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Role of supplier evaluation criteria in risk mitigation related to purchasing process

Maciej Urbaniak

ABSTRACT

The article aims to present the role of supplier evaluation criteria in reducing purchasing risk. Before a purchasing enterprise starts cooperating with suppliers, it set specific requirements and expectations. The fulfilment of these requirements and expectations is verified through the evaluation of suppliers. Evaluation results should indicate potential risks that may arise in the development of partnership cooperation. The article includes the results of empirical research conducted using the computer-assisted telephone interviewing (CATI) technique in medium and large manufacturing companies operating in Poland. The results of the conducted empirical research indicate that companies wishing to partner with suppliers try to limit the level of risk associated with purchases. When evaluating suppliers, manufacturers focus mainly on reducing the risk associated with the defective technical quality of products, timely deliveries, delivery flexibility, time to restore continuity of deliveries, completeness of order fulfilment and delivery documentation, as well as price competitiveness. Also, in the evaluation of suppliers, companies operating in Poland are beginning to pay attention to the reduction of negative environmental impact.

KEY WORDS

supplier evaluation, risk in purchasing processes, organisational management standards

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Corresponding author:

Maciej Urbaniak

University of Lodz, Poland
ORCID 0000-0003-4127-1192
e-mail: maciej.urbaniak@uni.lodz.pl

Introduction

Supply chain management is a fundamental concept that has evolved to enable organisations to improve their efficiency and effectiveness in the global and highly competitive environment of the twenty-first century. This concept comprises processes connected with planning, completion and evaluation related to the flow of materials, equipment, information and human resources among organisations to ensure the effective and fast delivery of tangible prod-

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ucts and services between the supplier and the customer. Building a competitive advantage in the business-to-business (B2B) market, in particular, is subject to shaping the long-term partner relationships between companies and their customers and suppliers (Padgett et al., 2020). An individualised, trust-based approach towards the establishment of contacts, interests and the possibilities of cooperation, offers the negotiation and execution of transactions with parties guaranteeing their equivalent positions, called win-win (Ogunranti et al., 2021). A positive evaluation of these activities is essential in maintaining these relationships and a sign of readiness for further cooperation partners, by which several measurable benefits can be seen by each party. The condition of their feelings is the effective communication in the form and content of communication meeting the expectations of each partner (Chen et al., 2017; Murphy & Sashi, 2018). The activities of multinational corporations, which introduced the concept of sustainable development, are heavily focused on collaboration with their partners in the supply chain. Building partnerships with customers and suppliers can bring a supply chain many important benefits, such as:

- ensuring business continuity, together with the methodology developed for identification, analysis, and risk mitigation (associated with the product and the processes implemented in the supply chain);
- increased flexibility, efficiency and effectiveness of the processes;
- effective and rapid communication between the partners.

Partnerships usually result from a kind of evolution beginning with repeated transactions based on loyalty to the source of purchase and lead to confidence related to the positive image of a particular partner. Repeated transactions often transform into long-term connections in which relations are regulated by agreements. If the parties are happy with keeping to the arrangements established in the agreements, their cooperation may transform into a close partnership (Wagner, 2011). This may produce numerous benefits for the partners, namely: improved quality of products and services, prompter execution of orders, preferential prices, improved communication between the supplier and the recipient (a quicker and more complete exchange of information) and joint research and development. The benefits enhance the positive images of the partners (Pan et al., 2020). In some cases, a partnership between the supplier and the customer may transform into a strategic alliance, which is based on joint achievement of specific long-term goals. Increasingly, manufacturing companies focus on selecting key suppliers to build long-term relationships (Holmen et al., 2013). The purpose of these relationships is to create trust based on the joint improvement of the technical quality of product solutions, the reliability of supplies, the shortening of the cycle of process implementation and the improvement of their efficiency (Bakshi & Kleindorfer, 2009). Shaping relationships with suppliers in purchasing processes can include the following steps:

- defining requirements for purchasing sources;
- identification of potential suppliers;
- qualification evaluation and supplier selection;
- negotiating terms of cooperation;
- order fulfilment (including order transfer, delivery monitoring and documentation);
- evaluation of cooperation, which includes the periodic assessment of suppliers (points or indicators), as well as self-assessment of suppliers and their verification through audits;
- assessment of the impact of cooperation with the supplier on improving the efficiency of processes in the supply chain (Nagel et al., 2021).

To reduce the potential risk related to both products (a technical quality that does not meet legal requirements or the expectations of buyers/users), as well as disruptions related to timely and complete deliveries, the buyer companies evaluate suppliers (Kaur & Singh, 2021). To prevent potential risks related to technical problems with the product and its physical flow in the logistics processes, many purchasing companies endeavour to help their suppliers. This assistance is realised by setting supplier goals for the continuous improvement of products and processes, the assessment of the degree of their implementation, the evaluation of cooperation and supplier development programmes. The goals achieved by suppliers are verified by Supplier Self-Assessment Questionnaires, Performance Feedback Reports Cards and audits (Kai et al., 2010). Enterprises that are clients offer their partners supplier development programmes that focus on joint project implementation. Many large international concerns educate their potential and current suppliers by publishing Supplier Guidebooks or Supplier Manuals. The purpose of these guidelines is to help suppliers prepare for initial and periodic audits. The theoretical part of the article presents the evaluation of suppliers as a tool to reduce risk in purchasing processes. In this part of the article, the important role of the requirements for suppliers and the criteria for their initial and periodic assess-

ment is indicated. These requirements focus both on assuring the technical quality of the product, improving the operational efficiency of processes (ensuring timeliness, flexibility and continuity of deliveries), as well as reducing the negative impact on the environment. It was indicated that Performance Feedback Reports and audits are important tools for evaluating suppliers. The empirical part presents the results of surveys conducted in enterprises from three industrial sectors. The research results were discussed and interpreted, also referring to research results by other authors. The conclusions indicate that the requirements for companies that are purchasing sources are constantly evolving. To meet them, OEMs are increasingly offering supplier development programmes to their partners.

1. Literature review

1.1. Role of supplier evaluation in reducing risk in a supply chain

As previously mentioned, companies conduct multi-criteria evaluations to reduce the risk associated with supplier cooperation (Hawkins et al., 2020). This evaluation is particularly important for building long-term cooperation with suppliers. This assessment is frequently undertaken by periodic measures. The result of this assessment is recorded on the supplier scorecard (Helmi et al., 2016). The main evaluation criteria usually focus on the three most important parameters, which are Quality, Cost, and Delivery (QCD) (Torabi et al., 2015). Increasingly, supplier evaluation is not limited to three key parameters. During the evaluation, buyers often use a multi-criteria set of measures to determine the efficiency of suppliers (Aksoy & Ozturk, 2011). The result of this assessment allows for the qualification that determines the status of suppliers. Most often, because of assessment and qualification, companies divide suppliers into:

- preferred suppliers, characterised by a stable financial position and a leading position in the field of technical solutions, quality and timely deliveries as well as price competitiveness;
- active suppliers (with the prospect of becoming preferred suppliers);
- restricted suppliers on hold, having problems with maintaining technical quality and timely deliveries, with which the volume of purchase transactions is gradually reduced and not included in new projects;
- disqualified suppliers that do not meet the minimum requirements (Ulaga & Eggert, 2006).

Particular importance is attached to the evaluation of suppliers of basic products (main raw materials, parts, assemblies), as well as services (e.g., logistics, such as transport or storage). The frequency of the evaluation depends on the intensity of the purchasing processes. Many companies that relatively frequently place orders conduct monthly or quarterly evaluations of their partners. Other entities make such an assessment every six months or at least once a year (Timothy et al., 2020). In the case of purchasing infrastructure elements (machines, devices, vehicles, office equipment) where individual purchases may be made in cyclical periods, sometimes longer than a year, the given delivery is assessed. The same is applied to the assessment of Maintenance, Repair and Operations (MRO) suppliers. On the other hand, the evaluation of such suppliers mainly concerns the response to complaints, fulfilment of warranty obligations and the provision of service (assembly, installation, maintenance, training and response to technical problems related to operation). The evaluation of suppliers is of particular importance for enterprises that have implemented quality management systems for compliance with the requirements of the ISO 9001 standard (Su et al., 2020). The guidance in this standard indicates that purchasing organisations should determine and apply criteria for the evaluation, selection, monitoring of performance, and re-evaluation of external providers, based on their ability to provide processes or products and services in accordance with requirements. These organisations must provide updates and inform current suppliers of their requirements and expectations as well as control and monitor the performance of external providers (ISO 9001, 2015, 13–14). The latest amendment to this standard focuses on the continuous improvement of the organisation and the concept of risk management (Castillo-Martinez et al., 2021). For this reason, purchasing companies require suppliers to perform a risk analysis of products and related processes (Mokhtar et al., 2019). It should be noted that in some sectors, the requirements placed on suppliers in the field of quality management do not only concern compliance with the guidelines contained in the ISO 9001 standard. They are also extended by additional requirements contained in relevant documents (specifications, standards), such as the automotive sector (IATF 16949, VDA series 6), the aviation sector (AS/EN /JISQ 9100), the rail industry sector (IRIS), the medical device sector (ISO 13485), the primary packaging materials of medicinal products

sector (ISO 15378), the cosmetics production sector (ISO 22716), the packaging industry for food products sector (EN 15593), and the sector of fusion welding of metallic materials (ISO 3834). These sector standards focus on ensuring product and process safety through requirements for conducting risk analysis and identifying mitigation options. Business entities notice that the risk of threats comes not only from internal sources at the suppliers (such as the level of personnel qualifications, the condition of infrastructure and technologies that do not ensure the expected quality, timeliness and continuity of deliveries) but also from external sources (Kaur & Singh, 2021). The sources of risk of external threats resulting from the changing environment (legal, political, social, technological) as well as acts of God (such as floods, hurricanes, earthquakes) are particularly critical for partners operating in supply chains. Therefore, companies are increasingly looking for an effective methodology, the implementation of which would allow them to reduce the level of risk of threats in supply chains (Bakshi & Kleindorfer, 2009). For the efficient and effective functioning of processes in supply chains, such threats as technical failures, emergency situations, or accidents are important as they may disrupt the timely execution of orders as well as result in the loss of commercial or financial credibility of the suppliers. Examples of risks that may cause disruptions in the functioning of supply chains include:

- delivery of defective materials/infrastructure by suppliers, necessitating repairs and replacements delays and increased costs;
- untimely deliveries of materials/infrastructure;
- bankruptcy of subcontractors,
- shortage of employees with the required qualifications;
- accidents/breakdowns caused by difficult working conditions or non-compliance with health and safety rules.

1.2. Supplier evaluation criteria

Technical quality is a crucial criterion of supplier evaluation. It is most often measured by the level of defective deliveries, i.e., the percentage ratio of the number of defective products delivered to the total number of products delivered. In the case of mass products, it is measured using the Defective Parts Per Million (PPM) index (Lixandru, 2016). In the sectors (e.g., automotive or electronic), the permissible value of the PPM index is defined (Bebr et al., 2017). If the permissible value of the index is exceeded, the supplier may be eliminated from further cooperation (Pernot & Roodhooft, 2014; Jum'a, 2020). The assessment of technical quality may also include the assessment of the product's ability to perform functional functions, reliability, innovative solutions, safety, operation and the versatility of applications or ergonomics. This assessment is conducted during the operation of the product. The result of this assessment is used to decide on the further procurement of infrastructure elements (such as devices, means of transport, construction elements). On the other hand, price conditions are often assessed not only in relation to the purchase costs but also to other accompanying costs. These costs are incurred by buyers during the transaction (e.g., delivery, insurance), the costs related to the operation, as well as the costs related to nonconformities (e.g., the need to file a complaint and losses incurred related to the fact that the purchased merchandise cannot be used) or the cost of decommissioning. When analysing this criterion in the evaluation of a supplier, customers often consider the comparison of prices offered by the provider with those offered by the competition. It can also be seen that many companies are sometimes willing to accept higher prices, provided they are justified by the supplier (e.g., increases in the price of raw materials, energy, currencies, taxes, duties, or other state-regulated charges). A particularly important criterion for evaluating suppliers in the case of companies operating in accordance with the concept of just in time is timeliness and completeness of deliveries (Akso & Ozturk, 2011). A closely related criterion is also the supplier's flexibility with regard to the possibility of changing the order in terms of time, quantity, sequencing or the type of product purchased (Gligor, 2020). Increasingly, an important criterion for evaluating suppliers is their ability to quickly restore the continuity of processes and supplies (Shishodia et al., 2019). Such situations may take place in the case of events such as power failures, traffic accidents, fire/explosion during the production or storage process, epidemics/pandemics, sabotage, theft of goods, means of transport, documents, terrorism, or failure to meet contract terms by subcontractors. For this reason, Original Equipment Manufacturers (OEMs) increasingly require Disaster Recovery & Business Continuity Plans from suppliers of all tiers to reduce the risk of delayed deliveries (Kaur & Singh, 2021). These activities should prepare partners for the disruption that may occur by focusing on risk reduction and ensuring a resilient supply chain (Mensah & Merkuryev, 2014). For many buyer companies, important criteria for

assessing the efficiency of suppliers are their response time to complaints or technical problems related to the use (raw materials, parts or infrastructure elements). Furthermore, many companies, especially international corporations, by promoting the concept of sustainability, wanting to further reduce the risk associated with suppliers, pay attention to such aspects as pro-ecological activities or contractor's ethics (Govindan et al., 2015; Guarnieria &Trojan, 2019; Kartika et al., 2020). Environmental management systems for compliance with the requirements of the ISO 14001 standard, as well as health and safety management systems based on the guidelines of the ISO 45001 standard, are also increasingly important in the evaluation of suppliers (Yan et al., 2017). Requirements for suppliers in terms of pro-ecological activities can be noticed in the case of companies that have implemented the concept of environmental management. These companies expect suppliers to reduce/withdraw hazardous substances used in production, as well as to reduce the consumption of raw materials, energy, and production and packaging waste.

The emphasis on the implementation of the requirements relating to environmental management is linked to compliance with legal provisions, especially in the Directives and Regulations of the European Union, such as:

- RoHS (Restriction of Hazardous Substances) Directive EU 2015/863;
- WEEE (Waste Electrical and Electronic Equipment) Directive 2012/19/UE;
- VOC (Volatile Organic Compounds) Directive 2004/42/EC;
- EuP (Eco-design for Energy using Products) Directive 2009/125/EC;
- Battery and Accumulator Directive 2013/56/EU;
- Packaging Directive 2018/852EU;
- REACH (Registration Evaluation Authorisation and Restriction of Chemicals) Regulation 1907/2006/EC and 2020/878 EC.

The requirements contained in these directives are also often applied by companies from outside the European Union, especially large international companies producing high-tech products (mainly from the United States and Japan), such as Dell, HP, IBM, Motorola, Fujitsu, NEC, Panasonic, Sony, or Toshiba. An important element in the assessment of supplier-implemented environmental management system is to identify the environmental aspects and introduce actions included in the objectives and environmental programmes, which include specific tasks and measures of supplier assessment (Ferrón-Vílchez, 2016). Many companies expect suppliers to include a Material Safety Data Sheet (MSDS) with their product, especially chemical products (Winter & Lasch, 2016). The main purpose of MSDS is to provide information regarding potential hazards resulting from contact with hazardous substances or preparations, methods of minimising the risk, as well as how to proceed in the event of a hazardous situation that threatens the life or health of workers and the natural environment.

1.3. Supplier evaluation through performance feedback reports and audits

Many companies (especially international concerns) wanting to discipline providers directly (e.g., in the case of problems with technical quality, timely execution of orders) or wanting to assess the periodic development of their partners' potential require them to fill in Performance Feedback Reports and conduct supplier audits (Pun & Heese, 2014). Performance Feedback Reports are used for the self-assessment of suppliers in terms of their requirements related to the guidelines contained in international management standards (published by ISO or sector organisations, as well as specific measurable goals in terms of improving the efficiency and effectiveness indicators of processes. The information contained in these reports allows companies to evaluate the ability of suppliers to ensure and improve the level of technical quality, shorten the time cycles of processes, as well as possibility of reducing costs. It can also be often observed that international concerns focus on implementing the concept of sustainable development from their partners for reporting on the implementation of environmental goals. These goals are related to the consumption of resources (materials, energy sources, water), reducing environmental burdens resulting from the process, e.g., emission, sewage, waste (Demir et al., 2018). To an increasing extent, suppliers are required to implement the concept of Life-Cycle Assessment (LCA, based on ISO 14040 series of standards) and eco-design approach (Jenssen & de Boer, 2019). Many international companies also oblige suppliers to implement a code of conduct that focuses on ethical behaviour guidelines (Asif et al., 2019). Therefore, supplier self-assessment reports also include such activities as ensuring safe working conditions, the freedom of association for employees, fulfilling obligations towards employees (social, wage, working hours, health and safety) and anti-discrimination practices. The accuracy and reliability of the data contained in these reports are verified through

audits of suppliers (Li et al., 2016; Afshan, 2013). During supplier audits, operational processes, such as customer service, research and development, production preparation, quality control of processes and products, packaging, storage and shipment of products are assessed. Particular attention is paid to the documents used (procedures and instructions), records of processes (especially quality control), product identification, workplace safety, and environmental management. Audit results are an important source of information for both partners. For the supplier, the audit result shows to what extent the customer's requirements and expectations have been met and what activities require risk analysis and continuous improvement (Sarkar & Mohapatra, 2006). For the client, the collected observations constitute important information for the analysis of the risk and the opportunities of continuing cooperation with the partner. Increasingly, in order to assess the credibility of contractors and to start and continue cooperation, large international concerns commission a legal and economic analysis of partners in supply chains. This type of detailed supplier analysis is referred to as Supply Chain Due Diligence. This investigation may include the legal status, ownership interest, legal title to tangible and intangible goods, fulfilment of obligations towards stakeholders, financial assets, debt, profitability, financial liquidity, shares in other enterprises, type and scope of insurance and financial guarantees. The result of this investigation may determine the stability and durability of these relations in the future. The analysis of the Performance Feedback Reports and report audits also allows an effective evaluation of the activities conducted by suppliers related to the implementation of environmental programmes and the achievement of the goals focused on reducing the negative impact on the environment. During the audits, the following are assessed: the state of the infrastructure and the working environment to ensure the safety of processes and products, employee behaviour observed during process activities, the staff's environmental awareness, the emergency preparedness response, waste treatment, monitoring measuring equipment and control of operational processes. For a supplier, the audit result indicates the extent to which the requirements and customer expectations in terms of reducing the onerous impact on the environment have been fulfilled and what areas need improvement and continuous improvement (van den Brink et al., 2019).

2. Research methods

The subject of the conducted research was to define the importance of supplier evaluation criteria as indicators in the opinion of the surveyed production companies. The research was conducted between October and November 2019 using the Computer Assisted Telephone Interview (CATI) technique. The research involved 150 producers (employing over 49 people) who were enterprises from the automotive, electromechanical and chemical sectors operating in the Polish business-to-business (B2B) market. All companies participating in the study had an implemented quality management system compliant with the guidelines of the ISO 9001 standard. Almost half of the surveyed economic entities (47.33%) were enterprises with foreign capital (including large international concerns with global activity). The expectations of production companies towards their suppliers regarding the implementation of the sustainability concept were assigned a rank on a scale from one (being the least important criterion) to five (the most significant). The study was commissioned by a specialised research agency that conducted a targeted selection of companies registered in the Bisnode database, which is a business directory search platform.

3. Research results

The results of the conducted research indicate that in the opinion of the surveyed production companies, the most important criteria for evaluating suppliers as indicators of risk mitigation related to purchasing process include: the level of non-compliance related to the technical quality of the delivered products (defectiveness), timely deliveries, delivery flexibility, time to restore continuity of deliveries, completeness of order fulfilment and delivery documentation, and price competitiveness. Relatively important evaluation criteria also include the accuracy of forecasts for the implementation of orders agreed with the supplier, response time to complaints, the correctness of delivery documentation (no errors), response time to problems related to the use of products in the processes implemented by the purchasing companies. Detailed results of the research are presented in Tables 1 and 2.

Tab. 1. Importance of supplier evaluation criteria as determinants of risk mitigation related to purchasing process in the opinion of the surveyed production companies (general results and a comparison between the segments depending on capital and the number of employees, average)

Evaluation criteria	General N=150	Capital		Number of employees	
		Polish N=79	Foreign N-=71	50-250 N=65	251- N=85
The level of non-compliance related to the technical quality of the delivered products (defect in deliveries indicator)	4.82	4.87	4.76	4.84	4.80
Timely deliveries	4.78	4.80	4.75	4.77	4.79
Flexible deliveries	4.72	4.71	4.74	4.73	4.71
Time to restore continuity of supplies	4.66	4.61	4.71	4.65	4.67
Completeness of order fulfilment and delivery documentation	4.63	4.66	4.59	4.64	4.62
Price competitiveness	4.61	4.63	4.59	4.62	4.60
Response time to complaints	4.42	4.43	4.41	4.46	4.39
Reduction/phasing out of hazardous substances used in production	4.32	4.17	4.47	4.13	4.47
Response time to technical problems related to the use of products	4.31	4.24	4.37	4.27	4.33
Limiting the consumption of raw materials, energy and waste	4.20	4.22	4.18	4.08	4.30
Reducing the emission of pollutants into the environment	4.20	4.23	4.18	4.08	4.31

Source: elaborated by the author, results of the empirical study, 2019.

Tab. 2. Importance of supplier evaluation criteria as determinants of risk mitigation related to purchasing process in the opinion of the surveyed production companies (general results and a comparison between the segments depending on sector, average)

Evaluation criteria	Sector		
	Automotive N=63	Electromechanical N=36	Chemical N=51
The level of non-compliance related to the technical quality of the delivered products (defect in deliveries indicator)	4.81	4.80	4.84
Timely deliveries	4.84	4.69	4.76
Flexible deliveries	4.82	4.66	4.65
Time to restore continuity of supplies	4.75	4.53	4.63
Completeness of order fulfilment and delivery documentation	4.62	4.57	4.67
Price competitiveness	4.60	4.62	4.63
Response time to complaints	4.44	4.44	4.38
Reduction/phasing out of hazardous substances used in production	4.42	4.35	4.16
Response time to technical problems related to the use of products	4.30	4.38	4.25
Limiting the consumption of raw materials, energy and waste	4.06	4.37	4.27
Reducing the emission of pollutants into the environment	4.13	4.35	4.21

Source: elaborated by the author, results of the empirical study, 2019.

It is noteworthy that increasingly more companies use supplier evaluation criteria related to reducing the negative impact on the environment. These criteria include reducing/withdrawing hazardous substances used in production, limiting the consumption of raw materials/energy/waste, or reducing the emission of pollutant gases into the environment (which are converted into the so-called carbon dioxide footprint). Detailed analyses of the results of the conducted research were formed by making a comparison between the segments (of the surveyed companies) depending on the capital (Polish and foreign), the number of employees (medium and large side enterprises), and the sector (automotive, electromechanical, chemical).

4. Discussion of the results

The level of non-compliance related to the technical quality of the delivered products (defect in deliveries indicator) as a supplier evaluation criterion is essential for enterprises with Polish capital only. In turn, the timeliness of deliveries is significantly important for entities with domestic capital, mainly of the automotive sector. On the other hand, the flexibility of deliveries, as well as the time to restore the continuity of supplies, play a crucial role in the case of manufacturers with foreign capital operating in the automotive sector. Completeness of order fulfilment and delivery documentation as an evaluation criterion is of great importance for medium-sized companies (employing 50–250 employees) with domestic capital, mainly active in the chemical sector. In turn, the response time to the complaint is also particularly important for medium-sized companies operating in the automotive and electromechanical sectors. The limitation/withdrawal of hazardous substances used in production is particularly important for large manufacturers with foreign capital employing over 250 employees, operating mainly in the automotive sector. On the other hand, the response time to technical problems related to the application of products is also crucial for manufacturers with foreign capital employing more than 250 employees operating but active in the electromechanical sector. Evaluation criteria related to environmental management are of particular importance for large economic entities operating in the electromechanical and chemical sectors. These criteria oblige suppliers to limit the consumption of raw materials, energy and waste as well as to reduce the emission of pollutants into the environment.

Summarising the results of the conducted research, one should notice a relatively high level of awareness of Polish industrial enterprises about ensuring the continuity of processes in the supply chain. To ensure this business continuity, companies analyse the risk of threats in their processes and also ask suppliers to ensure the technical quality of products, timeliness/flexibility/completeness of deliveries, as well as environmental protection. The results of the research show that the greatest importance is to ensure technical quality, as it constitutes the most significant risk of threats to product users. Therefore, it is the most important criterion for evaluating suppliers. The results of the research also indicate that vital criteria for supplier evaluation concern critical requirements for delivery, such as timeliness, flexibility, and completeness. In the case of the risk of events related to disruptions in the execution of orders, the time of restoring continuity of supplies is essential. In the case of non-compliance related to technical quality, the response time to complaints or response time to technical problems related to the use of products is also important. It should also be noted that Polish industrial enterprises perceive the risk related to environmental pollution. Therefore, supplier evaluation criteria related to environmental protection include the reduction/phasing out of hazardous substances used in production, limiting the consumption of raw materials, energy and waste or reducing the emission of pollutants into the environment.

To compare the criteria indicated by respondents within groups differentiated by capital, the number of employees and the represented sector, non-parametric Kruskal-Wallis tests were performed. With regard to the grouping variable, which was the origin of the capital of the surveyed enterprises (Polish and foreign), statistically significant differences were determined, which related to three criteria: timely deliveries ($p^{**}<0.05$), completeness of order fulfilment and delivery documentation ($p^{**}<0.05$), price competitiveness ($p^{**}<0.05$). Enterprises with Polish capital indicated these criteria more often in relation to economic entities with foreign capital. Companies with Polish capital probably order more deliveries less frequently after expecting more competitive prices from suppliers. It should be noted that the results of the Kruskal-Wallis test concerning the selection of criteria by enterprises differentiated by size did not confirm a statistically significant difference in relation to all analysed criteria. The results of the Kruskal-Wallis test on the selection of criteria by companies differentiated by industry showed that for two criteria: reduction

phasing out of hazardous substances used in the product ($p^{**}<0.05$), and response time to technical problems related to the use of the product ($p^{**}<0.05$) confirmed statistically significant differences in the selection of these criteria for supplier evaluation. The criterion reduction phasing out of hazardous substances used in production was indicated more often by companies in the automotive sector (the sum of rand 82.98) than by producers in the chemical sector (the sum of rand 73.38), and least frequently by economic entities from the electromechanical sector (the sum of rand 64.42).

Therefore, companies operating in the automotive sector find important the response time to technical problems related to the use of product and compliance with legal requirements (EU directives) in the field of limiting the negative impact on the environment. The results of the Kruskal-Wallis test did not confirm statistically significant differences in the assessment of the analysed supplier criteria within the groups of respondents differentiated by capital, employees, and sector.

The research results on supplier evaluation criteria presented in the article are closely related to the current trends in scientific exploration focusing on mitigation risk in supply chains (Hawkins et al., 2020). The results of studies conducted by other researchers clearly indicate that the initial assessment through the use of self-assessment questionnaires and conducting supplier audits significantly reduces the risk associated with the purchasing process (Foerstl et al., 2010). Other researchers, on the basis of the results of their studies, indicate the main criteria for evaluating suppliers, which may disrupt the relationship between buyers and their suppliers. These are the technical quality of products, timely deliveries and price competitiveness (Alikani et al., 2019; Hosseini et al., 2019; Taherdoost & Brard, 2019). These criteria are the technical quality of products, timely deliveries and price competitiveness (Alikani et al., 2019; Hosseini et al., 2019; Taherdoost & Brard, 2019). It should also be noted that in recent years, more and more researchers, as a criterion for evaluating suppliers as a criterion of mitigation risk in supply chains, also indicate activities limiting the negative impact on the environment (Lahane & Kant, 2021; Esmaeili-Najafabadi, 2021). Therefore, it can be concluded that the results of empirical research carried out in manufacturing companies operating on the Polish market presented in the article are consistent with the current perceived global trends.

Conclusions

The considerations conducted on the basis of the literature analysis and the results of empirical research indicate that purchasing companies limit the risk associated with purchases by conducting supplier evaluations. The results of the conducted research indicate that the evaluation criteria focus mainly on the assessment of technical quality, as well as on the timeliness and flexibility of deliveries (the possibility of changes in orders). Increasingly important for evaluation is also the preparation of suppliers to restore supply continuity in crisis situations when the timeliness of order fulfilment may be threatened. An efficient response of suppliers is also important, especially in the event of complaints or problems related to the use of purchased products. Besides, increasingly more often, the evaluation also concerns the activities of suppliers related to reducing the negative impact on the environment (the elimination of hazardous substances, savings in the consumption of raw materials, energy, as well as the reduction of gas emissions to the atmosphere). The evaluation criteria are communicated to suppliers in the form of requirements. The fulfilment of these requirements is verified through self-assessment reports, audits and periodic assessment of the experience of cooperation with suppliers. For many companies, relationships with suppliers are not limited only to setting stringent requirements and continuous monitoring of their fulfilment. Increasingly, business entities notice that actions aimed at reducing risk in supply chains lead to building partnership ties with contractors. Partnership relationships are effectively formed in joint projects in the implementation of both product and organisational innovations. Innovations contribute to the improvement of effectiveness (by shortening the cycles of the execution time of activities) and the efficiency of processes (reducing costs). To increase the synergy of collaborative projects, an increasing number of OEMs are offering supplier development programmes (Glavee-Geo, 2019). These programmes are based on training, consultations and joint projects in the field of implementing both product innovations (improvement of technical parameters of products) and organisational innovations (Nasr & Jaber, 2019). These programmes contribute to reducing the risk of delayed and defective deliveries, improving work safety, reducing the negative impact on the natural environment as well as increasing the efficiency of processes by reduc-

ing costs (Zachary et al., 2019). Supplier development programmes are based on the win-win principle, which influences the formation of trust between partners.

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