

DETERMINANTS OF THE FUNCTIONING OF METAL COMPANIES IN SUPPLY CHAINS

Ewa STANIEWSKA

Czestochowa University of Technology; ewa.staniewska@pcz.pl, ORCID: 0000-0001-8022-8555

Purpose: The purpose of this article is to identify and assess the nature of the relationships of metal companies in supply chains and the basic determinants of development of these relationships and the perception of the role of supply chain management in business practice?

Design/methodology/approach: The paper presents the results of a pilot study on the key elements of cooperation among metal companies in supply chains. The research was carried out using the author's survey questionnaire and covered companies operating in Poland. The issues studied included such elements as: the competences of companies in forming relationships, the reflection of the role and place of supply chain management in the organizational structure of the surveyed companies, the assessment of the role of the surveyed entities in the supply chain, the place of the leader or coordinator in supply chains, the level of involvement of partners, and the supply chain integration and relationship formation activities undertaken.

Findings: The results obtained allowed to identify the role and place of the surveyed companies in supply chains, as well as the key competencies and actions taken to integrate and develop supply chain cooperation.

Research limitations/implications: The article is exploratory in nature and provides the basis for further research in building effective corporate relationships in supply chains.

Practical Implications: Understanding inter-organizational relationships is a fundamental part of supply chain management, which, based on the results, remains a significant challenge for many companies.

Social implications: Shaping supply chain relationships is an important aspect of business operations that result in collaboration to create value for customers. **Originality/Value:** The research niche presented in the article concerns the application of a survey of opinions and judgments, based on an original survey questionnaire, in the group of companies from the metal industry.

Keywords: supply chain, metal industry, enterprises in the supply chain

Category of the paper: research paper.

1. Introduction

In the changing conditions of business entities, an important role is played by identifying areas and resources to increase competitiveness, among which building relationships among

business partners in the supply chain can be of particular importance. The important determinants shaping the sustainable competitive advantage of modern enterprises undoubtedly include quality of cooperation among business partners and creation of relationships with partners in integrated supply chains. The basis of such cooperation is the integration and development of relationships within the company, and then the transfer of these practices to the respective links, until the entire supply chain is fully integrated. The effects of these activities can present both opportunities for development and increased competitiveness, but also significant challenges.

The purpose of the study is to identify and assess the nature of the links and present the basic determinants of the formation of relationships of metal industry enterprises in supply chains and the role of supply chain management in business practice. Achievement of the goal of the paper required identification of the key competencies of the surveyed companies in this scope, as well as of the measures taken to integrate and develop supply chain cooperation. The research method used was an original survey questionnaire addressed to the industry enterprises conducting their business in Poland. The realization of the research objective involved the following research questions:

- What are the supply chain management competencies of the surveyed companies?
- How is the role of integration and development of relationships in the supply chain reflected in the organizational structure?
- How do companies assess their place and role in the supply chain?
- What is the level of cooperation in the supply chain of the companies?
- How do the surveyed companies assess the involvement of partners in decision-making?
- What actions are being taken for supply chain integration?

Obtaining answers to the above questions made it possible to identify the role, place, scope of integration and cooperation in the surveyed companies, as well as the factors influencing the formation of relationships. In addition, they formed the basis for the formulation of the research thesis: the cooperation of metal enterprises with economic partners can be of different nature, which affects the formation and level of relationships in supply chains.

2. Cooperation of enterprises in the supply chain

The theoretical basis of the integrated supply chain concept is M.P. Porter's value chain, in which the pursuit of value growth for customers requires taking action beyond individual companies is strictly determined by appropriate market relationships with customers and suppliers (Pisz et al., 2013).

As K. Rutkowski states, a single company cannot compete with a supply chain, in which, thanks to the extensive cooperation of its links, synergistic effects are achieved leading to an increase in potential which could not be achieved through cooperation based solely on

transactions. Companies in industries operating in global markets have replaced the concept of an internal value chain with a system of value creation created by all the links of the chain (Rutkowski, 2005)

The essence of business entities' activity is to increase value for both customers and all stakeholders. The surplus benefit of entering into partnerships within supply chains is an important determinant of the development of relationships aimed at increasing value as measured by both quantitative and qualitative indicators (Zarządzanie łańcuchem dostaw, 2007).

Supply chains can therefore be considered a network of organizations that collaborate with each other to deliver the products desired by the market, as well as the process of creating value for the customer (Tarasiewicz, 2014). An important role is therefore played by the integration of business processes across the supply chain, referred to in the literature as supply chain management (Cooper et al., 1997).

The basis of the modern interpretation of supply chain management is the tendency to integrate activities within individual organizations. It involves setting the strategic direction of the business, determining the type of activities, organizational structures, processes to integrate the operations conducted, selecting potential partners, and overseeing the activities (Schary et al., 2002). It can be defined as the comprehensive management of the entire network of partners and the relationships among them (Harrison, van Hoek, 2010).

The essence of modern supply chain management is the decision-making process involved in synchronizing the physical, informational and financial streams of demand and supply flowing among its participants in order for them to achieve competitive advantage and create added value for the benefit of all its links, customers and other stakeholders (Witkowski, 2010).

In turn, supply chain management (Bozarth, Handfield, 2007) is defined as: the active management of supply chain activities and relationships among the respective links in the chain in order to maximize customer value and achieve sustainable competitive advantage. These are conscious efforts by a company or group of companies to build and operate supply chains in the most efficient and effective way possible (c.f. Stock et al., 2010; Larson, Halldorsson 2004).

A special role in building competitiveness in the modern economy can be attributed to the formation of both internal and external relations among entities. At the same time, the increase in the importance of relationships represents one of the most significant development trends in contemporary mechanisms of value creation, competitiveness, innovation, knowledge enrichment and diffusion (Shinet al., 2019; Ralston et al., 2017; Høgevold et al., 2019; 2020).

Working closely with partners and including them in the value creation chain, which is characterized by an effective flow of information/knowledge and a willingness to bring core competencies to the relationship, provides the basis for more efficient use of resources, cost reduction, and the potential for increased flexibility and synergies for partners (Yeh et al., 2020; Louri-Okoumba, Mafini, 2021).

The basis for modern interpretation of supply chain management (Witkowski, 2010; Swierczek, 2012) is the trends of holistic orientation to flows and processes, a network concept (Blaik, 2017, 2018), integration of activities within individual organizations (Szozda et al., 2016), and the formation of relationships both within the enterprise and across the supply chain (Qu et al., 2015). Therefore, the essence of supply chains is the creation of a network of relationships among companies, which includes such issues as managing the physical flow of tangible goods, financial resources and information. A high degree of efficiency and reliability in supply chain operations requires joint planning, coordination, monitoring, but most importantly - information sharing and risk sharing. Particular importance in this context should therefore be given to understanding the determinants, dependencies and interactions among partners in supply chains.

3. Research methodology

The research was conducted in 50 Polish companies in the metal sector, covering the broad metal industry, i.e. the production and processing of steel and steel products. The detailed structure of the surveyed companies in terms of size (according to the classification of activity), type, scope of activity, ownership of capital employed and duration of existence in the market, is shown in Figure 1. The selection of the research sample was purposive (microenterprises were not included in the study).

The research method used was an original survey questionnaire, consisting of questions on the characteristics of the studied companies and the research problems addressed. The questionnaires were filled out by people in managerial positions, mainly in the field of supply chain management or other related fields, and the results obtained were analyzed quantitatively and qualitatively.

In terms of business size, well-established large and medium-sized companies played the main role in the study group. Their activities were largely international in scope. In terms of ownership of the capital involved, these were companies with Polish capital. Manufacturing companies dominated among the respondents. This is reflected in the results regarding the place and role played by the surveyed companies in supply chains (see Figure 2).

The metal companies surveyed are primarily manufacturers located as an initial or middle link in the supply chain and often also serve as downstream suppliers or suppliers of metal products to multiple industries.

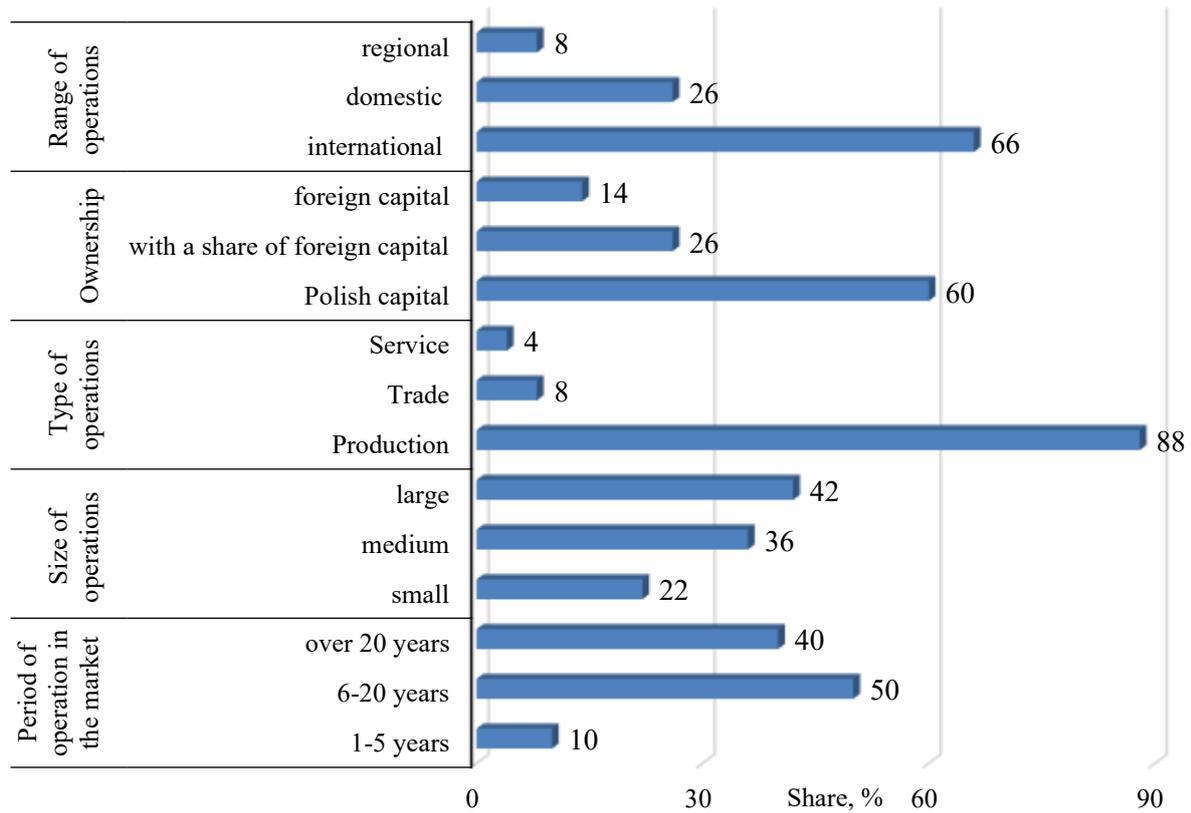


Figure 1. Characteristics of the surveyed businesses.

Source: Own study.

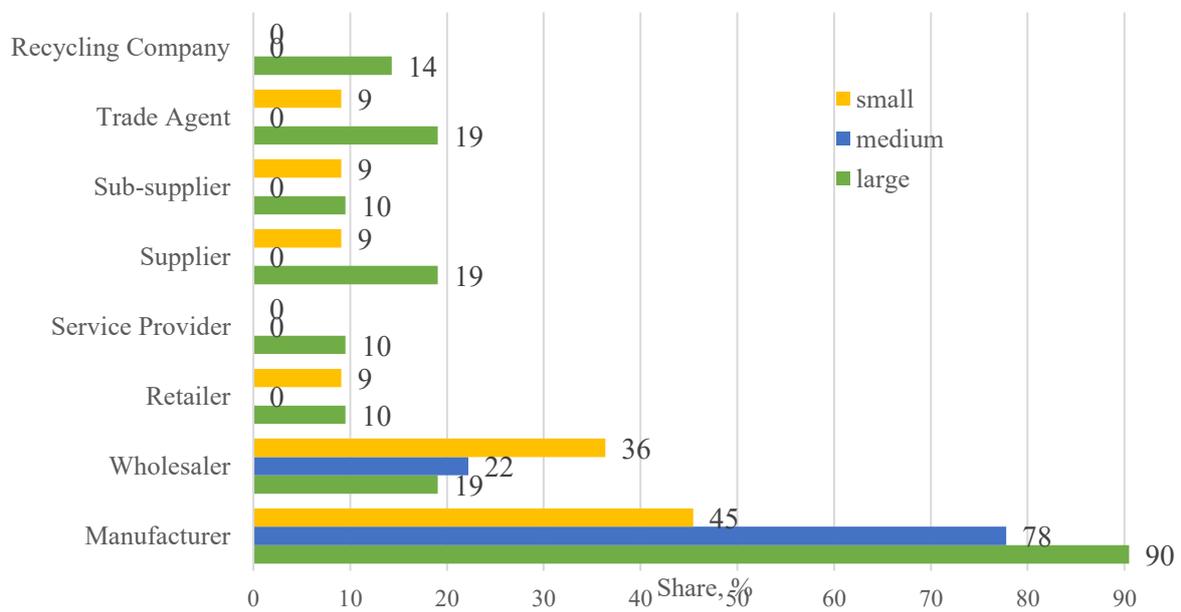


Figure 2. The role of the surveyed companies in the supply chain.

Source: Own study.

4. Research results

The surveyed companies in the metal industry cooperate with many business partners, but for the purposes of this research and outlining the scale of cooperation, a question on the number of suppliers, customers and business intermediaries, was included. The results obtained are as follows: suppliers - the average number is 94 entities: large companies - 155, medium-sized - 70, small - 54), customers - on average 568 entities (large enterprises - 1214, medium-sized - 291, small - 199), commercial intermediaries - on average 17 entities (large enterprises - 36, medium-sized - 8, small - 6). However, it is worth noting that the surveyed companies cooperate with economic partners to varying degrees. These could be links based on sales transactions, short-term/periodic agreements or long-term relationship-based cooperation. The results of the survey on relationships formed indicate that the formation of relationships mainly relates to activities within the organization (especially in small enterprises it is 91% of answers, while in medium-sized enterprises and large enterprises - more than 50% of answers). This indicates that companies are aware that the basis for broader supply chain cooperation is internal integration. Creating relationships with suppliers and customers is the domain of about half of large enterprises and about 30% of medium-sized enterprises, while small enterprises indicate relationships with customers and suppliers to a small extent. In the case of ties with commercial intermediaries, relationship formation is indicated by 18% of small, 28% of medium-sized and 24% of large enterprises.

The results of the research on the supply chain management competencies of the surveyed companies indicate the basic elements that characterize the level of supply chain integration, and these include: the existence of a supply chain management unit in the organizational structure, implementation of an integrated management system, measurement of performance, participation in purchasing and sales consortia, supply risk analysis and assessment, joint research on product development, supply chain-wide management concepts and systems, information system integration and supply chain controlling. The results obtained regarding the competencies of companies in the area of supply chain management are shown in Table 1.

The respondents' answers allow us to conclude that the integration of supply chain management activities is primarily the responsibility of the logistics department/unit. This is understandable given that the role of supply chain management is seen as the next stage in the development and integration of logistics tasks (cf. Blaik, 2017). However, the basis of this integration is the creation of partnerships with the respective links in the supply chain. Respondents' answers underscore an awareness of the important role of supplier and customer relationships regardless of the size of enterprises. Another aspect is emphasis of the important role of integration in such areas as the information and management systems, but in the case of many supply chain management competencies, in the business practice of the surveyed entities they refer to the enterprise, and the indications for the scale of the entire network are lower.

Table 1.*Competencies of supply chain management in surveyed companies*

Enterprise Competencies, %		high	medium	low
Existence in the organizational structure of the unit responsible for supply chain management	no units	10	17	45
	unit, logistics department	38	56	27
	individual persons in functional departments	43	17	27
	member of the management board	5	6	0
	supply chain management unit/department	19	11	0
Developing partnerships	with suppliers	57	61	45
	with customers	57	61	45
	distributors	19	6	9
	service providers	33	28	36
	with recovery organizations	29	22	18
Integrated management system	in the company	48	61	64
	across the supply chain	43	17	18
Measurement of the effects of operation	in the company	52	72	64
	across the supply chain	38	17	0
Participation in consortia (groups) related to	shopping	38	44	36
	sales	38	17	26
Supply analysis and risk assessment	in the company	52	50	45
	in the supply chain	38	28	9
Supply chain product research and development		33	6	18
Supply chain-wide management concepts and systems		24	39	18
Integration of the information system		57	22	27
Preparation for supply disruptions and irregularities		43	22	27
Controlling the supply chain		24	6	0

Source: own study.

Another of the issues analyzed was the dependencies that exist between partners in supply chains. The results of the indications are shown in Figure 3.

Few of the companies surveyed play a leadership role in a supply chain. A significant number of large enterprises have equity ties with customers, while small and medium-sized enterprises were more likely to have equity ties with suppliers. In contrast, more than 55% large and medium-sized enterprises indicate that they operate within a network of peers. In the case of small businesses, however, 75% carry out their activities in a dominated network.

Another aspect studied was evaluation of the level of cooperation, and the results obtained are shown in Figure 4.

Most often, respondents indicated cooperative collaboration (60% of small businesses, about 40% of large and medium-sized companies on average). A significant number of companies, regardless of size, indicated relationships involving the exchange of information for ongoing transactions. In the case of medium-sized enterprises, strategic partnerships and related long-term cooperation and information exchange in making joint decisions were indicated most often (compared to other enterprises), but this is definitely not the dominant nature of the relationships of metal companies.

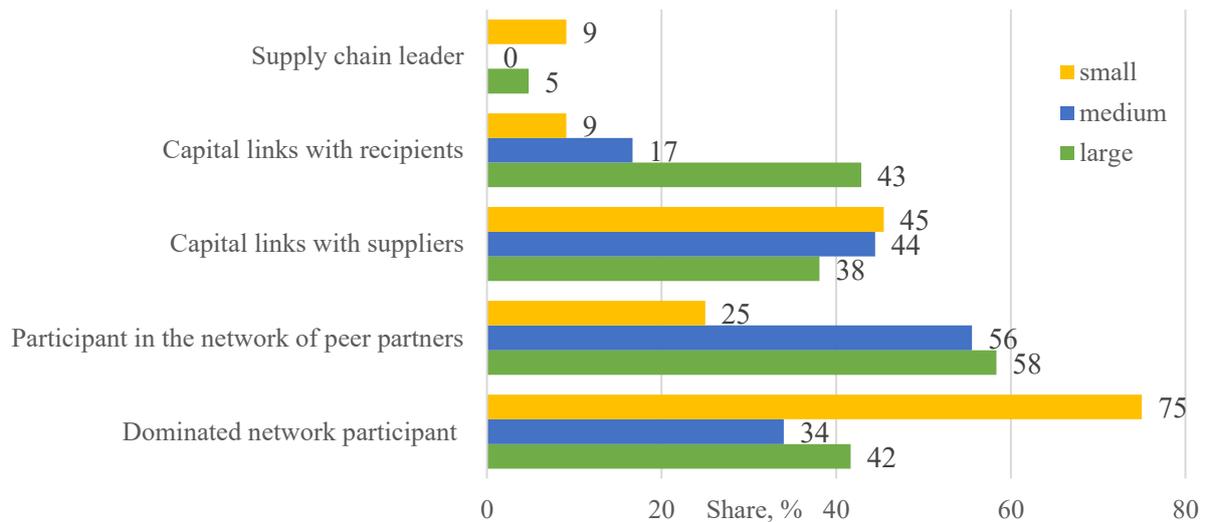


Figure 3. Network dependencies of enterprises.

Source: own study.

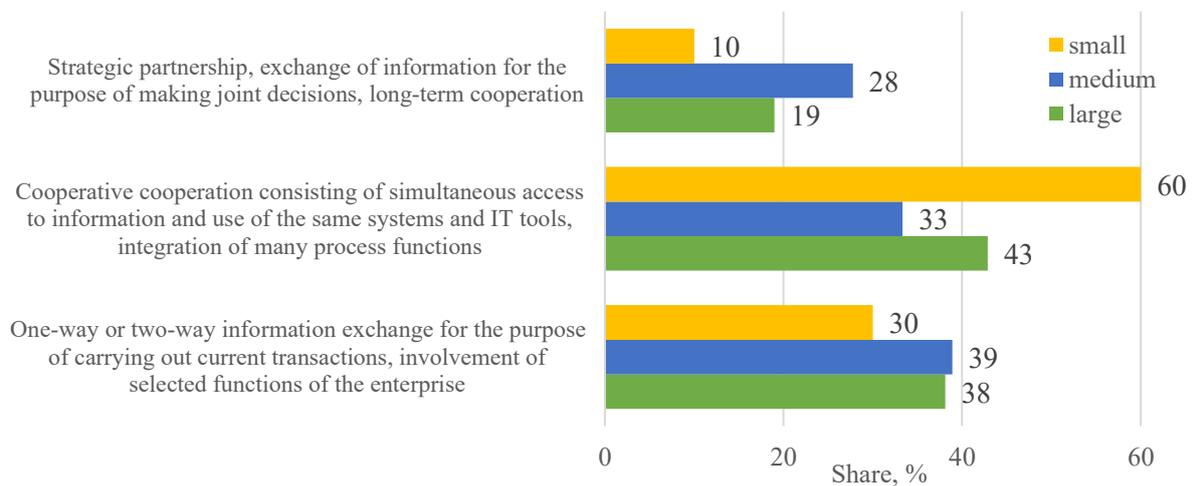


Figure 4. Assessment of the level of cooperation with economic partners

Source: Own study.

An important issue in the study of relations between business partners is communication, exchange of information and, in the case of partnerships, also participation in decision-making. Another issue was to obtain information on which contractors develop partnerships with the surveyed companies, and what is the type of agreements. The results are shown in Figure 5.

Respondents' answers on participation in the supply chain decision-making process indicate significant limitations in this regard, or even a lack of such participation (more than 60% of medium-sized enterprises). Only 14% of large companies indicate a high level of involvement in this area. It is worth pointing out, however, that a significant proportion of respondents from large and small enterprises co-participate, with customers, in the decision-making process. Links in this scope with suppliers are present in a significant proportion of medium-sized companies.

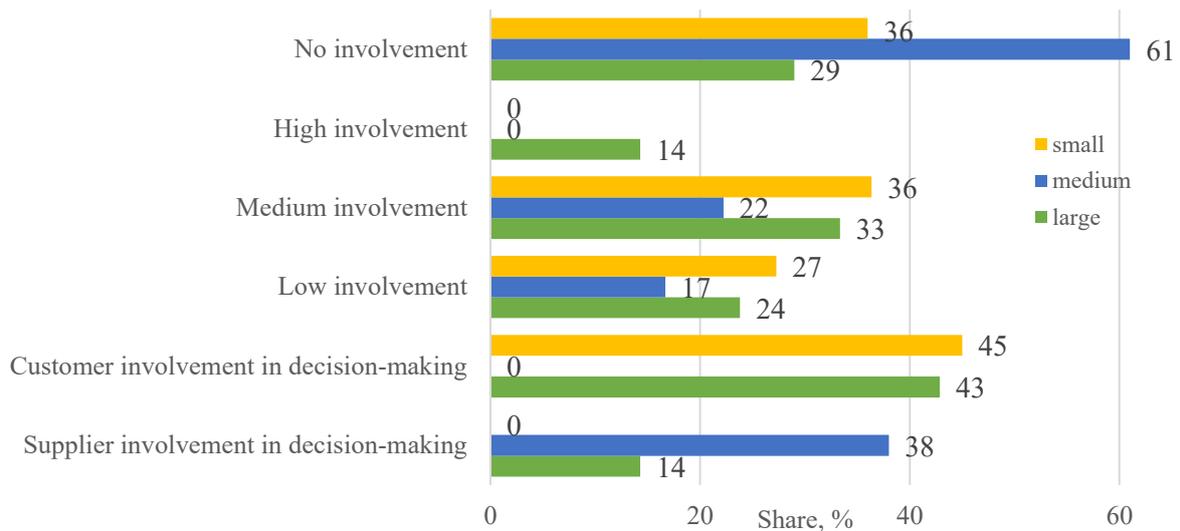


Figure 5. Participation of Partners in Decision-Making.

Source: Own study.

5. Conclusion

The modern economy is characterized by a high level of competition and an extensive network of connections and dependencies. Metal industry companies play a significant role in the economy and are an important link in many supply chains, so the quality of cooperation of economic partners and relational resources are some of the most important factors that determine competitiveness, and an important development trend. In turn, understanding the determinants of inter-organizational relationships is a fundamental element of supply chain management.

Based on the research conducted at metal industry companies, it can be concluded that creating relationships based on partnership principles is a significant challenge for many companies. Closer cooperation mainly refers to customers and suppliers, but it does not necessarily refer to strategic partnerships, which are characterized by long-term cooperation and joint decision-making. The predominant form of relationship is the exchange of information to implement current transactions and (long-term) agreements with customers, suppliers and distributors. The results obtained can form the basis for further research into the factors that constitute the main barriers and constraints to development of partnerships, which undoubtedly constitute the basis of competitiveness.

The obtained results indicate the important role of the logistics department in the integration of activities related to supply chain management. At the same time, this integration requires the creation of partnership relations between individual links of the supply chain, which are, however, conditioned by the maturity of supply chains, which is a basic element of the efficiency and effectiveness of supply chain management (cf. Cheshmberah et al., 2020). Another significant limitation is the challenges and barriers to cooperation within the supply

chain, which affect the effectiveness of supply chain management in business practice, such as, among others, information exchange, trust, lack of conviction about the possibility of cooperation on a partnership basis with contractors, limited application of modern supply chain management concepts (cf. Jain, 2020). Another important direction to be taken into account in the pursuit of supply chain maturity is the reduction of dominance in collaborative and sustainable supply chain development (cf. Sánchez-Flores, Cruz-Sotelo, Ojeda-Benitez, Ramírez-Barreto, 2020).

References

1. Blaik, P. (2017). *Logistyka. Koncepcja zintegrowanego zarządzania*. Warsaw: PWE.
2. Blaik, P. (2018). Megatrendy i ich wpływ na rozwój logistyki i zarządzania łańcuchem dostaw. *Gospodarka Materialowa i Logistyka*, 4, 2–11.
3. Bozarth, C.B., Handfield, R.B. (2007). *Wprowadzenie do zarządzania operacjami i łańcuchem dostaw*. Gliwice: Helion, 35.
4. Cheshmberah, M., Beheshtikia, S. (2020). Supply Chain Management Maturity: An All-Encompassing Literature Review on Models, *Dimensions and Approaches*, *LogForum*, 16(1), 103-116. Retrieved from: <https://doi.org/10.17270/J.LOG.2020.377>.
5. Cooper, M.C. Lambert, D.M., Pagh, J.D. (1997). Supply Chain Management: More than. A New Name of Logistics. *International Journal of Logistics Management*, 8(1), 1-14. Retrieved from: <https://doi.org/10.1108/09574099710805556>.
6. Harrison, A., van Hoek, R. (2010). *Zarządzanie logistyką*. Warsaw: PWE, p. 38.
7. Høgevoid, N.M., Svensson, G., Otero-Neira, C. (2019). Validating action and social alignment constituents of collaboration in business relationships: a sales perspective. *Marketing Intelligence & Planning*, 37(7), 721-774. Retrieved from: <https://doi.org/10.1108/MIP-12-2018-0577>.
8. Høgevoid, N., Svensson, G., Otero-Neira, C. (2020). Trust and commitment as mediators between economic and non-economic satisfaction in business relationships: a sales perspective. *Journal of Business & Industrial Marketing*, 35(11), 1685-1700. Retrieved from: 10.1108/JBIM-03-2019-0118.
9. Jain, J. (2020). *Supply Chain Management: Literature Review and Some Issues*. Academia.edu. Retrieved from: https://www.academia.edu/27435107/Supply_Chain_Management_Literature_Review_and_Some_Issues, 28.01.2025.
10. Larson, P.D., Halldorsson, A. (2004). Logistics Versus Supply Chain Management: An International Survey. *International Journal of Logistics: Research and Applications*, 7(1), 17-31. Retrieved from: <https://doi.org/10.1080/13675560310001619240>.

11. Loury-Okoumba, W.V. and Mafini, C. (2021). Supply chain management antecedents of performance in small to medium scale enterprises. *South African Journal of Economic and Management Sciences*, 24(1), 1-13. Retrieved from: <https://doi.org/10.4102/Sajems.V24i1.3661>, available at: <https://sajems.org/index.php/sajems/article/view/3661>.
12. Pisz I, Sęk T., Zielecki W. (2013). *Logistyka w przedsiębiorstwie*. Warsaw: PWE, pp. 357-358.
13. Qu, W. G., Yang, Z. Y. (2015). The effect of uncertainty avoidance and social trust on supply chain collaboration. *Journal of Business Research*, 68(5), 911–918. Retrieved from: <https://doi.org/10.1016/j.jbusres.2014.09.017>.
14. Rutkowski, K. (Ed.) (2005). *Logistyka dystrybucji. Specyfika. Tendencje rozwojowe. Dobre praktyki*. Warsaw: Oficyna Wydawnicza Szkoły Głównej Handlowej, p. 76.
15. Ralston, P.M., Glenn Richey, R., Grawe, S.J. (2017). The past and future of supply chain collaboration: a literature synthesis and call for research. *The International Journal of Logistics Management*, 28(2), 508-530.
16. Sánchez-Flores, R.B., Cruz-Sotelo, S.E., Ojeda-Benitez, S., Ramírez-Barreto, M.E. (2020). Sustainable Supply Chain Management—A Literature Review on Emerging Economies. *Sustainability*, 12(17), 6972. Retrieved from: <https://doi.org/10.3390/su12176972>.
17. Schary, P.B., Skjøtt-Larsen, T. (2002). *Zarządzanie globalnym łańcuchem podaży*. Warsaw: PWN, 217, 221.
18. Shin, N., Park, S.H. and Park, S. (2019). Partnership-based supply chain collaboration: impact on commitment, innovation, and firm performance. *Sustainability*, 11(2), 449. Retrieved from: <https://doi.org/10.1108/IJLM-09-2015-0175>.
19. Stock, J.R., Boyer, S.L., Harmon, T. (2010). Research opportunities in supply chain management. *Journal of the Academy of Marketing Science*, 38(1), 32–41. Retrieved from: <https://doi.org/10.1007/s11747-009-0136-2>.
20. Szozda, N., Świerczek, A. (2016). *Zarządzanie popytem na produkty w łańcuchu dostaw*. Warszawa: PWE.
21. Świerczek A. (2012). Próba naukowej refleksji nad koncepcją łańcucha dostaw. *Gospodarka Materialowa i Logistyka*, 3, 2–7.
22. Tarasiewicz, R. (2014). *Jak mierzyć efektywność łańcuchów dostaw?* Warszawa: Oficyna Wydawnicza Szkoły Głównej Handlowej w Warszawie, p. 13.
23. Witkowski, J. (2010). *Zarządzanie łańcuchem dostaw. Koncepcje – procedury – doświadczenia*. Warszawa: PWE.
24. Yeh, T.M., Pai, F.Y., Wu, L.C. (2020). Relationship stability and supply chain performance for SMEs: from internal, supplier, and customer integration perspectives. *Mathematics*, 8(11), 1902. Retrieved from: <https://doi.org/10.3390/math8111902>.
25. *Zarządzanie łańcuchem dostaw*. (2007). Helion: Harvard Business Review, 96.