CHOSEN FACTORS INFLUENCING COOPETITION IN WESTERN POLAND IN THE 2009–2011 PERIOD

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Abstract. 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. Apprehension related to coopetition have to do with the so-called limited confidence principle, applied by Polish entrepreneurs to other commercial entities. This principle has worked out well up until recently. However, the ongoing globalisation and increasing pace of technological progress are forcing, especially small- and medium-sized enterprises, to pay closer attention to quite a different strategy of "sleeping with the enemy". The empirical part of the article indicates, how the chosen factors influence establishing coopetition. The list of factors include: PKD (Polska Klasyfikacja Działalności – Polish Classification of Economic Activities) section, where the company customers come from, the distance from other delivery network participants, relations with those participants and technological class applicable to the company's technological process.

Key words: innovative cooperation, coopetition, competition

INTRODUCTION

Coopetition became a research topic relatively late, in the second half of the 1990s. Pioneering work had been done by Brandenburger and Nalebuff. However, R. Noord, a CEO of Novell, was the first one to use the very term in 1990 [Peng T.-J.A. et al. 2011, p. 532].

Analysing literature, one can encounter a definition, according to which a coopetition is a situation of simultaneous competition and cooperation between at least two companies [Lado, Boyd and Hanlon 1997, pp. 110–141; Gimeno 2004, pp. 820–842; Madhavan, Gnyawali and He 2004, pp. 918–927; Luo 2007, pp. 129–144; Chen 2008, pp.

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288–304; Kim and Parkhe 2009, pp. 363–376; Peng and Bourne 2009, pp. 377–400]. The notion of competition has been tackled also by Bengtsson and Kock [2000, pp. 411–426], Luo, Rindfleisch and Tse [2007, pp. 73–83], Ritala and Hurmelinna-Laukkanen [2009, pp. 819–828]. According to their interpretation, coopetition denotes a situation, when a company decides to cooperate with its competitor on a market different to this where the competition originally took place. In this approach, coopetition can be viewed as an aggressive strategy of "sleeping with the enemy" [Quint 1997, pp. 7–8].

Economic sciences give many reasons to closely examine the notion of coopetition. The most important one includes increasing technological advancement of products and ongoing globalisation processes. The above reasons are of great importance especially to small- and medium-sized enterprises – SMEs [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 [Gomes-Casseres 1997, pp. 33–44; BarNir and Smith 2002, pp. 219–232]. Some researchers even claim that coopetition between SMEs is crucial for the survival of this business segment [Merrifield 2007, pp. 10–14]. It is also important that SMEs involve in coopetition much easier than bigger companies, since the former are more flexible and less restrained by formalised structures, procedures and policies [Gnyawali and Park 2009, pp. 308–330]. The research conducted by Harbisona and Pekar showed that in highly developed countries, more than a half of relations between companies occurs within one sector or between competitors [Harbison and Pekar 1998]. This is caused by the fact that the competing companies are often faced with similar challenges and threats. since they share their environments. Owing to this similarity, when a cooperation is established, the formerly competitive enterprises can now more successfully compete with bigger companies that try to eliminate them from the market. In such cases, a cooperation between erstwhile competitors can contribute to: a) increased production and lower unit cost as a result of 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].

It should be noted that the research conducted by Carayannis and Alexander [1999, pp. 197–210] indicates 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 companies, entering a coopetition is related to an increase in technological potential and brings additional benefits stemming from the common use of complementary resources, that previously were accessible to only one of the coopetition 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 and Benavides-Velasco 2004, pp. 927–938].

The regions of Western Poland are characterised by a various degree of economic development. Lower Silesia Voivodeship is one of most developed regions of Poland. West Pomeranian Voivodeship is often described as an „average" region in terms of economic development. Lubuskie Voivodeship is in turn ranked as one of the least developed regions. In this context, the aim of this article is an attempt to identify the determinant

factors stimulating or impeding coopetition between industrial companies in diverse circumstances found in Western Poland.

MATERIAL AND METHODS

The methodological part of an analysis uses econometric modelling. Econometric analysis involves the following stages:
1) choice of dependent variable (y) and candidate independent variables ($x_1, x_2, ..., x_k$),
2) collecting empirical material,
3) the choice of those independent variables that influence the dependent variable in a significant way,
4) the choice of mathematical model, describing the relations among variables,
5) estimation of model parameters, that is substituting indefinite parameters with specific numerical value, set on the basis of empirical data,
6) model verification using hypotheses and statistical testing.

As it was mentioned, the first phase involved the choice of dependent variable and candidate independent variables. The dependent variable was set to denote the fact of innovative cooperation with a competitor, however the candidate independent variable list was very long and included parameters relating to the company or relating to the company's innovative activity further divided into investment and implementation activities.

The chosen dependent and independent variables were binary, meaning that their values were either 0 or 1. In the case of the dependent variable this meant that either the coopetition took place (then the value of the variable is 1), or it did not (in such case the value was 0).

In the case of independent variables, for each of the companies 42 variables were taken into account in total, divided into four groups:
1) variables related to the customer PKD sector (14 variables),
2) variables related to the distance from: the competitor, supplier and customer (12 variables),
3) variables related to relations with competitors, suppliers and customers (12 variables),
4) variables related to technological classes used by the company (technologies: high, mid-high, mid-low, low).

The fact that both dependent and independent variables are dichotomous means that the most popular tools in econometric modelling, such as multiple regression, cannot be used. In order to obtain a model where the dependent variables are binary (0, 1) one has to use either logit or probit regression. In the logit regression the expected values of dependent variable have to be contained in a segment between 0 to 1, which is obtained by the means of logit transformation. In the probit regression the dependent variable can be thought of as a result of a hidden variable with normal distribution, which takes on values from minus to plus infinity [Zeliaś, Pawełek and Wanat 2009; http://www.statsoft.pl].

In either logit or probit models, in which a dependent variable takes on binary values, the expected value of dependent variable is interpreted as the probability of a given event under conditions specified using independent variables. The probit modelling used in our

work has its roots in classical probability calculus, formed at the beginning of the nineteenth century by P. Laplace.

Parameter estimation during model creation has been done using the maximum likelihood method. The basic assumptions for the method are related to a likelihood function. It is applied to models with additive random component, assuming the component has a normal distribution [Welfe 2003, p. 76].

The calculations presented in this article have been performed using Statistica suite. For one dependent variable 42 probit models had been created, and only 11 of them were statistically significant. These are presented and described in detail later in the article.

Since the models used had taken into account only one factor, to interpret the analysed interrelations the structural representation of models was chosen. The sign accompanying a parameter is of key importance. The plus sign indicates that the probability of establishing cooperation by a given enterprise 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[1] [2008].

RESULTS

Influence of the customer PKD section on establishing coopetition in Western Poland

The data in Table 1 indicate that the companies with customers coming from the K section of PKD (finance and insurance) have the highest probability of establishing coopetition. In such cases probability of coopetition equals 0.19 and is almost two and a half times higher than in the case of companies with customers located in other PKD sectors.

Table 1. An influence of the customer PKD section on establishing coopetition in Western Poland in 2009–2011 period

PKD Section	Parameter	S	T	$P > |z|$	P_1	P_2	χ^2	P
D – energy production and supply	–0.60	0.30	–1.99	0.05	0.02	0.08	5.02	0.03
G – retail and wholesale trade	+0.29	0.13	2.23	0.03	0.10	0.06	4.98	0.03
H – transportation and storage	+0.52	0.15	3.43	0.00	0.15	0.06	11.15	0.00
K – finance and insurance	+0.57	0.29	1.98	0.05	0.19	0.07	3.62	0.06

S – standard error, T – Student's T-statistic for the parameter, $P > |z|$ – the probability of parameter non-significance, P_1 – the probability of an event in a given group of companies, P_2 – the probability of an event in the remaining groups of companies, χ^2 – chi-squared test, P – the probability of model non-significance.

Source: Compiled on the basis of own research.

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[1] The rules pertaining to innovation-related data collection and interpretation.

Having a customer located in the H (transportation and storage) and G (retail and wholesale trade) PKD sections also stimulates coopetition. In such cases the probability of coopetition equals 0.15 and 0.10 respectively. When a company has its customers located in the H section, the probability of coopetition is also two and a half times higher than in the case of companies with customers located in other PKD sectors. When a company has its customers located in the G section, the probability of coopetition is 66% higher than in the case of companies with customers located in other PKD sectors.

Having customers located in the D section of PKD (energy production and supply) clearly inhibits coopetition. In such cases the probability of coopetition equals 0.02 and is more than four times lower than in the case of companies with customers located in other PKD sectors.

Influence of relations with other supply network participants on establishing coopetition in Western Poland

Close relations with competitors and suppliers has a stimulating effect on establishing coopetition, as shown in Table 2.

Table 2. An influence of relations with other supply network participants on establishing coopetition in Western Poland in 2009–2011 period

Relation	Parameter	S	T	P > |z|	P_1	P_2	χ^2	P
Collaboration with competitor	+0.46	0.15	3.07	0.00	0.14	0.06	9.05	0.00
Necessary relations with suppliers	−0.45	0.21	−2.14	0.03	0.04	0.09	5.24	0.02
Collaboration with suppliers	+0.43	0.18	2.33	0.02	0.15	0.07	5.10	0.02

Source: Compiled on the basis of own research.

The probability of coopetition in companies that collaborate with their suppliers and competitors equals 0.15 and 0.14 respectively. In both cases, the probability of establishing coopetition is more than two times higher, than in the case of companies that have other than close relations with their suppliers and competitors. The last statistically significant model confirms this observation. The model describes an inhibiting influence on coopetition of companies having only necessary relations with suppliers. In such cases the probability of coopetition equals 0.04 and is more than two times higher than in the case of companies having other than necessary relations with their suppliers.

Influence of distance to supply network participants on establishing coopetition in Western Poland

Table 3 describes the influence of distance to supply network participants on establishing coopetition in Western Poland.

Table 3. An influence of distance to supply network participants on establishing coopetition in
         Western Poland in 2009–2011 period

Distance from a supply network participant	Parameter	S	T	P > |z|	P_1	P_2	χ^2	P
Supplier located in local scale	+0.32	0.15	2.16	0.03	0.12	0.07	4.51	0.03
Supplier located outside Poland	−0.58	0.25	−2.26	0.02	0.03	0.09	6.28	0.01
Customer located outside Poland	−0.52	0.20	−2.49	0.01	0.03	0.09	7.23	0.01

Source: Compiled on the basis of own research.

The Table 3 shows that only having a locally located supplier stimulates coopetition. The probability of entering into coopetition by a company that has a locally located supplier equals 0.12 and is 70% higher than in the case of companies with supplier located somewhere else in the region, country or even outside Poland.

One obtains similar results analysing the other of the above presented models. Having supplier located outside Poland has a clear inhibiting effect on establishing coopetition by the companies from Western Poland. The probability of establishing coopetition in this group equals 0.03 and is three times lower than the probability of establishing coopetition by companies having their suppliers located within Poland.

Having customer located outside Poland also has an inhibiting effect on establishing coopetition by the companies from Western Poland. The probability of establishing coopetition in this group equals 0.03 and is, as in the supplier case, three times lower than the probability of establishing coopetition by companies having their customers located within Poland.

Influence of technological class of the production on establishing coopetition by companies from Western Poland

An analysis of an influence of the technological class used during production on establishing coopetition by the companies from Western Poland yielded only one statistically significant model. The model was described the influence of mid-low technologies used in production on establishing coopetition by a given company. This model is as follows:

$$Y = -0.52x - 1.14$$

Student's T-statistic: (−2.12) (−14.53)
The probability of parameter non-significance: (0.03) (0.00)

where: standard error S = 0.25;
        chi-squared test χ^2 = 5.15;
        the probability of an event in a given group of companies P_1 = 0.05;
        the probability of an event in the remaining groups of companies P_2 = 0.13;
        the probability of model non-significance P = 0.0233.

The presented model indicates that using mid-low technologies by the companies inhibits establishing coopetition. In such cases probability of coopetition equals 0.05 and is more than two and a half times lower than in the case of companies that use other than mid-low technologies.

CONCLUSIONS

Analysing the literature one encounters the opinion that coopetition between SMEs is crucial for the survival of this business segment. However, practice shows that coopetition is one of the less popular forms of collaboration between companies of Western Poland. There were ten times fewer companies that had entered into coopetition, compared to companies that were collaborating with suppliers, and six and a half times fewer than those collaborating with customers. The number of coopetition cases found in Western Poland can be compared to the number of cooperation cases between companies and universities or PAN (Polska Akademia Nauk – Polish Academy of Sciences) units.

Analysis of companies that had entered into coopetition, taking into account the technology these companies are using, shows that it is high tech companies that most often entered into coopetition. In the above group the coopetition had been observed to happen in 65.1% of all coopetition cases. The mid-high tech companies hold the second place, in terms of a number of coopetition cases. This group constituted 23.8% of all the companies involved in coopetition. The mid-low tech companies placed third contributing to 9.5% of all coopetition cases. The low tech companies were the ones where the coopetition had happened the least. This group constituted 1.6% of all the companies involved in coopetition.

Analysis of companies that had entered into coopetition, taking into account the size of the companies, shows that it is small-sized companies that most often entered into coopetition (46% of all coopetition cases). Medium-sized companies placed second, contributing to 22.2% of all coopetition cases. The remaining two size classes (micro and large) contributed equally with nearly 16% of all coopetition cases.

An analysis of influence of customer PKD sector on the disposition to enter into coopetition yielded four statistically significant probit models. These showed that having customers in K, H or G sections of the PKD stimulates entering into coopetition. Having customers located in D section of the PKD has an inhibiting effect on establishing coopetition.

Exploring an influence of relations with other supply network participants on establishing coopetition yielded three statistically significant probit models. According to these maintaining close relations with suppliers and competitors stimulates entering into coopetition by the companies from Western Poland. However, maintaining only the necessary relations with suppliers influences coopetition negatively.

Exploring an influence of the distance to other supply network participants, also yielded three statistically significant probit models. According to these models, having locally located supplier influences positively entering into coopetition by companies from Western Poland. Having suppliers and customers located outside Poland has a clear inhibiting effect on entering into coopetition.

Finally, an influence of technologies used in a company on entering into coopetition also had been analysed. In this case only one statistically significant probit model had been obtained. It showed that using mid-low technologies in production has an inhibiting effect on establishing coopetition by a company.

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WYBRANE CZYNNIKI WPŁYWAJĄCE NA KOOPETYCJĘ W ZACHODNIEJ POLSCE W LATACH 2009–2011

Streszczenie. Analiza literatury z zakresu koopetycji zarówno na poziomie krajowym, jak i ponadnarodowym wskazuje, że problematyka ta staje się coraz bardziej popularna. Nie można jednak tego samego stwierdzić w odniesieniu do oceny znaczenia koopetycji z praktycznego punktu widzenia. Obawa związana z koopetycjami jest zbieżna z zasadą ograniczonego zaufania, która jest stosowana przez polskich przedsiębiorców w odniesieniu do innych podmiotów. Ta zasada funkcjonowała dobrze aż do niedawna. Postępująca globalizacja i wzrastające tempo postępu technicznego zmuszają jednak – szczególnie małe i średnie przedsiębiorstwa – do zwrócenia większej uwagi na zupełnie odmienną strategię „sypiania z wrogiem". Empiryczna część artykułu wskazuje, jak wybrane czynniki wpływają na podjęcie koopetycji. Lista czynników obejmuje: sekcję PKD (Polska Klasyfikacja Działalności), pochodzenie klientów, odległość do innych uczestników sieci dostaw oraz klasę technologiczną odpowiadającą procesom technologicznym w firmie.

Słowa kluczowe: nowoczesna współpraca, koopetycje, konkurencja