 A. Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	288.717 <sup>a</sup>	.004	.005

TABLE 11 B. Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	.749	2	.688

TABLE 11 C. Variables in the Equitation

Variables in the Equitation		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1a	Marketing innovations introduced internally	.076	.086	.776	1	.378	1.078	.912	1.276
	Constant	-.141	.162	.757	1	.384	.869		

a. Variable(s) entered on step 1: Marketing innovations introduced in cooperation.

From classification table – overall percentage 51.7.

**Logistic regression – internal product innovation/share of sales of innovative products in total sales**

TABLE 12 A. Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	282.399 <sup>a</sup>	.000	.000

TABLE 12 B. Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	5.082	3	.166

TABLE 12 C. Variables in the Equitation

Variables in the Equitation		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1a	Product innovations introduced internally	.015	.115	.016	1	.899	1.015	.810	1.272
	Constant	-.410	.291	1.981	1	.159	.664		

a. Variable(s) entered on step 1: Product innovations introduced internally.  
From classification table – overall percentage – 59.3.

### Logistic regression –product innovation in cooperation/share of sales of innovative products in total sales

TABLE 13 A. Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	281.221 <sup>a</sup>	.006	.008

TABLE 13 B. Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	1.375	3	.711

TABLE 13 C. Variables in the Equitation

Variables in the Equitation		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1 <sup>a</sup>	Product innovations introduced in cooperation	.127	.116	1.194	1	.274	1.135	.904	1.424
	Constant	-.522	.194	7.207	1	.007	.593		

a. Variable(s) entered on step 1: Product innovations introduced in cooperation.

From classification table – overall percentage – 59.3.

### Logistic regression – internal marketing innovation/share of sales of innovative products in total sales

TABLE 14 A. Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	281.371 <sup>a</sup>	.005	.007

TABLE 14 B. Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	3.577	6	.734

TABLE 14 C. Variables in the Equitation

Variables in the Equitation		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1a	Marketing innovations introduced internally	.069	.068	1.042	1	.307	1.071	.938	1.223
	Constant	-.580	.245	5.612	1	.018	.560		

a. Variable(s) entered on step 1: Marketing innovations introduced internally.

From classification table – overall percentage – 59.3.

### Logistic regression – marketing innovation in cooperation/share of sales of innovative products in total sales

TABLE 15 A. Model summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	281.938 <sup>a</sup>	.002	.003

TABLE 15 B. Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	.947	2	.623

TABLE 15 C. Variables in the Equitation

Variables in the Equitation		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1a	Marketing innovations introduced internally	.059	.085	.479	1	.489	1.061	.897	1.254
	Constant	-.436	.165	7.006	1	.008	.647		

a. Variable(s) entered on step 1: Marketing innovations introduced in cooperation.

From classification table – overall percentage – 59.3.

TABLE 16. Spearman correlation between product and marketing innovations introduced internally and in cooperation (whole sample, N=209)

Rho Spearman	Introduced internally		Introduced in cooperation	
	Total number of product innovations	Total number of marketing innovations	Total number of product innovations	Total number of marketing innovations
Internally				
Total number of product innovations	1			
Total number of marketing innovations	.437**	1		
In cooperation				
Total number of product innovations	.525**	.264**	1	
Total number of marketing innovations	.261**	.459**	.324**	1

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

**TABLE 17. Spearman correlation between product and marketing innovations introduced internally and in cooperation; LowEx -LowInnpro cluster; n=75**

Rho Spearman	Introduced internally		Introduced in cooperation	
	Total number of product innovations	Total number of marketing innovations	Total number of product innovations	Total number of marketing innovations
Internally				
Total number of product innovations	1			
Total number of marketing innovations	.525**	1		
In cooperation				
Total number of product innovations	.594**	.399**	1	
Total number of marketing innovations	.280*	.430**	.489**	1

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

**TABLE 18. Spearman correlation between product and marketing innovations introduced internally and in cooperation. LowEx -HiInnpro cluster; n=33**

Rho Spearman	Introduced internally		Introduced in cooperation	
	Total number of product innovations	Total number of marketing innovations	Total number of product innovations	Total number of marketing innovations
Internally				
Total number of product innovations	1			
Total number of marketing innovations	.482**	1		
In cooperation				
Total number of product innovations	.459**	.279	1	
Total number of marketing innovations	.199	.265	.254	1

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



**TABLE 19. Spearman correlation between product and marketing innovations introduced internally and in cooperation. HiEx -LowInnpro cluster; n=49**

Rho Spearman	Introduced internally		Introduced in cooperation	
	Total number of product innovations	Total number of marketing innovations	Total number of product innovations	Total number of marketing innovations
Internally				
Total number of product innovations	1			
Total number of marketing innovations	.372**	1		
In cooperation				
Total number of product innovations	.389**	-.093	1	
Total number of marketing innovations	.296*	.535**	.109	1

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

**TABLE 20. Spearman correlation between product and marketing innovations introduced internally and in cooperation. HiEx -HiInnpro cluster; n=52**

Rho Spearman	Introduced internally		Introduced in cooperation	
	Total number of product innovations	Total number of marketing innovations	Total number of product innovations	Total number of marketing innovations
Internally				
Total number of product innovations	1			
Total number of marketing innovations	.343*	1		
In cooperation				
Total number of product innovations	.598**	.366**	1	
Total number of marketing innovations	.260	.541**	.333*	1

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

TABLE 21. Spearman correlation between product and marketing innovations – summary

Spearman correlations - summary	Whole sample n=209	LowEx -LowInnpro n=75	LowEx -HiInnpro n=33	HiEx -LowInnpro n=49	HiEx -HiInnpro n=52
Product internally Product in cooperation	VERY STRONG H5	VERY STRONG H5	STRONG H5	MODERATE	VERY STRONG H5
Marketing internally Marketing in cooperation	STRONG H6	STRONG H6	NO	STRONG H6	VERY STRONG H6
Product internally Marketing internally	STRONG H7 a	VERY STRONG H7 a	STRONG H7 a	MODERATE	MODERATE
Product internally Marketing in cooperation	MODERATE	WEAK	NO	WEAK	NO
Product in cooperation Marketing internally	MODERATE	MODERATE	NO	NO	MODERATE
Product in cooperation Marketing in cooperation	MODERATE	STRONG H7 d	NO	NO	MODERATE

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## Notes

<sup>1</sup> Oslo Manual. Guidelines for collecting and interpreting innovation data. Joint publication by OECD and Eurostat, 3rd ed., OECD Publishing, 2005, chapter 3.

<sup>2</sup> “A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in technical specifications, components and materials, incorporated software, user friendliness or other functional characteristics. Product innovations can utilize new knowledge or technologies, or can be based on new uses or combinations of existing knowledge or technologies. A marketing innovation is the implementation of a new marketing method involving significant changes in product design or packaging, product positioning, product promotion or pricing. Marketing innovations are aimed at better addressing customer needs, opening up new markets, or newly positioning or firm’s product”. Oslo Manual, op.cit. pp. 49-52.

<sup>3</sup> See L. Halpern, Literature survey on the links between innovation, competition, competitiveness, entry & exit, firm survival and growth, MICRO-DYN, EU Sixth Framework Programme, 2007, Working Paper No. 02/07.

<sup>4</sup> S. Roper, J.H. Love, Innovation and export performance: evidence from the UK and German manufacturing plants. „Research Policy”, 2002, No. 7, pp. 1087-1102; A. R Gourlay, J.S. Seaton, UK export behaviour at the firm level, „Economic Issues”, 2004, No. 2, pp. 3-20; S.Becker, P. Egger, Endogenous product vs. process innovation and firm’s propensity to export, CESIFO 2007, Working Paper No. 1906.

<sup>5</sup> S. Becker, P. Egger, op. cit.; T.H. Clausen, M. Pohjola, International competitiveness: internal capabilities and open innovation as sources of export performance. MICRO-DYN, the EU Sixth Framework Programme, 2009, Working Paper No. 05/09.

<sup>6</sup> See e.g. B. Wernerfeld, A resource-based view of the firm, “Strategic Management Journal”, 1984, September-October; C.K. Prahalad, G. Hamel, The core competence of the corporation. “Harvard Business Review”. 1990, May-June, pp. 79-91; J. Barney, Firm resources and sustained competitive advantage, “Journal of Management”. 1991, No. 1, pp. 99-120; D. J.Collis, C. Montgomery, Corporate strategy. Resources and the scope of the firm, Irwin/McGraw-Hill, Chicago 1997.

<sup>7</sup> B. de Wit, R. Meyer, Strategy synthesis: Resolving strategy paradoxes to create competitive advantage, Thomson Learning, London 2005.

<sup>8</sup> J.D. Lewis, Partnerships for profit. Structuring and managing strategic alliances. Free Press, New York 1990. R.M. Kanter, Collaborative advantage. “Harvard Business Review”, 1994, No. 4, pp. 96-108; R.M. Morgan, S.D. Hunt, Relationship-based competitive advantage: the role of relationships marketing in marketing strategy, “Journal of Business Research”, 1999, Vol. 46, pp. 281-290; B. Donaldson, T. O’Toole, Strategic Market Relationship, 2nd ed., J. Wiley, Chichester, 2007.

<sup>9</sup> See e.g.C. Freeman, (1991), Networks of innovators: a synthesis, “Research Policy”, 1991, No. 5, pp. 499-514; M. Sakakibara, Heterogeneity of firm capabilities and co-operative research and development: an empirical examination of motives, “Strategic Management Journal”, 1997, Vol. 18, No. 6, pp. 143-216; G.G. Bell, Clusters, networks, and firm innovativeness, “Strategic Management Journal”, 2005, Vol. 26, pp. 287-295.

<sup>10</sup> Although the term „open innovation” was coined by H. Chesbrough (2003) in his book Open innovation, the idea of using external sources of innovation was practiced many years before that, and presented in the literature on innovation management. More on the concept of open innovation see e.g. in H. Chesbrough, W. Vanhaverbeke, J. West, Open innovation. Researching a new innovation paradigm. Harvard Business School Press, Boston 2006; E. von Hippel, Democratizing innovation. MIT Press, Cambridge, MA, 2005.

<sup>11</sup> U. Lichtenthaler, Open innovation: past research, current debates, and future directions. „Academy of Management Perspectives”, 2011, February, p. 77.

<sup>12</sup> T.H. Clausen, M. Pohjola, op. cit..

<sup>13</sup> Ibidem.

<sup>14</sup> Y. Caloghirou, I. Kastelli, A. Tsakanikas, Internal capabilities and external knowledge sources: Complements or substitutes for innovative performance. „Technovation” 2004, vol. 24, pp. 29-39; R. Belderbos, M. Carre, B. Lokshin, Complementarity in R&D cooperation strategies, “Review of Industrial Organisation”, 2004, Vol. 28, No. 4, pp. 401-426; B. Cassiman, R.Veugelers, In search of complementarity in innovation strategy: internal R&D, cooperation in R&D and external technology acquisition. “Management Science”, 2006, Vol. 52, No. 1. pp. 68-82; C. Schmiedeberg, Complementarities of innovation activities: An empirical analysis of the German manufacturing sector. „Research Policy”, 2008, vol 37, pp. 1492-1503.

<sup>15</sup> K. Laursen, A. Salter, Open for innovation: the role of openness in explaining innovation performance among U.K. manufacturing firms. „Strategic Management Journal” 2006, Vol. 27, pp. 131-150; J. Hagedoorn, N. Wang, Is there complementarity or substitutability between internal and external R&D strategies? UN University, UNU-Merit Working Paper Series No. 2010-005.

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<sup>17</sup> C. Mothe, T.U.N. Thi, The link between non-technological innovation and technological innovation, „European Journal of Innovation Management”, 2010, Vol. 13, No. 3, pp. 313-332.

<sup>18</sup> B. Lokshin, A. van Gils, E. Bauer, Crafting firm competencies to improve innovative performance. UNU-MERIT Working Paper Series 009, United Nations University, Maastricht Economic and Social Research and Training Centre on Innovation and Technology, 2008.

<sup>19</sup> See M. Song, C. Droge, S. Hanvanich, R. Calantone, Marketing and technological resource complementarity: an analysis of their interaction effect in two environmental contexts. „Strategic Management Journal”, 2005, Vol. 26, pp. 259-276; J. Tidd, J. Bessant, Managing innovation: integrating technological, market and organizational change. (4th ed.). J. Wiley, Chichester 2009.

<sup>20</sup> Statutory research of World Economy Collegium No 05/S/0013/10 „International Competitiveness of Polish Enterprises – the Analysis of Innovation Potential and Innovation Strategies of Polish Enterprises”, authors: T. Gołębiowski, L. Danik, M.S. Lewandowska, J. Żukowska, Warsaw 2010.

<sup>21</sup> Authors would like to thank Prof. M. Rószkiewicz for consulting the applied methods.

<sup>22</sup> Woodward, R., Yoruk, D.E, Koc, P., Pander, W. (2010). Knowledge-based entrepreneurship in Poland, CASE Network Studies and Analyses. No. 408/ 2010. Warsaw; Wziętek-Kubiak, A., Balcerowicz, E., Peczkowski, M., Differentiation of innovation behaviour of manufacturing firms In the New Member States – Cluster analysis on firm-level data, (2009) Micro-Dyn, Working Paper, No. 08/09, Warsaw.

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