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Coopetition Disadvantages: the Case of the High Tech Companies

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Coopetition (simultaneous cooperation and competition between competitors) is rapidly becoming a key success factor for enterprises operating in the contemporary business world. The literature on coopetition characterizes these relationships mostly in the context of the benefits achieved; however, coopetition is fraught with threats arising mainly from both the coexistence and interaction of streams of cooperation and competition between competitors. Research on a sample of 235 companies operating in the high technology sector (HT) in Poland has shown that there is a number of risks accompanying coopetition. The most common amongst them are the low efficiency of activities and goals pursued (statistically significant for all the activities of the value chain as areas of cooperation). The areas of coopetition that are most exposed to risk are sales and distribution, logistics and finance (nine out of 12 risks analysed). Due to the similarity of the frequency of occurrence of particular threats to coopetition, and using the method of cluster analysis, four groups of value chain areas with similar risks have been identified. The first such group is finance and marketing, the second is sales and production, the third is human resources and logistics, and finally the fourth is information technology, purchasing inputs and R&D. When selecting the area of competitive cooperation corresponding to the individual clusters of the value chain activities, one may expect the occurrence of similar threats to coopetition. The research findings allow interested parties to predict threats to coopetition when choosing specific areas of cooperation and thus an extension to cooperation between competitors which will not increase the quantity of these threats.

Keywords: *Coopetition, Cooperation, Disadvantage, Coopetition Disadvantages, High Tech Companies.*

Introduction

Coopetition is regarded as a phenomenon of inter-organizational cooperation, both bilateral and multilateral, which is increasingly growing in importance having developed intensively in recent years. The concept of coopetition was introduced to the business environment in the late 1980s by R. Noorda, Managing Director of the software company Novell, and subsequently popularized in the management literature by Brandenburger & Nalebuff in their book "Co-opetition", published in 1996.

Etymologically, the word "coopetition" is a combination of two terms: cooperation and competition. In broader terms, it means that companies cooperate with each other and share the uncertainty arising from the environment and, on the other hand, they compete with each other in other areas of activity, remaining competitors. There is, however, still an inherent paradox, given the possible tension between value creation and capture (Bouncken *et al.*, 2015). Bengtsson & Kock (2014) claim that coopetition is a paradoxical relationship between two or more actors, regardless of whether they are in horizontal or vertical relationships, simultaneously involved in cooperative and competitive interactions. The benefits which they obtain as a result are the effect of merging both competitive pressure and access to resources. This is because competition forces companies to take action to improve their position in the sector, while cooperation allows them to improve skills and resources (Bengtsson & Kock, 2000).

This understanding of the coopetition concept determines the areas of occurrence of this phenomenon. It may be stated that the factors which determine interest in coopetition include: similarity (diversity) of resources, stage of production, proximity to customers, and so on. Also noticeable is the presence of a significant positive correlation (positive relationship) between the degree of commonality of coopetition and the degree of globalization of sectors (Farrell, 2004). Coopetition, as a multidimensional and multifaceted concept, is regarded as a somewhat peculiar object of research. However, despite the growing number of publications, it is a relatively poorly known phenomenon, and a general understanding of the concept is still some way off. Moreover, there is no generally accepted definition for co-opetition so far (e.g. Gast *et al.*, 2015; Stein & Ginevicius, 2010) and some contexts in which coopetition can occur are neglected, e.g. coopetition in family firms, context of start-ups, and protection mechanisms in coopetition strategy (Gast *et. al.*, 2015).

Cooperation between competitors may cover all the activities of the value chain (Cygler & Sroka, 2016). Most frequently, however, competitors choose cooperation in the field of both primary and support activities.

Coopetition as a new phenomenon in the global economy, is considered in the context of the relationship advantages to

the parties involved (e.g. Belderbos *et al.*, 2004; Quintana-Garcia & Benavides-Velasco, 2004; Dussauge *et al.*, 2004; Zineldin, 2004; Rusko, 2011; Tomski, 2011; Kim *et al.*, 2013; Akdogan *et al.*, 2015) and their complexity (the coexistence of cooperation and competition). Such complex relationships also create the danger of the emergence of certain disadvantages (e.g. Bengtsson & Kock, 2000; Zineldin 2004; Nieto and Santamaria, 2007; Walley, 2007; Chai & Yang, 2011). However, these disadvantages were analysed at a general level only, without taking into account the nature and scope of the cooperation. The problem then appears, whether the existence of specific disadvantages is conditioned by the specificity of the cooperation area in coopetition. In other words, whether one can extract for each function in the value chain - as an area of cooperation between competitors – a specific set of disadvantages, the occurrence of which is the most common (statistically significant). And if coopetition, in which the area of cooperation is a particular function of the value chain has its own profile (configuration) of disadvantages, is there a possibility of extending cooperation (by other functions of the value chain) to minimize the number of emerging threats.

Given these facts, the goal of this paper is to demonstrate that beside advantages, there are also significant disadvantages associated with the phenomenon of coopetition. The authors analyse these disadvantages of coopetition considering the area of cooperation (activities of the value chain), in which regard they consider if the presence of a particular threat is conditioned by the areas of cooperation between competitors. The method of cluster analysis was applied. Analyses were carried out on a sample of 235 companies operating in the high-tech sector in Poland; the data for this paper was gathered on the basis of questionnaire research.

Theoretical Background of Coopetition

The complexity of coopetitive relationships is based on the coexistence and interaction of streams of cooperation and competition between competitors (Lado *et al.*, 1997). There is a contradiction in terms of logic of conduct based on trust and conflict. Trust is an important success factor of long-term relationships between companies (Jeffries & Reed, 2000) or every partnership (Mohr & Spekman, 1994). Trust in business relationship develops gradually, although this process is not linear (Bagdoniene & Hopeniene, 2013). As a result, each partner, relying on a trusted network, can concentrate on building its core competencies, improving technologies and furthering innovativeness (Sankowska, 2013). Therefore one may state that trust and common interests create the basis for effective cooperation (Brito & Costa de Silva, 2009).

An increase of trust between the parties undermines the temptation of opportunistic behaviour (Harris & Dibben, 1999). There is a greater tendency to share resources (both tangible and intangible), which strengthens the sense of community. On the other hand, however, despite voluntary cooperation, there exists potential for opportunistic activities by the parties, especially when they make decisions with limited sources of information. In contrast, a rivalry stems from competition for limited heterogeneous resources and similarities of the product range which is offered to the same customers. In the coopetition literature, the concept of being a competitor is understood differently: from a narrow interpretation, as direct competitors forming a strategic group (Lechner *et al.*, 2006), to a much broader interpretation, going beyond the framework of one sector (Brandenburger & Nalebuff, 1996). These changes in the understanding of what it means to be a competitor and, consequently, coopetition, result from globalization processes, as well as redefining the roles of the sectors, and the roles of companies toward each other (Hamel & Prahalad, 1994).

Coopetitive behaviours are most frequently studied in the context of the relationship between companies. Coopetition is often perceived as an inherent element in the development strategies of companies (Dagnino, 2009). There are also analyses of the occurrence of simultaneous streams of cooperation and competition at intra-organizational level, especially within transnational corporations (Luo, 2005; Tsai, 2002). More and more often, however, one points to the sociological and psychological aspects of coopetition. Deliberations in the field of sociology are focused on the discussion of trust in competitive cooperation, relating to both interpersonal and inter-organizational relations. Sabel (1993) defines trust as a common belief that neither party will use the partner's weaknesses against it. Loyalty strengthens the relationships among partners and trust is based on honesty, openness and responsibility (Ginevicius, 2010).

Coopetition utilizes the scientific achievements of Lane & Backhmann (1998), who distinguished three perspectives of trust perception: calculation (trust based on calculation), understanding (knowledge-based trust) and personal engagement (trust based on identification). These three perspectives are observed in coopetitive relationships and may also change, depending on the dynamics and direction of the coopetitive relationships. In contrast, research in psychology has shown that individuals who tend to compete have extravert characteristics (Colley *et al.*, 1985). In turn, people with an introvert tendency tend towards cooperation (Lu & Argyle, 1991). People who demonstrate a tendency to cooperate are characterized by greater willingness toward social interaction, feelings of acceptance and the ability to take a somewhat dynamic look at themselves as well as others (including empathy). They are tolerant and trustworthy (Ross *et al.*, 2003).

Coopetitive relationships are mainly interpreted in terms of three theoretical concepts: game theory, transaction costs theory, and the resource-based approach. In game theory, coopetition is perceived as a game in which the interests of the parties partially overlap. In this game, the parties involved bring their own added value. Coopetition in game theory is based on the classic analysis of the prisoner's dilemma (Mayberry *et al.*, 1992). In order to limit the opportunistic behaviour in the solution of the prisoner's dilemma, a *tit for tat* strategy is applied (Axelrod, 1984). The principle of reciprocity which is applied encourages players to give up myopia in their assessment of the situation and reduction in opportunistic behaviour. The payout structure, timeframe of the activities as well as the number of players affect the nature of the activities in the direction of cooperation (Parkhe, 1993; Oye, 1986). The tendency of players towards cooperation also increases with the importance of future movements and payments (i.e. the shadow of the future) and the durability of the relationship (Axelrod 1984). Players will be more interested in the long-term benefits rather than current payments (the problem of greed).

In terms of the theory of transaction costs, the choice of three forms of organizational functionality is considered: market transactions, hierarchical structures and hybrid relationships (Williamson, 1987). Every form has the relevant transaction costs attached. The main sources of transaction costs are: asset specificity, uncertainty, complexity of the environment, limited access to information, the continuity of transactions, and bureaucratic costs (Jones & Hill, 1988). In addition, the stimulators in the creation of transaction costs are: limited rationality, opportunistic behaviour and a limited choice of partners. According to Madhok (2000), companies choose coopetitive relationships (hybrid) as a response to the generation of additional transaction costs resulting from market imperfections. In the case of high transaction costs of both market transactions and hierarchical structures, the companies choose intermediate forms of cooperation, including coopetition. These intermediate forms (cooperation) also generate transaction costs, resulting, among other things, from the need to acquire specific assets and the coordination of activities. Being aware of the creation of coopetitive relationships, the problem exists of the elevated level of transaction costs in relation to the other forms of hybrid links. Coopetition belongs to the hybrid forms which are most affected by transaction costs. This mostly results from the competitive nature of cooperation between rivals, which requires additional collaterals and contracts. The cost of submissiveness grows as a result. The level of trust between partners in coopetitive relationships is also relatively low, which leads to the creation of so-called opportunistic cooperation (Hill, 1990). As a result, the relationships are characterized by a narrow area of cooperation and increased transaction costs.

Increasingly, the issue of coopetition is discussed in the literature in the frame of resource-based approach. The condition for the creation of a relatively sustainable competitive advantage is access to unique assets (tangible and intangible). Independent acquisition of strategic resources is frequently judged too expensive. Therefore, an increasing number of companies are deciding to cooperate with organizations which have complementary and strategic resources (Bouncken & Kraus, 2013). Cooperation with companies (including competitors) which hold complementary assets may generate benefits resulting from the synergy of joint resources (which are the subject of cooperation) with the resources which are available to the company (Chetty & Wilson, 2003; Clarke-Hill *et al.*, 2003).

Coopetition Disadvantages

The literature on coopetition devotes a great deal of attention to the benefits resulting from competitive cooperation. Bengtsson and Kock (2000) recognized coopetition as a strategy which brings vast development potential for companies. It results mainly from the ability to obtain scarce resources (Silverman & Baum, 2002; Gnyawali & Madhavan, 2006), stimulation of innovation (Ritala, 2012), reduction of costs (Lado *et al.* 1997; Le Roy & Sanou, 2014; Navickas & Malakauskaite, 2009), opportunities for technological growth (Ahuja, 2000; Gnyawali & Park, 2009), market (Luo, 2007), reducing the risk of activity (Luo *et al.*, 2007), learning from allies (Bouncken *et al.*, 2016) and increase innovativeness and competitiveness (Gast *et al.*, 2015). Increasingly, however, there are voices in the discussion on coopetition which highlight the threats and risks of this type of inter-organizational relationship. Several publications devoted to these relationships have been entitled sleeping with the enemy (e.g. Nevin, 2014). As Bouncken *et al.*, (2015) state, coopetition is fraught with difficulties in the sense that opportunism, misunderstandings and spillovers can hamper the positive impact of coopetition on performance and innovation.

The competitive nature of the coopetitive relationships gives rise to the occurrence of opportunistic behaviour in the system. The level of these behaviours is greater than in the case of alliances formed with non-competitive organizations and other hybrid links (Dowling *et al.*, 1996). Opportunism often leads to unethical behaviour, as companies break the rules of the market "game". At the same time, a low level of trust becomes an opportunity to treat coopetitive relationships in terms of temporality. Therefore, companies are keenly interested in achieving their goals in the shortest possible time, keeping in mind that the relationship may be terminated immediately. Opportunistic behaviour entails additional risks which are associated with an uncontrolled leakage of information (and other intangible assets) from the partner or even economic espionage (Lavie, 2006). Frequently, there is a real risk of loss of control over its own technology (Hamel, 1991).

Aggressively opportunistic behaviour leads to the asymmetry of benefits derived from the coopetitive relationship. They also distort one of the pillars of stable cooperation, i.e. maintaining the relationship between benefits derived and one's own contribution to the system. Asymmetric access to resources may also arise (Gnyawali & Madhavan, 2001). The emergence of such losses will need to generate additional specific assets resulting not only from the essence of the coopetitive relationship, but also the need to better protect their interests.

Coopetitive relationships are characterized by a high degree of conflict, which is mainly due to the coexistence and interaction of streams of cooperation and competition in the relationship between the parties (Cygler & Sroka, 2016). This results in increased transaction costs for the entire project. The continuing high level of conflict between the parties may reduce the effectiveness of the cooperation and the effectiveness of both individual and common goals of the parties involved. In extreme cases, it can lead to the paralysis of the coopetitive system and, consequently, to the inefficiency of coopetitors themselves.

Specificity of coopetition causes parties to attempt to protect their interests through agreements of exclusivity, meaning that any decision to cooperate with one competitor limits the possibilities of cooperation with others. The so-called coopetitive negative blocks are mainly created with competitors from different strategic groups (Nohria & Garcia-Pont, 1991).

A loss of organizational independence and decision-making is a further example of a dangerous threat stemming from competitive cooperation. Contractual clauses limit the possibility of choosing another partner for cooperation. At the same time, the complexity of coopetition forces parties to take into account the requirements of competitive

cooperation in their strategic decisions. This limits the freedom of company decision-making, which is particularly troublesome when creating multiple coopetitive links. Limiting the autonomy of decision-making becomes the price of functioning in coopetitive networks (Cygler, 2015).

Aggressive opportunistic behaviour, lack of a sense of community in cooperation and high costs of settlement means that parties strive for domination in coopetitive relationships. There is a danger of transforming the relationships into a zero-sum game (Luo, 2004). As a result of continuous conflict and aggressiveness of mutual activities, the parties are weakened, which has both organizational and market consequences. In the case of organizational consequences, frequent attempts are made by stronger units to take over weak partners, bringing about a subsequent loss of organizational independence (Das & Teng, 1996). Involvement in a conflictual coopetitive relationship causes a lack of due care towards customers, non-utilization of market opportunities and lack of sufficient flexibility in terms of changes in the environment. This may result in a loss of customers and a subsequent deterioration in market position.

Studies conducted by Ritala *et al.,* (2008) also showed that cooperation with competitors may generate above-average costs of functioning, beyond the financial capabilities of the company. Consequently, these coopetitive relationships may threaten the existence of the company.

Coopetitive relationships take diverse forms due to the characteristics of the streams of cooperation and competition (Lado *et al.,* 1997). Stratification of coopetitive relationships depend not only on the existence of streams of cooperation between rivals, but also on the internal structure which is expressed by the areas of cooperation. This cooperation may cover all the activities of the value chain, including both primary and support ones. On the other hand, the competitive nature of cooperation between rivals means that the appearance of threats should be considered as an inherent feature of this relationship. It is for this reason that the aim of this paper is to test the following hypothesis H_0:

> H_0: *The choice of an area of cooperation between competitors is not a prerequisite for the emergence of disadvantages of coopetition.*

The positive verification of hypothesis H_0 will indicate that there is no correlation between the choice of the area of cooperation and the emergence of threats. In contrast, negative verification will indicate that such a relationship does in fact exist. Threats of coopetition frequently occur in a certain configuration. This configuration should be treated as a function of the prevalence of these threats. The question therefore arises whether there are similarities in the profiles of said threats, depending on the areas of cooperation adopted in coopetition. Deliberations are concentrated on the grouping of areas of cooperation, depending on the prevalence of the same disadvantages of coopetition. A cluster analysis will be used for this purpose (Tryon, 1939), which is often used in studies of strategic management (Ketchen & Shook, 1996).

Methodology

Data Description

Our multistage research was conducted between September 2012 and January 2013. As a result of the research, the group of 235 companies from the high-tech sector declaring competitive cooperation was separated. The choice of the research sample was influenced by the characteristics of the sector and the commonality of the coopetitive relationships created therein. Data was collected directly by means of questionnaire surveys; respondents were senior management executives or company owners. The choice of the research sample was carried out in several stages. The high-tech sector was defined according to the OECD classification; companies were classified into seven basic sectors: processing and production (16 companies), pharmaceutical sector (79 companies), production of office equipment and computers (4), production of TV, radio and communication devices (31), medical equipment production (54), spaceship production (16), and HT services (35). Due to the size of the companies, the majority were small companies (130), followed by medium (72), and large (33). The following organizational forms were observed: 171 were stand-alone companies, 49 were corporations, 13 holdings, while two companies took another form. The majority of the companies conducted operations on a national scale at a minimum (165), and the rest (70) operate on a transnational scale. There are 15183 high-tech companies registered in Poland, and their structure in terms of size and activities in different sectors corresponds to the structure of the research sample. Using the formula for the minimum sample size to estimate the fraction of the population and assuming a trust (confidence) level of 0.95, as well as the maximum error of estimation of 5 %, the sample size was equal to 375. Finally, 402 companies have been deemed eligible for inclusion in the research sample to the research, from which 235 have declared the implementation of simultaneous cooperation and competition with direct competitors. Thus the sample meets the requirements of representativeness for the population of companies operating in the high-tech sector in Poland.

Variables

Two groups of variables were separated in order to carry out our research. The first of these groups was the areas of cooperation, to which Porter's (1980) value chain concept was applied to assist in the process of identification. Finally, nine areas of cooperation were separated, and subsequently labelled with letters of the alphabet: A – research and development (R&D); B – purchasing inputs; C – production/services; D – sales/distribution; E – marketing; F – logistics; G – Finance; H – computer information systems; I – Human relations. Analyses demonstrate that most of the companies surveyed cooperate with competitors in the area of production/services (194 responses), sales/distribution (175 responses) and purchasing and supply inputs (165). In contrast, companies were least likely to cooperate in the areas of finance and human relations (just 122 companies each) as well as computer science.

The second group of variables was created by 12 possible threats to coopetition which may arise as a result of

competitive cooperation. These disadvantages include: D1 – loss of the control over the activity; D2 – adverse effects of cooperation benefits in relation to expenditure when compared to a competitor (asymmetry of the system); D3 – partner opportunism (including unethical behaviour); D4 – the need to create specific assets; D5 – ban on cooperation with another competitor (i.e. negative coopetitive block); D6 – severe conflicts preventing cooperation; D7 – low efficiency of activities and goals pursued; D8 –decline in value of the company; D9 – deterioration of the market position; D10 – deterioration of the image of the company; D11 – the loss of decision-making and organizational independence; D12 – an increase in operating costs (compared to stand-alone activity). These variables were selected on the basis of an analysis of the literature and our own previous studies and research (Cygler, 2015; Cygler *et al.* 2014; Sroka & Hittmár, 2013, 2015). An analysis of the transaction costs theory became the basis for separating threats D1, D2, D3, D4, D5, D7, D11, and D12; the achievements of game theory allowed the researchers to distinguish threats D2 and D6, and the resource-based approach - D4. Additionally, threats D8, D9, and D10 were the result of an analysis of our previous studies (Cygler, 2015; Sroka & Cygler, 2014). Preliminary analyses demonstrated that the most frequently mentioned coopetition disadvantages are associated with an increase in costs (130 responses); the low effectiveness of activities and goals pursued (114 responses); and the opportunistic behaviour of partners (99 responses). In contrast, the lowest level of threats to coopetition include a decline in the value of the company (58 responses); loss of control over activity (62 responses); and the deterioration of the image of the company (67 responses).

Methods

In order to verify the hypothesis H_0 (i.e. the lack of relationship between the choice of the area of cooperation between competitors and the occurrence of disadvantages of coopetition), an independence test of χ^2 (chi-square) was applied. The choice of the test is associated with the dichotomy of the variables.

Due to the frequency of disadvantages in coopetition, one may determine similarities of the particular areas of cooperation between competitors. Cluster analysis will be utilized for this purpose. This method is one of the so-called methods of interdependency analysis, which means that all the variables in the analysis are regarded as interdependent, without separation of dependent variables (effects) and independent ones (reasons) thereof. Cluster analysis allows the identification of internally coherent groups of objects. The research is carried out in four main phases: the choice of the variables and the adoption of a method for determining similarities between objects (I), the choice of the allocation of given objects into homogeneous groups (II), the choice of the number of clusters identified (III), and the interpretation and profiling of the clusters obtained (IV). There are two basic approaches to the grouping (clustering): hierarchical and non-hierarchical. In the hierarchical approach, one gets a hierarchical structure of the similarities between objects in the form of a tree called a dendrogram. Ward's method was used (Ward 1963). In the subsequent step of the analysis, the method of K-means clustering was used (as a non-hierarchical method). K-means clustering divides the entire collection of cases into *k* possibly different clusters. The algorithm of this method is based on the transfer of objects between the indicated number of clusters in order to minimize the variation within clusters and maximize the variation between clusters.

Findings and Discussion

Our research has shown that as a result of the coopetitive relationships created, the likelihood of the emergence of disadvantages of coopetition is 0.758.

Due to the choice of nine areas of cooperation between competitors (from A to I) and twelve possible disadvantages (D1 to D12), the number of null hypotheses was 108. The calculated levels of chi-square tests are presented in Table 1. The rejection of the hypothesis of the absence of links between the area of cooperation and the occurrence of disadvantages has been marked in bold. Simultaneously, 63 statistically significant compounds between the choice of area of cooperation with a competitor and coopetition disadvantages have been demonstrated, assuming a significance level of $p < 0.05$ and the critical value for χ^2 of 3.841.

Table 1

Test Levels of χ^2 in Research into Links between the Areas of Cooperation between Competitors and Disadvantages of Coopetition

Value chain activities	Coopetition disadvantages											
	D1	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**	**D8**	**D9**	**D10**	**D11**	**D12**
A	0.66	3.06	1.82	3.06	3.33	3.06	**3.96***	3.06	1.21	0.60	0.60	**4.32***
B	3.06	2.17	**4.90***	**4.90***	3.51	3.51	**4.90***	3.06	2.61	1.73	2.17	**8.23***
C	2.44	**5.13***	**4.27***	2.91	**4.87***	2.44	**6.81***	1.52	**4.37***	3.15	2.44	5.13
D	2.84	**5.49***	**11.34***	3.58	**6.68***	3.21	**5.49***	**3.96***	**6.28***	**5.49***	**5.10***	**5.89***
E	3.00	3.00	**5.50***	**6.10***	**7.43***	3.62	**9.42***	3.62	**6.28***	**4.87***	**10.09***	**8.09***
F	3.23	1.92	**3.89***	**7.99***	**5.23***	**4.56***	**3.89***	2.57	**5.91***	**6.60***	**7.29***	**5.23***
G	**6.68***	**7.67***	**4.73***	5.70	3.77	**5.70***	**6.68***	**8.67***	**9.67***	2.81	**7.67***	**9.67***
H	**6.93***	**9.37***	**4.56***	**4.56***	**5.34***	**4.56***	**5.34***	2.25	2.25	2.25	3.01	**12.72***
I	1.87	**6.68***	**6.68***	**10.69***	**4.73***	**5.70***	**7.67***	2.81	3.77	**5.70***	**4.73***	3.77

*- significant dependence for $p<0.05$, n=235

Given the areas of cooperation, the most prevalent disadvantages appear in the cases of sales and distribution, logistics and finance (nine indications each). In the case of sales and distribution, one should expect the following disadvantages: asymmetric benefits compared to the investment between the parties; opportunistic behaviour of coopetitors (the greatest threat); forcible restrictions towards cooperation with other competitors; and the low efficiency of the relationship, which in turn may lead to the deterioration of the market position and image of the company, loss of both its and organizational decision-making independence, increased operating costs and a decline in the value of the company.

When deciding to cooperate in the field of logistics, one should expect (as in the case of sales and distribution) opportunistic (and unethical) behaviours of the parties; limitations to cooperation with other rivals; the reduced effectiveness of cooperation; the deterioration of the market position and image of the company and, consequently, decline in the value of the company; loss of its decision-making and organizational independence; as well as an increase in operating costs. Additionally, one should expect more conflicts which may jeopardize the success of the project and the need to create specific assets (which may be viewed as the greatest threat).

When choosing finance (as an area of competitive cooperation), as in the two previous activities of the value chain, one should expect such coopetition disadvantages as: opportunism of the parties; low efficiency of the activities and goals pursued; loss of organizational and decision-making independence; deterioration of the market position; and increase in operating costs (of which the latter two outcomes were recognized as the greatest threats). In addition, one should also expect a threat to control over operations; the asymmetry of benefits compared to expenditures of the parties; conflictual relationships; and the threat of a decline in the value of the company.

The next three areas, namely marketing, information technology and human relations, each showed eight statistically significant relationships with the emergence of coopetition disadvantages. In the case of marketing cooperation, one should expect: opportunism of the parties; the need to create specific assets; the need to reduce to a single competitor in cooperation; low efficiency of the cooperation itself, and thereby deterioration of the company's market position and its image; loss of decision-making and market independence (the greatest risk); as well as an increase in operating costs. As in the area of marketing cooperation, informatics is also exposed to coopetition disadvantages associated with opportunism; the need to create specific assets; the exclusiveness of cooperation and the low efficiency thereof; and increased costs (which had the highest value of statistical significance in the research). In addition, it is expected that there will be disadvantages resulting from the loss of control over activities; the asymmetry of benefits; and the high level of conflict between competitors. In turn, in the case of cooperation in the area of human relations, one should expect the following coopetition disadvantages: emergence of opportunistic behaviour; asymmetry of benefits and expenditures; requirements for the selection of partners for cooperation; conflicts between the parties; the low efficiency of cooperation; deterioration of the image of the company; and the loss of decision-making and organizational independence. These areas of cooperation pose the greatest threat to coopetition.

Cooperation in the production area is exposed to the emergence of five threats, namely asymmetry of the system; opportunism of the parties; subjective limitations to cooperation; low efficiency of cooperation; and the deterioration of market position). In the case of cooperation in the field of purchase supply, there were four statistically significant dependences: opportunism of the partner; the need to create specific assets; low efficiency of cooperation; and increased costs. In contrast, the analysis showed that cooperation in the field of R&D is exposed to the appearance of only two coopetition disadvantages: low efficiency of cooperation and generation of increased costs. Such a low number of coopetition disadvantages in this area is mainly due to detailed contractual collaterals in the relationship between the parties. When analysing the weight of coopetition disadvantages as expressed by the number of statistically significant relationships with areas of cooperation between competitors, one should note that the inherent feature of coopetitive relationships is the low efficiency of joint activities and goals pursued; in fact, it is observed in all the areas of the value chain). Partner opportunism is in second place (statistically significant dependence of its occurrence is not observed only in the field of R&D). Third place is occupied by the increase in costs (statistically significant dependence exists in seven areas of the value chain, with the exception of production/services and human resources). In turn, the least significant coopetition disadvantages are the loss of control over activities and the decline in the value of the company (there is a statistically significant dependence with only two areas of cooperation). When analysing the generality of occurrence of specific risks depending on the area of cooperation between competitors, one may see that the highest percentage of companies indicated opportunistic behaviour (D3) in sales / distribution (D) (Table 2).

Table 2

Share of Losses by Area

Value chain activities	Coopetition disadvantages											
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
A	3.40%	3.40%	2.04%	3.40%	6.12%	3.40%	7.48%	3.40%	1.36%	0.68%	0.68%	4.76%
B	4.85%	3.03%	6.67%	4.24%	4.85%	4.85%	6.67%	4.24%	3.64%	2.42%	3.64%	10.91%
C	5.67%	11.34%	10.31%	6.70%	11.34%	5.67%	13.92%	3.61%	10.31%	7.22%	5.67%	12.37%
D	4.57%	8.57%	16.57%	5.71%	10.29%	5.14%	8.57%	6.29%	9.71%	8.57%	8.00%	9.14%
E	3.38%	3.38%	6.76%	7.43%	8.11%	4.05%	10.81%	4.05%	7.43%	5.41%	11.49%	11.49%
F	3.47%	2.08%	4.17%	9.03%	5.56%	4.86%	4.86%	2.78%	6.25%	6.94%	7.64%	6.25%
G	6.56%	7.38%	4.92%	5.74%	4.10%	7.38%	9.02%	9.02%	9.02%	4.10%	8.20%	13.11%
H	6.67%	8.89%	5.19%	5.19%	5.19%	5.19%	5.19%	2.96%	2.22%	2.96%	2.96%	12.59%
I	2.46%	6.56%	5.74%	9.02%	4.92%	6.56%	7.38%	2.46%	3.28%	4.92%	4.10%	4.92%

n=235

The most frequent loss in the area of research and development (A) is the low efficiency of jointly executed processes and goals (D7). This loss is also the most common in area C - production /services. In turn, in the areas of purchasing inputs (B), marketing (E), finance (G) and computer information systems (H), an increase in costs (D12) is the most frequent indicated loss. Additionally, the loss of organizational and decision-making independence (D11) in the area of marketing is indicated equally often. However, in two areas, logistics (F) and human resources (I), the most common loss is D4 - investment in specific assets, i.e., those which are not typical for the company (but required investment) and will be used only for the purposes of cooperation.

The application of Ward's method (cluster analysis) allowed the separation of four clusters of similar areas of cooperation between competitors, depending on the existing coopetition disadvantages (Figure 1).

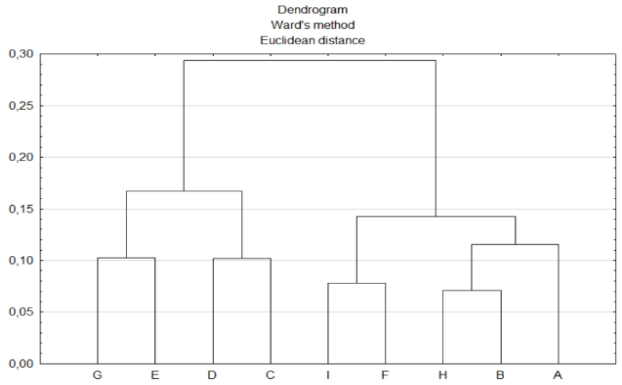

Figure 1. Clusters of coopetition areas

The areas of finance and marketing (G and E) constitute Cluster 1. Cluster 2 comprises areas of sales / service and production (D and C). Cluster 3 includes human resources and logistics (I and F). In contrast, information technology, supply and R & D (H, B and A) form Cluster 4. Subsequently, the result of the k-means clustering method has confirmed the correctness of the grouping of areas of cooperation between competitors due to the similarity of the occurrence of coopetition disadvantages (the same areas in different clusters were obtained). In addition, k–means analysis allowed the authors to determine the average frequency of indications of threats in the specific clusters of areas of coopetition (Figure 2).

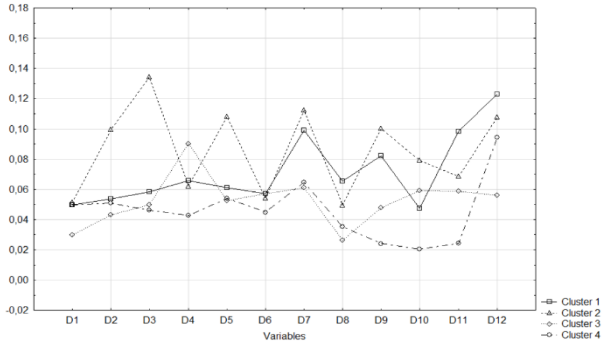

Figure 2. Average rates of indications of coopetition disadvantages in the clusters of areas of cooperation between competitors

The characteristic features of Cluster 1 are the disadvantages associated with the threat of losing decision-making and organizational independence, as well as the increase in operating costs (D11 and D12). This cluster is also characterized by the increased frequency of threats related to the low level of effectiveness of work and goals (D7) and the deterioration in market position (D9). Cluster 2 is characterized by the frequent occurrence of multiple losses, and in particular the loss of control over activities (D1), asymmetric relations between the effects of cooperation and expenditures thereon in relation to the competition (D2), opportunism of the partner (D3), the prohibition of cooperation with another competitor (D5), low effectiveness of work and goals (D7), the deterioration in market position (D9) and deterioration of the image of the company (D10).

In turn, the only and most prevalent threat in Cluster 3 is the requirement to create specific assets for competitive cooperation. This cluster is also characterized by the rarest occurrence of the coopetition disadvantages associated with the loss of control over activities (D1), asymmetric relations between the effects of cooperation and expenditures thereon in relation to the competition (D2), the decrease in the value of the company (D8) and the increase in operating costs (D12).

In contrast, cluster 4 is characterized by the very rare occurrence of the following coopetition disadvantages: opportunism of the partner (D3), the need for investment in specific assets (D4), lack of opportunities for cooperation with other competitors (D5), conflict-relationship with a competitor (D6), the deterioration in market position (D9), the deterioration of the image of the company (D10), and the loss of decision-making and organizational independence (D11). This cluster is characterized by the lowest number of coopetition disadvantages.

Conclusions

Coopetition, while ostensibly generating benefits for the parties involved, is nonetheless also associated with significant disadvantages. Given the aim of the paper, our analyses clearly demonstrate that the complexity of these relationships results from the multiplicity and commonality of the prevalence of coopetition disadvantages. Threats of coopetition frequently occur in a certain configuration. Additionally one should add that this configuration should be treated as a function of the prevalence of these threats. The occurrence of individual threats depends on the internal structure of the stream of cooperation, and in particular, the choice of the areas in which competitors choose to cooperate. Research has shown that there is a statistically significant dependence between the choice of particular activities of the value chain (as an area of cooperation between competitors), and the appearance of specific threats. The highest number of disadvantages are generated by sales/distribution, logistics, and finance activities (nine out of 12 threats each). The lowest level of statistically significant correlation with the occurrence of disadvantages of coopetition is observed in the area of R&D (two). The most common disadvantages of coopetition are the reduced

efficiency of activities and the goals pursued, partner opportunism and increased operating costs.

Due to the similarity of configurations of the frequency of occurrence of coopetition disadvantages, one may extract four clusters of areas in the value chain, meaning that in terms of the choice of cooperation areas within one cluster, one may expect a similar frequency of the same risks. The areas of finance and marketing constitute Cluster 1. Cluster 2 comprises areas of sales / service and production. In turn, cluster 3 includes human resources and logistics. And in contrast, information technology, supply and R&D form Cluster 4. We believe that this knowledge is especially useful in situations in which a stream of cooperation in coopetition covers more than one area in the value chain.

In summary, it may be concluded that when deciding on coopetition, companies should consider not only the benefits, but also the threats associated with such relationships. This is due to the fact that disadvantages are inherent feature of coopetitive relations between competitors. Moreover, it may allow to predict threats to coopetition when choosing specific areas of cooperation.

Research on the coopetitive relationships of companies operating in the high-tech sector in Poland has shown that shaping the cooperation stream determines the occurrence of certain disadvantages, allowing companies to prepare and thus limit their negative impact on relationships with competitors at a relatively early stage. Due to the significantly higher focus of attention on the benefits of coopetition by researchers and managers, the concept (essence) and dynamics of disadvantages is an important, but to date little-explored, field of studies. Therefore, it seems reasonable to extend the research, both conceptual and empirical, on coopetition in terms of its disadvantages.

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