



THE NATURE AND TYPES OF NETWORK RELATIONS IN DISTRIBUTION OF METALLURGICAL PRODUCTS

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ABSTRACT. The article analyses the motives for establishing cooperation within a company supply network as division points in a supplies chain of metallurgical products. The division points were defined and identified at the level of service centres in the investigated chain. The analysis took into consideration various types of inter-organisational bonds, which are placed in the network relations classification matrix. The study concerns a complex distribution system. The analysed distribution network combines flows characteristic for both flexible and narrow supply chains.

Key words: supply chain, logistic customer service, network relations, inter-organisational bonds.

INTRODUCTION

In complex distribution systems, which, among other things, characterise the metallurgical industry, distribution companies take over part of the production process in order to diversify the product closer to the final consumer market. Hence, the infrastructure in such organisations is more diversified than in traditional wholesale stores. The article presents a thesis that, in order to ensure high standards of realisation of orders from its customers by a distribution company, which adapts products to the customers' orders, it is crucial to acquire logistic resources from partners in the chain. Therefore, distribution companies establish diversified relations with companies, which are their competitors to date in the market. It is of paramount importance especially for orders, which are difficult to forecast, due to the turbulence of the environment or the product variety.

The formation of inter-organisational bonds has different motives, ranging from efforts to improve the company efficiency, efforts to develop resources through a drive towards organisational learning, to efforts in order to reduce uncertainty [Czakoń 2007]. The intensity of the formed inter-organisational bonds is one of the strategic decisions both in the configuration process and in a supply chain.

The need to gain access to substitutive, regarding its own, resources of the partner company is a special case of making decisions about creating a network relation. On the one hand, the formation of network relations within substitutive resources increases the maximum output of a network, and on the other hand, it weakens the competitive position resulting from being distinctive, according to the added value chain concept by Porter. Thus, it can be assumed that there are flexibility thresholds for which an increase in flexibility, through successively established network relations, does not improve a company's economic success and logistic customer service.

The goal of these considerations is to point out various motives for making decisions about cooperation with former competitors in the area of distribution of metallurgical products, and to suggest a direction for future research aimed at determining the significance of the relationship between the motive of relations formation and the type of relations from a dynamic perspective.

RELATIONS AND MOTIVES OF COOPERATION (INTER-ORGANISATIONAL BONDS) WITHIN SUPPLY NETWORKS AND CHAINS

The high standards of service are related to the need for adaptable reaction to non-standard orders. It is so because the customer requires an order realised on time, comprehensively, securely, adapted to their specific needs, thus they require flexibility from the supply chain in general. Within the supply chain, on the basis of flow characteristics, one can distinguish links responsible for flexibility in reaction to non-standard orders. In the metallurgical industry, such links are service centres. Companies responsible for flexibility, combining different flow characteristics, try to establish cooperation with other companies, because individually, each of them does not possess sufficient resources to fully realise very complex objectives. It is the key motive for establishing cooperation in metallurgical products distribution. Generally, collaboration relations result from needs in the area of:

- the acquisition of complementary or substitutive production resources,
- the acquisition of new technological solutions, including shared R&D,
- production and services,
- marketing and market research,
- logistics.

The significance of relations in administrative processes increases due to the increasing popularity of the relation marketing paradigm. Despite dynamic development of research on relations between economic entities, there has not been any agreement about the issue of defining relations and distinguishing them from interactions or bonds, which are categories to be frequently confused [Eriz V, Wilson D 2006]. Interactions are understood as stimuli between two elements. In social sciences, bonds are understood as an exchange based on reciprocity, long-term relations and trust. The emphasis is on primary bonds, including economic and technical ones, commonly referred to as emotionless, and secondary bonds, it is emotional bonds based on the exchange of knowledge, technology, sharing visions and strategic goals, and trust between partners. In administration sciences, relations mean different intensities of mutual interactions, up to the bond as the strongest relation between organisations. In that sense, not every relation is a bond, but every bond is a relation. In the article, long-term relations based on trust and collaboration, developed together with other links of the supply chain and network, will therefore be termed bonds and will be identical to network relations.

In the context of the processes of developing network relations, variables influencing the quality of relations are significant. Among them, the most prevailing are variables concerning the aspects of mutuality and sharing [Wilson D., 2005]. The quality of relations is assessed, however, according to the three following criteria: trust, involvement and satisfaction [Ulaga W., Eggert A., 2006].

The broadest classification of relations was proposed by Gummesson [1994], who indicates 30 types, which also include strategic alliances formed within a market and a sector. The alliances as a type of formalised network relations are discussed at length in part t3 of the article.

The literature discusses two primary models of collaboration of entities in distribution: the traditional transaction (win-lose relations) and the partnership relations (win-win relations), which are broken down to models that are more detailed. With respect to the technological premises of relation formation, one can distinguish vertical and horizontal integration. Horizontal integration (industry-specific) is based on the diversification of a company's business. The horizontal configuration is usually characterised by the similarity of technological processes, the uniformity of the processed

products. The vertical integration results, on the other hand, from the realisation of the basic, fundamental processes of a company. Partnership is created between companies possessing complementary resources. In this interpretation, one can indicate differences in the formed bonds at the level of the supply chain and network, which will be a subject of analysis in the further part of the article. However, before pointing out relation characteristics in supply networks and chains, it is worth noting that logistic attributes of a product, including in particular the level of product diversification, determine the character of the supply chain.

Harrison and van Hoek [2010] observe that logistic strategies are formulated differently for mass products, which induce the formation of slim supply chains, and differently for products offered in various versions, for which flexible chains are preferred. As for standard products, forecast accuracy is higher than as regards multi-variant products, strongly diversified according to the customer's needs. Hence, it makes it possible to design with greater accuracy the supply chain and the output of individual links. Non-standard products require from the supply chain flexibility, the ability to react to diverse needs. Resource demands are thus more complex and cannot be based on the potential of a narrow group of entities integrated in a supply chain. At the same time, by analysing tendencies in different industries, it can be noticed that there are changes in proportions between mass or standard products and those highly differentiated ones, offered in multiple variants. In relation to the metallurgical industry, the majority of separate segments of consumers of metallurgical products require adaptation of the product to the special requirements of the customer. Those factors indicate an expansion of the role of intermediaries in distribution channels with additional functions related to the adaptation of the product to special requirements of the customer. It can be exemplified by the service centre analysed in the metallurgical products distribution sector. It is a division point in the supply chain because it combines two types of the chain characteristics. On the one hand, it secures the flows of mass standard products (segment II) required by slim supply chains, realising the functions of a classical wholesale store. On the other hand, it secures the contemporary product diversification trends in distribution channels (segment I and III) by additional resources, which make it possible to develop form usability. The separate segments: I - the automotive industry, II - trade companies, III - the house appliances sector and medical equipment are included in the assessment of the level of logistic customer service in the 4th section of the article.

A supply chain, as a sequence of organisations collaborating to provide the largest possible amount of a product or service for the customer, can create very complex interrelation networks at every stage. Harrison and van Hoek [2010] note that, although in the literature the notions of a supply network and a chain are often used interchangeably, in fact they are characterised by different relations and flows. The network denotes a more complex structure than the chain, organisations can be connected in a crossing manner and the exchange between them can be bidirectional, just as in the case of the metallurgical products network presented in the study.

Cooperation in a distribution network involves three aspects: compatible goals, the type of relations between cooperating entities and the diversification of the significance collaborative relation for the cooperating entities. In addition, one can distinguish two cooperation principles: the principles of profitability and reciprocity [Spyra Z., 2007]. In the distribution networks of metallurgical products it is vital to have a broad perspective on one's own and the partner's organisational potential, encompassing the company together with its branches with different geographical coverage, as well as inter-organisational bonds with transport companies and shippers.

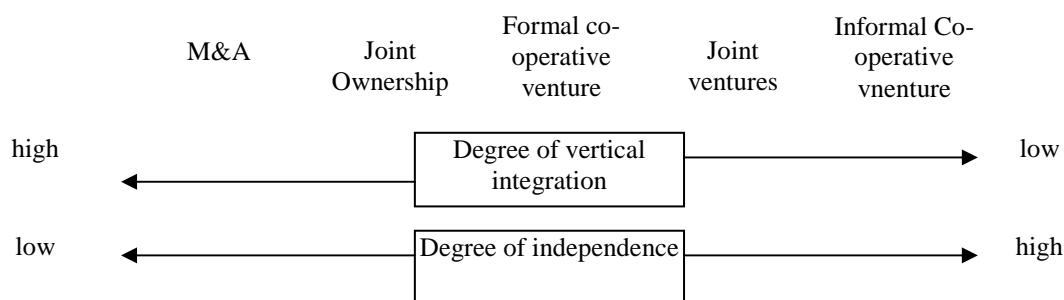
THE CHARACTERISTICS OF NETWORK RELATIONS - A SUGGESTION OF A RELATIONS CLASSIFIER

In the research in market entities, from the methodological point of view, extreme important concept was the model by Eiriz V. and Wilson D., which organizes the approach to relations from the research perspective based on three priorities:

- rationale for relationship: fundamental theoretical bases for creation, development, maintenance and potential cessation of relations;
- relationship processes: the processes during which relations are created, developed, maintained and broken; the most significant task is here to explain which relation variables, such as trust, involvement, adaptation, uncertainty, interrelation and reciprocity are crucial;
- relationship structure: structures appropriate for the management of relations; it is fundamental here to understand how companies organise and administer relations and, (originally in the research by Eiriz and Wilson), which forms of network structures and management models are more useful for the marketing of relations. This priority in the research direction presented in the article refers to the estimation which forms of network structures (relation types) are more useful for the increase in flexibility for non-standard orders. Flexibility is, in turn, treated as a priority motive for the formation of network relations, which has its main sources in the need to diversify the product at the distribution stage.

Taking into account the priorities of the model by Eiriz V. and Wilson D., the study suggested a classification of relations based on the intensity of created relations and their degree of formalisation. It was also assumed that reliability (security, completeness and meeting deadlines) of tasks carried out within a network is higher for formalised bonds.

The question of alliances is raised in few theoretical concepts. The most significant ones include the transaction cost theory and the game theory. The late 1995 saw a new consideration of the problem, in the eclectic model of international production by J.H. Dunning, which immediately became a turning point in the development of thoughts and theories dedicated to strategic alliances. One of the most general definitions of strategic alliances was presented by K.R. Harrigan [1988] saying that they are joint ventures and cooperation agreements which provide the partners with the ability to collaborate in order to achieve specific strategic goals, and this approach is consistent with that presented by Contractor F.J., Lorange P [1988]. The source of strategic alliances lies therefore in the possibilities of acquiring complementary resources of the partners for the development of key processes, which facilitate gaining a competitive advantage in the market. According to the diverse degree of vertical integration or independence, alliances can take on different forms, the range of which is described in Fig. 1.



Source: Huang J., Tzeng G., Ong C., 2007

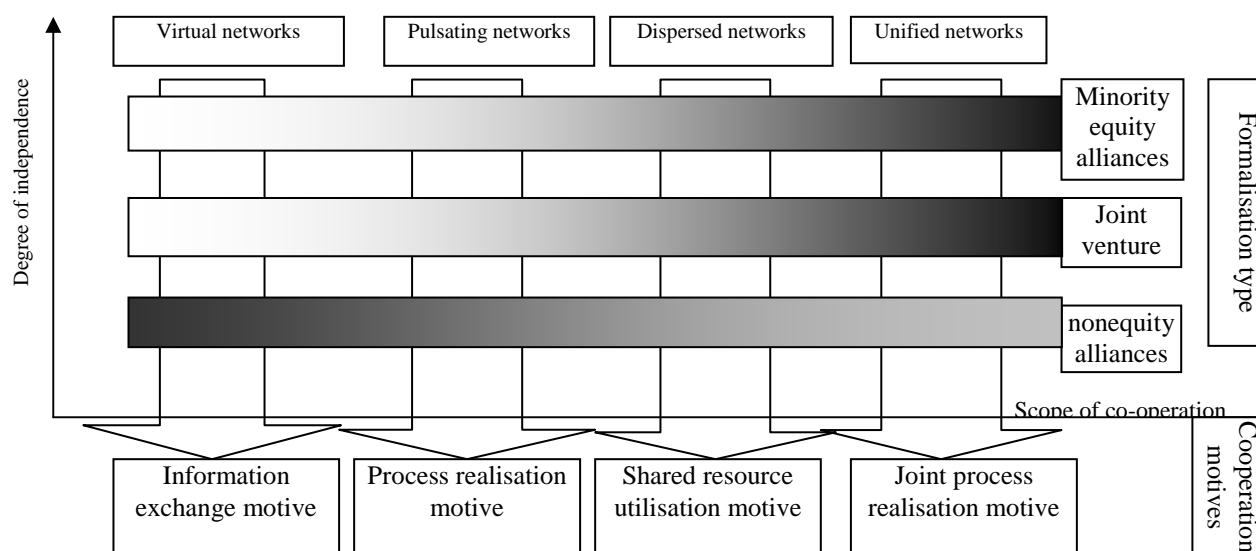
Fig. 1. Strategic spectrum of alliances
 Rys. 1. Zakres powiązań strategicznych

In analysing the definition of Harrigan, special attention needs to be paid to its four basic elements: the problem of separation of cooperation agreements from joint ventures, partnership relations between the allies, the union of work and profits, and the purposefulness of agreements. The author draws a clear line between cooperation agreements, that are those in which proprietary relations do not change, and joint ventures, where a new organisational entity is created, the shareholders of which are partners signing a contract. Contractor and Loranie [1988] define cooperation agreements as non-

equity alliances and treat them as agreements between partners aimed at gaining common benefits. Contractor and Loriane also consider the possibility of establishing an alliance as an agreement based on partial buyout of the partner's shares (minority equity alliances) which does not have the character of joint ventures. The three types of alliances mentioned: joint ventures, non-equity alliances, minority equity alliances, are considered in the majority of the literature as generally binding and this classification will also be adopted in the article.

MOTIVES FOR THE ESTABLISHMENT OF NETWORK RELATIONS AS EXEMPLIFIED BY A CHOSEN DISTRIBUTION NETWORK OF METALLURGICAL PRODUCTS

Taking into account the literature publications mentioned in section 3 of the article, a matrix of relations in supply networks was drawn (Fig. 2). The matrix combines two of the presented classification criteria: the degree of independence of the partners with reference to the degree of formalisation of cooperation and the scope of cooperation relating to tasks carried out together and the expenditure of resources for their realisation.



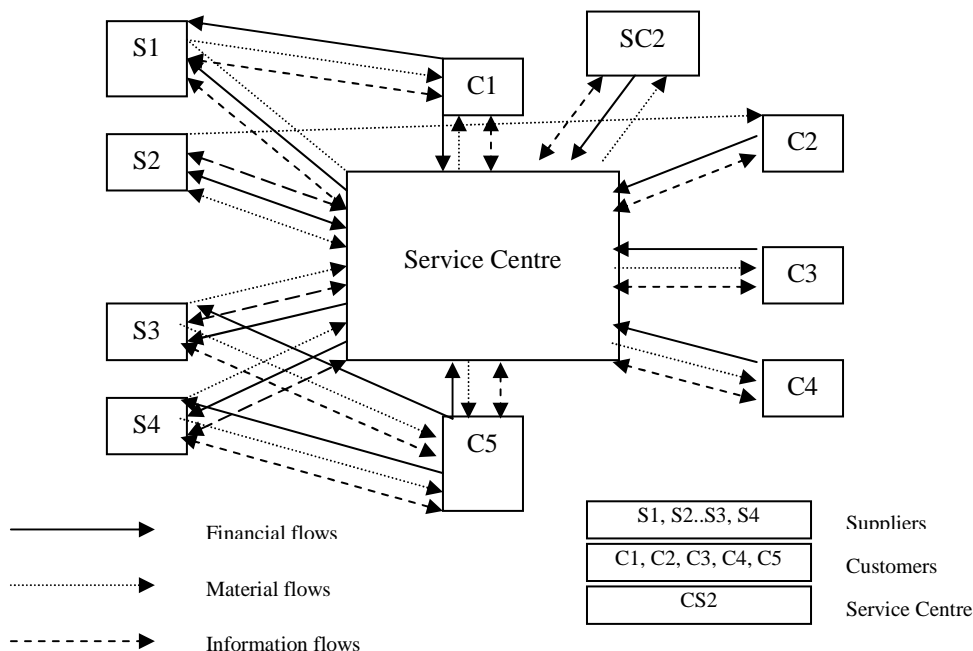
Source: The author's own research

Fig. 2. Relation matrix in a supply network
 Rys. 2. Macierz zależności w sieci dostaw

The flows in the discussed metallurgical products network (Fig. 3) are multidirectional. The service centre cooperates with four suppliers. As regards cooperation with the supplier S1, we can talk about a strategic alliance in the form of a minority equity alliance. The highest level of partnership between those companies results from their being related by capital and their cooperation being defined formally. The scope of cooperation is broad and includes the joint realisation of marketing processes, partly logistic and technological ones.

According to the presented map of relations, there is a group of customers for whom both the analysed service centre and supplier S1 are the source of supplies. The division of the supplied products between supplier S1 and the service centre is related to various resources of the service centre and supplier S1. The fundamental difference is that supplier S1 is accustomed to supplying large material shipments (the specified production minimum) and the service centre offers shipments that are more flexible and the possibility of changing shipment schedules. Such a division of supplies is very beneficial to both the customers and suppliers. The customer is provided with a service of

a specific level by trusted suppliers, where all purchased products come from one source of supplies that is from supplier S1, which additionally removes the risk of the material being inconsistent with requirements.

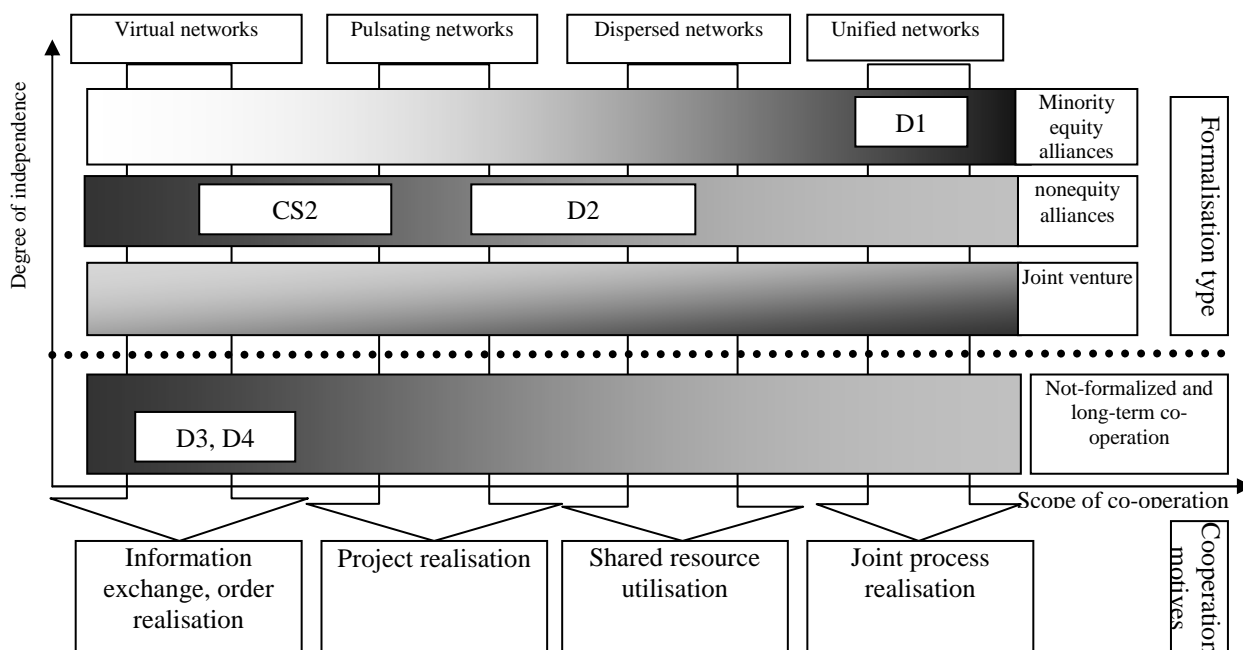


Source: On the basis of the company's materials

Fig. 3. Relation map: suppliers - service centre – customers
 Rys. 3. Mapa zależności: dostawcy – centrum usługowe - klienci

Supplier S2 is a company similar to the discussed service centre, seated in Germany. The relations between them are based on partnership and long-term relations formalised with a cooperation agreement. All flows of relations on the map are bidirectional, due to the fact that supplier S2 is for the service centre both a source of supplies and a customer. Supplier S2 supplies the service centre primarily with finished products compliant with a specific order placed by the customer. After shipment, such products are sent to the end consumer within 48 h at the latest.

As can be seen in Figure 3, there are also material flows between supplier S2 and customers of the service centre K2. In such a case, there is also information and financial flows between supplier S2 and the service centre and the products are transported directly to the customer. The customer settles transactions only with the service centre. It is a very convenient manner of cooperation, because it allows reducing the duration of order realisation and limits the number of products brought into the warehouse as well as the costs of transport. However, this type of cooperation is possible only between trusted and loyal partners, which can be seen in the degree of formalisation of cooperation between those partners. There is no competition for customers between the service centre and supplier S2, each company operates in a defined region of the European market. As regards suppliers S3 and S4, cooperation with the service centre is based on the same principles. There are no formal relations with the suppliers, the cooperation is based on pure transactional relations and each transaction is preceded by negotiations. Due to the fact that there is competition for end consumers between the service centre and suppliers S3 and S4, there is no possibility of the material flow directly to the customer. One of the ways to reduce the supplies in the warehouse is ordering finished products for specific orders of the customer, delivering them to the service centre and then to the end consumer.



Source: The author's own research

Fig. 4. Inter-organisational bonds in the chosen supply network of metallurgical products
 Rys. 4. Powiązania międzyorganizacyjne w wybranej sieci dostawczej wyrobów metalurgicznych

If there is no possibility of ordering finished products, the service centre acquires semi-finished products, which require additional processing by cutting to the desired size. Due to the above, in the analysed supply network of metallurgical products one identified bond types and motives related to them, which are presented in Fig. 4. The analysed enterprise does not form an alliance of a joint venture. However, the scope of the network is growing significantly thanks to non-formalized and long-term relations. The results of the adopted strategy were assessed through the analysis of the customers' satisfaction level. Three consumer segments were isolated: the automotive industry, the household appliances industry and medical equipment, as well as broadly defined trade companies. The results concerning the transaction function are presented in Table 1. In the general assessment of the company, in all segments it was unanimously concluded that the strongest points of the service centre are such elements as product quality and availability, shipment flexibility and meeting deadlines. As regards the pre-transactional service elements, the company is judged very highly with respect to the quality of the offered products, the time of response to queries, the ability to adapt the offer to one's individual needs and the provision of non-standard products.

Table 1. Customer satisfaction assessment with reference to the transaction elements of customer service
Tabela 1. Ocena zadowolenia klientów w powiązaniu do elementów transakcji w obsłudze klienta

No.	C. Service elements during transaction/during order realisation	Average mark		
		S I Motorisation	S II Trade companies	S III Household appliances, medical equipment
1.	Realisation deadline and order promptness	5.00	4.50	5.00
2.	Full order realisation - shipment completeness	4.75	4.75	4.75
3.	Consulting and technical support	4.50	4.50	4.50
4.	No limit as to the size of the order	4.00	4.25	3.75
5.	Information about the order's realisation status	4.75	4.50	4.75
6.	Precision of packing and marking	4.50	4.75	4.75
7.	Flexibility of reaction to orders of non-standard products	4.25	4.50	4.25
8.	Payment conditions	4.25	4.50	4.25
9.	Quality of documentation	5.00	4.75	4.50
10.	Certificates	5.00	4.75	4.25

During a transaction (Tab. 1), what are important for the customers is a short deadline and the promptness of order realisation, as well as the completeness of shipments and the absence of the production minimum. In the assessment of the post-transactional service elements, the elements of key importance are the manner of dealing with complaints and qualitative complaints. Special attention should be paid to aspects, which are very important to the customers and are rated very low by them at the same time. As regards customers from the first and the third segment, no such features were recorded, in the second segment it can be seen that customers are dissatisfied with the price level.

CONCLUSIONS

Each group of relations between the companies is characterised by a definite group of features distinguishing it from all others. Cooperation agreements are characterised by their fragmentary nature, the transfer of assets within the coalition and integrity. The fragmentary nature means that they refer to a chosen part of the businesses of the participants to the contract, which is the subject of the agreement. This is adequate to the second plane of classification suggested in the article with respect to the intensity of relations. In this plane one isolated virtual networks concerning the information exchange, dispersed networks concerning the resource utilisation, pulsating ones concerning the project realisation and unified ones concerning the process realisation. The participants can also function individually and conduct a business activity, which is not part of the agreement. These types of relations are included in the analysed supply network of metallurgical products. The analysed service centre tries to meet the expectations of its customers by establishing different types of relations within the network and the supply chain, depending on the motive of the established cooperation. As revealed by the conducted survey of the customer's satisfaction, this type of the flexibility formation strategy provides, as a result, a high level of customer satisfaction.

The presented features of inter-organisational bonds prove that the discussed forms of cooperation are of a dynamic character. This manifests especially in the possibilities of structural changes of systems depending on the conditions of the environment. The success of cooperation is based primarily on the achievement of balance between the goals of the coalition, individual partners, their

capabilities and willingness to adjust to the requirements of the alliance and the constantly changing environment. What seems an interesting area for further research therefore is the analysis of the determinants of the forms of cooperation between companies in a distribution network of metallurgical products. At the same time, further research will be aimed at determining the thresholds of flexibility developed by network relations. Thus, they are thresholds for which an increase in flexibility, through successively created network relations, does not improve the economic success of the company and the logistic service of the customer.

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ISTOTA I TYPY ZALEŻNOŚCI SIECIOWYCH W DYSTRYBUCJI PRODUKTÓW METALURGICZNYCH

STRESZCZENIE. W pracy przeanalizowano motywy powstawania współpracy w obrębie sieci dostawców jako punkty podziału w łańcuchu dostaw produktów metalurgicznych. Punkty podziału zostały zdefiniowane i zidentyfikowane na poziomie centrów usługowych w obrębie badanego łańcucha. W trakcie badań poddano analizie różne typy międzyorganizacyjnych powiązań, które umieszczono w macierzy klasyfikacyjnej zależności sieciowych. Praca dotyczy złożonego systemu dystrybucji. Analizowana sieć dystrybucji łączy w sobie cechy zarówno elastycznego jak i wąskiego łańcucha dostaw.

Słowa kluczowe: łańcuch dostaw, usługa logistyczna, zależności sieciowe, powiązania międzyorganizacyjne.

DIE NATUR UND ARTEN VON NETZWERK-BEZIEHUNGEN IN DER DISTRIBUTION VON METALLURGISCHEN PRODUKTEN

ZUSAMMENFASSUNG. Die Arbeit analysiert die Motive für eine Zusammenarbeit innerhalb des Versorgungsnetz des Unternehmens als Verteilungspunkte in der Lieferkette von metallurgischen Produkten. Die Verteilungspunkte wurden definiert und identifiziert auf der Ebene der Dienstzentren in der untersuchten Kette. Die Analyse berücksichtigte verschiedene Arten von inter-organisatorischen Bindungen, die in der Einstufungsmatrix von Netzbeziehungen angeordnet sind. Das Studium bezieht sich auf ein komplexes Vertriebssystem. Die analysierten Vertriebsnetz kombiniert das Fluss, das charakteristisch für flexiblen wie auch und engen Lieferketten ist.

Codewörter: Lieferkette, Logistikdienst, Netzwerk-Beziehungen, inter-organisatorischen Bindungen.

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