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Chosen determinants of coopetition between the industrial companies of the Lubusz region in the 2009-2011 period

1. Introduction

A. M. Brandenburger and B. J. Nalebuff were the first to analyse, in 1996, the phenomenon of coopetition. The most widely accepted definition of coopetition is that it is a situation, where companies simultaneously compete and cooperate with each other. This means that coopetition is a combination of cooperation and competition (Lado, Boyd, Hanlon 1997, pp. 110-141; Madhavan, Gnyawali, He 2004, pp. 918-927; Gimeno 2004, pp. 820-842; Luo 2007, pp. 129-144; Chen 2008, pp. 288-304; Kim, Parkhe 2009, pp. 363-376; Peng, Bourne 2009, pp. 377-400).

A slightly different approach to the notion of coopetition is presented in the works of e.g. Bengtsson and Kock (2000 pp. 411-426), Luo, Rindfleisch and Tse (2007 pp. 73-83) and Ritala (2009, pp. 819 – 828).

According to their interpretation, coopetition denotes a situation, where a company decides to cooperate with its competitor on a market different to this where the competition originally took place. Coopetition can be likened to the “sleeping with the enemy” aggressive kind of strategy (Quint 1997, pp. 7-8).

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Ongoing globalisation and constantly increasing technological sophistication of products force companies, especially small and medium enterprises (SMEs), to establish cooperation (Coy 2006, pp. 96-97). There are many obstacles that have to be tackled by SMEs, including high costs and risks related to research and development or lack of funds for long-range innovative actions (BarNir, Smith 2002, pp. 219-232; Gomes-Casseres 1997, pp. 33-44). Some claim that cooperation between SMEs is crucial for the survival of this business segment (Merrifield 2007, pp. 10-14). It is also important that SMEs get involved in cooperation relation much easier than bigger companies, since the former are more flexible and less restrained by formalised structures, procedures and policies (Gnyawali, Park 2009, pp. 308-330).

The research conducted by Harbison and Pekar (1998) showed that in highly developed countries more than a half of relations between companies occur within one sector or between competitors.

Carayannis and Alexander (1999, pp. 197-210) indicate that the benefits of establishing cooperation between competitors are especially evident for companies: a) in sectors relying on the most up-to-date-knowledge, b) using interdisciplinary technologies, c) manufacturing short life cycle products. In such sectors, establishing cooperation is related to an increase in companies' technological potential and a widespread use of complementary resources, that previously have been accessible to only one of the cooperation parties. An obvious condition under which a company allows others to use resources that were at its sole disposal is the possibility of gaining additional benefits when compared to the situation where this company continues to use the resource on its own (Quintana-García, Benavides-Velasco 2004, pp. 927-938).

Competing companies are often faced with similar challenges and threats. It stems from the fact that these companies are functioning in similar conditions. Owing to this similarity, when a cooperation is established, the formerly competitive enterprises can now more successfully compete with bigger companies, that try to push them out of the market. In such cases, a cooperation between erstwhile competitors can contribute to: a) additional benefits arising from the scale effect, b) distribution of risk on a larger number of enterprises, c) more effective use of complementary resources, d) relative easiness in entering new markets, e) relative easiness in accessing external resources (Chen 1996, pp. 100-134).

The Lubusz region is not one of Poland's highly developed voivodeships. Hence, sharing limited resources by the companies from one sector is so much

important here. The aim of this article is to attempt to identify the determinant factors encouraging or impeding cooperation between industrial companies of the Lubusz region.

2. Research methodology

The methodological part of an analysis is based on econometric modelling. The first phase of the research consisted in the choice of the dependent variable and candidate independent variables. The candidate list was very long and included parameters relating to a company, its suppliers, competitors and customers. The dependent variable was chosen to denote the fact of cooperation between an industrial company and its competitor.

The next stage of research involved collecting empirical data. The starting point was a database of companies, accessible via the Internet. This database contained information on 13 233 companies from the Lubusz region, including 1 782 industrial companies. A questionnaire had been sent to all industrial companies.

The return rate was 30.6%. The exceptionally high return rate was related to the fact that there are only a small number of industrial companies in the Lubusz region, coupled with a large number of market researchers involved and the fact that the companies were easily accessible to the researchers.

The dependent and independent variables were dichotomous, meaning that their values were either 0 or 1. In the case of the dependent variable this meant that either the cooperation took place (then the value of the variable was 1), or it did not (in such case the value was 0). In case of exogenous variables, for each of the companies, 38 variables were taken into account in total, divided into three groups:

- variables related to the customer sector (14 variables),
- variables related to the distance from: the competitor, supplier and customer (12 variables),
- variables related to relations with competitors, suppliers and customers (12 variables).

An example variable assignment (0 or 1) is shown in table 1.

Table 1. An example variable assignment for the following independent variables: distance from the supply network participants and relations with the supply network participants

Supply network participant	Localisation of a network participant			
	local	regional	national	international
Supplier	1	0	0	0
Competitor	0	1	0	0
Recipients	0	0	1	0

Relations with a supply network participant				
Supply network participant	No contact	collaboration	Relations hostile	Relations neighbourly
Supplier	1	0	0	0
Competitor	0	1	0	0
Recipients	0	0	0	1

Source: own elaboration

In case of an independent variable describing the customer sector, the variable assignment (either 0 or 1) is shown in the following table.

Table 2. An example variable assignment for the following independent variables: customer sector

Does customer become from one of the selected sectors:					
Sector	yes	no	Sector	yes	no
Agriculture and Fisheries	0	0	Gastronomy	0	0
Mining Industry	0	0	Finance and Insurance	0	0
Industry	1	0	Public sector	0	0
Energetics	0	0	Education	0	0
Architecture	0	0	Health	0	0
Trade	0	0	Entertainment & Leisure	0	0
Transport	0	0	Final consumer	0	0

Source: own elaboration

In logit or probit models, where a dependent variable takes on binary values, the expected value of endogenous variable is interpreted as the probability of a given event under conditions specified using independent variables.

The calculations presented in this article had been performed using the Statistica suite. For one dependent variable 38 probit models had been created, only 8 of those were statistically significant.

Since the models had taken into account only one factor, in order to interpret the analysed interrelations, structural models were used. The sign accompanying a parameter is of key importance here. The plus sign indicates that the probability of establishing cooperation with a given enterprise by an industrial company of a given size is higher than in all the other groups taken together. The minus sign indicates that the probability of establishing innovative cooperation with a given enterprise is lower than in all the other groups taken together. The undertaken research is of statistical nature and deals with a period of three years, which is consistent with methodological standards described in the Oslo Manual (The Measurement of Scientific and Technological Activities, Proposed Guidelines for Collecting and Interpreting Technological Innovation Data, 2008).

3. Description of the sample

As a result, 545 questionnaires were collected that had been filled in by industrial companies of the Lubusz region. Out of the total, 268 enterprises were involved in innovative cooperation. It consisted 49.2% of all the companies that had decided to return the filled in questionnaires.

Small companies formed the biggest group collaborating in terms of innovation. Small companies consisted 42.5 % of the sample. The second and third place were taken by medium and micro enterprises, consisting 24.7% and 21.6% of the sample, respectively. The smallest group of collaborating companies was formed by large enterprises, consisting slightly more than 11.2% of the sample.

In terms of technology used, vast majority of the companies used low tech solutions. This group consisted 59.7% of all the companies involved in technologically innovative cooperation. The second place, with 27.6%, was taken by mid-to-low tech companies. The smallest group was formed by high or high-to-mid tech companies. These consisted 3% and 9.7% of all the companies that were involved in innovative cooperation, respectively.

In terms of the equity capital, most companies that responded to the questionnaire described their equity capital as Polish. This group

consisted 71% of all the companies involved in innovative cooperation. The companies with mixed equity capital consisted 12%, whereas companies with foreign equity capital consisted 16% of all the companies involved in innovative cooperation.

4. Influence of a customer sector on the existence of competition among the companies of the Lubusz region

An analysis of influence of customer sector on the disposition to enter into cooperation on the side of industrial company resulted in two statistically significant models, described in the following table.

Table 3. Influence of a customer sector on the existence of competition among the companies of the Lubusz region in the period 2009-2011

Sector	Parameter	S	T	$P > z $	P_1	P_2	χ^2	P
Sectors of Trade	+0.58	0.19	3.122	0.0019	0.25	0.11	9.88	0.0017
Sectors of Transport	+0.70	0.21	3.329	0.00099	0.33	0.13	10.852	0.00099

where:

S - standard error,

T - T-student statistics for the parameter,

$P > |z|$ - probability of no significance parameter,

P_1 - the probability of a given phenomenon in the researched group of companies,

P_2 - the probability of a given phenomenon in other groups companies,

χ^2 - Chi square test compliance,

P - the probability of insignificance model.

Source: own calculations on the basis of the research

The above table indicates that having customers from transportation or trade sectors increases the cooperation rate between industrial companies from the Lubusz region. Probability of establishing collaboration with a competitor by industrial companies with customers from the transportation sector equals 0.33 and is more than two and a half times higher than the probability of establishing collaboration with a competitor among companies with customers from other sectors. Probability of establishing collaboration with a competitor by industrial companies with customers from the trade sector equals 0.25 and is slightly more than two times higher than the probability of establishing collaboration with a competitor among companies with customers from other sectors.

5. Influence of relations with competitor on the existence of cooperation among the companies of the Lubusz region

The following table presents an influence of relations with competitor on the existence of cooperation among the industrial companies of the Lubusz region. In case of this group, two statistically significant models had been also obtained, described by the following table.

Table 4. Influence of relations with competitor on the existence of cooperation among the industrial companies of the Lubusz region in the 2009-2011 period

relations with competitor	Parametr	S	T	$P > z $	P_1	P_2	χ^2	P
close	+0.60	0.22	2.618	0.0093	0.31	0.14	6.666	0.0098
neighbourly	-0.52	0.25	-2.063	0.04	0.08	0.19	4.663	0.0308

Source: own calculations on the basis of the research

According to the above table, establishing cooperation is facilitated solely by having close relations with a competitor. In such cases, probability of cooperation equals 0.31 and is more than two times higher than in a situation where the company had established with its competitor relations other than close. Even neighbourly relations between competitors does not facilitate cooperation. In such cases, probability of cooperation equals 0.08 and is more than two and a half times lower than in a situation where the company had established with its competitor relations other than neighbourly.

6. Influence of distance and relations with supplier on the existence of cooperation among the companies of the Lubusz region

In case of variables that referred to the relations with suppliers and distance to suppliers, based on the collected questionnaires, we had obtained one probit model in each case, presented below. The first model describes influence of a distance from a supplier on disposition of industrial companies to enter into collaboration with competitors.

$$Y = -0.99x - 0.90$$

T-student statistics:	(-2.2297)	(-9.461)
Probability of no significance parameter:	(0.0266)	(0.000)

where:

Standard error: $S = 0.44$,

Chi square test compliance: $\chi^2 = 7.06$,

The probability of a given phenomenon in the researched group of enterprises:

$P1 = 0.03$,

The probability of a given phenomenon in other groups enterprises: $P2 = 0.18$,

The probability of insignificance model: $P = 0.00788$.

The above model indicates that having a supplier based outside Poland influences negatively a disposition of industrial companies to enter into cooperation relation. In case when an industrial company has a supplier based outside Poland, the probability of establishing collaboration equals 0.03 and was six times lower than in case of companies with suppliers based in Poland.

The second, statistically significant model obtained on the basis of the collected questionnaires is related to the influence of maintaining only the necessary relations with suppliers on establishing collaboration with competitors. This model is as follows:

$$Y = -0.70x - 0.88$$

T-student statistics:	(-2.345)	(-8.9297)
Probability of no significance parameter:	(0.0197)	(0.000)

where:

Standard error: $S = 0.30$,

Chi square test compliance: $\chi^2 = 6.47$,

The probability of a given phenomenon in the researched group of enterprises:

$P1 = 0.06$,

The probability of a given phenomenon in other groups enterprises: $P2 = 0.19$,

The probability of insignificance model: $P = 0.011$.

The presented model indicates that maintaining only the necessary relations with suppliers negatively influences establishing cooperation. Probability of establishing innovative collaboration with a competitor among companies maintaining only the necessary relations with suppliers equals 0.06 and is more than three times lower than probability of establishing cooperation among companies maintaining other than merely the necessary relations with suppliers.

7. Influence of distance and relations with customers on establishing competition in the Lubusz region

Only one statistically significant model had been obtained in relation to the influence of distance from a given industrial company to its customers on forming cooperation. It shows the relation between having a customer located outside Poland on entering into collaboration with a competitor. This model is as follows:

$$Y = -0.92x - 0.86$$

T-student statistics:	(-2.758)	(-8.762)
Probability of no significance parameter:	(0.006)	(0.000)

where:

Standard error: $S = 0.33$,

Chi square test compliance: $\chi^2 = 9.9396$,

The probability of a given phenomenon in the researched group of enterprises: $P1 = 0.04$,

The probability of a given phenomenon in other groups enterprises: $P2 = 0.20$,

The probability of insignificance model: $P = 0.0016$.

The above model indicates that having a customer located outside Poland influences negatively the chances of entering into collaboration with a competitor. Probability of establishing cooperation in such case equals 0.04 and is more than five times lower than probability of establishing collaboration with competitor among companies that have customers located in Poland.

In case of variables related to relations with customers, also only one statistically significant model had been obtained. This model deals with relation between maintaining only the necessary relations with customer and establishing cooperation.

$$Y = +0.78x - 1.04$$

T-student statistics:	(2.292)	(-10.759)
Probability of no significance parameter:	(0.0227)	(0.000)

where:

Standard error: $S = 0.34$,

Chi square test compliance: $\chi^2 = 5.0884$,

The probability of a given phenomenon in the researched group of enterprises: $P1 = 0.40$,

The probability of a given phenomenon in other groups enterprises: $P_2 = 0.15$,
The probability of insignificance model: $P = 0.0241$.

This model indicates that maintaining only the necessary relations with customer positively influences the chances of entering into collaboration with a competitor. In such cases probability of cooperation equals 0.4 and is more than three times higher than in the case of companies maintaining close, neighbourly or hostile relations with its customer.

8. Conclusions

Analysing the literature dealing with cooperation on both national and international levels, one cannot help but notice that this notion has recently become increasingly more popular. The same cannot be said however, of the notion of cooperation from a practical point of view. Reluctance and fears related to cooperation have to do with the so-called limited confidence principle, applied by Polish entrepreneurs to other commercial entities. This principle has worked out up until recently. However, the ongoing globalisation and increasing pace of technological progress are forcing, especially small and medium enterprises, to pay closer attention to quite a different strategy of "sleeping with the enemy". High costs and risk level of research and development activity and dire financial situation of many companies, have increasingly become a barrier that is very hard to overcome for small and medium businesses. In a situation of growing technological gap between the Lubusz region and highly developed regions of Poland and the world, cooperation can speed up the development of the companies, especially those counted as small or medium enterprises, and the entire region. Entering into collaboration with competitors can be a factor in: a) gaining the benefits of the scale effect, b) risk distribution on a larger number of entities, c) more effective use of limited and complementary resources, d) relative easiness in entering new markets, e) relative easiness in accessing external resources that are necessary in the development of the company.

Analysing the influence of customer sectors for the researched companies it can be noticed that having customers in transportation and trade sectors stimulates the establishing of cooperation.

Analysing the influence of relations maintained with the supply network participants it should be pointed out that only having close relations with competitors can positively influence entering into cooperation. Other kinds of relations maintained with competitors influence cooperation negatively.

Coopetition is also positively influenced by maintaining only the necessary relations with customers by the industrial companies from South-East Poland. Lack of closer relations with customers forces the industrial companies to look out for other enterprises that can aid in further development of the company. Maintaining only the necessary relations with suppliers influences coopetition negatively.

Considering the distance between the participants of supply network, having suppliers and customers located outside Poland influences coopetition negatively.

Summary

Chosen determinants of coopetition between the industrial companies of the Lubusz region in the 2009-2011 period

Analysing the literature dealing with coopetition on both national and international levels, one cannot help but notice that this notion has recently become increasingly more popular. The same cannot be said however, of the notion of coopetition from a practical point of view.

The empirical results obtained using the probit model. Analysing the influence of customer sectors for the researched companies it can be noticed that having customers in transportation and trade sectors stimulates the establishing of coopetition.

Analysing the influence of relations maintained with the supply network participants it should be pointed out that only having close relations with competitors can positively influence entering into coopetition. Other kinds of relations maintained with competitors influence coopetition negatively.

Coopetition is also positively influenced by maintaining only the necessary relations with customers by the industrial companies from South-East Poland. Lack of closer relations with customers forces the industrial companies to look out for other enterprises that can aid in further development of the company. Maintaining only the necessary relations with suppliers influences coopetition negatively.

Considering the distance between the participants of supply network, having suppliers and customers located outside Poland influences coopetition negatively.

Key Words: *coopetition, innovative cooperation.*

Streszczenie

Wybrane determinanty kooperacji przedsiębiorstw przemysłowych z województwa lubuskiego w latach 2009-2011

Studiując specjalistyczną literaturę krajową jak i zagraniczną, która dotyczy zagadnienia kooperacji można zauważyć, że w ostatnim czasie zagadnienie to staje się coraz bardziej popularne. Nie można natomiast tego samego powiedzieć o kooperacji z perspektywy praktyki gospodarczej.

Wyniki zaprezentowane w części empirycznej uzyskano przy wykorzystaniu modelowania probitowego. Analizując wpływ sektorów, z których pochodzą odbiorcy badanych przedsiębiorstw można zauważyć, że na nawiązanie kooperacji stymulująco wpływa posiadanie odbiorców zlokalizowanych z sektorze transportowy i handlowym.

Analizując wpływ relacji utrzymywanych z uczestnikami sieci dostaw na uwagę zasługuje, iż tylko utrzymywanie bliskich kontaktów z konkurentami może przyczynić się do nawiązania z nimi kooperacji. Inne relacje z konkurentami wpływają wyraźnie destymulująco na nawiązanie kooperacji.

Na kooperację pozytywnie wpływa również utrzymywanie tylko niezbędnych kontaktów z odbiorcami przez przedsiębiorstwa przemysłowe z Polski południowo-zachodniej. Brak bliższych kontaktów z odbiorcami wymusza na przedsiębiorstwach przemysłowych konieczność poszukiwania innych podmiotów, z którymi podmioty te mogą związać swój dalszy rozwój. Z kolei destymulująco na nawiązanie kooperacji wpływa również utrzymywanie tylko niezbędnych kontaktów z dostawcami.

Z punktu widzenia odległości uczestników sieci dostaw, na kooperację zdecydowanie negatywnie wpływa posiadanie dostawców i odbiorców zlokalizowanych poza granicami Polski.

Słowa

kluczowe: kooperacja, współpraca innowacyjna.

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