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Expectations of manufacturing companies towards suppliers in terms of implementing improvement activities

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Abstract

Purpose – This article aims to map the expectations of manufacturing companies towards suppliers in terms of implementing improvement activities. The article poses two research questions: RQ1: What kind of improvement of activities do the surveyed producers expect from their suppliers? RQ2: Do factors such as size, capital or implemented systems influence different assessments of the analyzed requirements toward suppliers?
Design/methodology/approach – The Computer Assisted Telephone Interview (CATI) technique was used to collect data. The sample consists of 150 producers (employing over 50 people) who were suppliers for enterprises from the automotive, electromechanical and chemical sectors operating in the Polish business-to-business (B2B) market. We analyzed 11 improvement activities, while their correlation structure was examined by exploratory factor analysis.
Findings – We have identified three latent factors – risk reduction, product innovation and increasing efficiency – which summarize the main expectations of manufacturing companies towards suppliers. Expectations for these factors are independent of the implemented management system, although the analysis showed higher expectations for product innovation in organizations with the implementation of Kaizen.
Originality/value – The article fills the research gap in the literature. The research results presented in the literature so far have focused on the expectations of enterprises towards suppliers in terms of meeting the criteria for their initial and periodic assessment. The research gap in the article is the result of empirical research presenting the expectations of manufacturers towards suppliers in terms of improving their processes. Based on the findings of the presented study, development trends and implications for managers responsible for purchasing processes and relationships with suppliers can be determined.

Keywords Supply chain, Manufacturing, Improvement, Supplier
Paper type Research paper

1. Introduction

Organizations are concerned about the quality of their products, customer satisfaction, continuous improvement and manufacturing costs (Mittal, *et al.*, 2023). Therefore, it can be

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observed that companies that are buyers expect their suppliers to take improvement actions. Such expectations are usually formulated by large international concerns being Original Equipment Manufacturers (OEMs), which have implemented improvement tools (such as international quality and environmental management systems, Kaizen or Lean Management concepts). The implementation of these tools is conditioned by the OEMs' desire to continuously improve processes in supply chains and implement the concept of sustainability (Fritz, 2022; Kuwornu, Khaipetch, Gunawan, Bannor, & Ho, 2023; Yu, Xu, Huo, Zhang, & Cao, 2023). This article focuses on identifying the improvement actions expected by customer companies towards suppliers. This problem can be considered as a research gap because, in the literature, most studies focus on customer requirements interpreted as criteria for the initial and periodic evaluation of suppliers (Chang, Pai, Lo, & Hu, 2021; Liou, Chang, Lo, & Hsu, 2021). Initial evaluation focuses on supplier selection and qualification (Liu, Liu, Chu, Zheng, & Chu, 2022; Joy, Annesh, & Shreekumar, 2023). This evaluation is based on the analysis of offers, self-assessment questionnaires, trial purchases and audits at suppliers. In turn, periodic evaluation focuses on meeting the requirements by suppliers in the field of mutual cooperation related to the purchasing and after-sales service processes, as well as building relationships between partners in supply chains (Hawkins, Gravier, & Muir, 2020; Hernandez-Martinez, Mutlu, & Fransoo, 2021). This evaluation is based on a scoring analysis, self-assessment questionnaires and supplier audits in case of delivery problems. The scoring analysis increasingly includes a multi-criteria evaluation of suppliers (Franco, Benitez, de Sousa, Neto, & Frank, 2022; Zakeri, Chatterjee, Cheikhrouhou, & Konstantas, 2022). In recent years, more and more companies (especially multinationals) have also used criteria based on the concept of sustainability to assess this (Chang *et al.*, 2021; Coskun, Kumru, & Kan, 2022). However, it can be observed and indicated that these studies do not focus on the expectations of customer enterprises towards suppliers in terms of their development. The expectations of buyers towards their suppliers are mostly based on the requirements of international management standards published by ISO and on the assumptions of the Kaizen or Lean Management concepts. Fulfilling these expectations by suppliers allows us to improve operational processes, reduce risk in supply chains and reduce the negative impact on the environment (Urbaniak, Zimon, & Madzík, 2023a). These expectations are communicated in the form of guidelines such as supplier guidelines, supplier handbooks, supplier manuals as well as in the form of supplier self-assessment questionnaires. However, there is a lack of research that addresses the issue of expectations of manufacturing enterprises towards suppliers regarding the improvement of their operational activities. Moreover, manufacturers' expectations of suppliers may be influenced by aspects such as company size, capital or implemented management systems. The need for research in this area is indicated in the works by, among others, Urbaniak, Tundys, and Ankiel (2021) and Urbaniak, Zimon, and Madzík (2023b). Considering the above, the article aims to map the expectations of manufacturing companies towards suppliers in terms of implementing improvement activities. To address the research gaps, the key research questions were identified and are given here in this section:

RQ1. What kind of improvement of activities do the surveyed producers expect from their suppliers?

RQ2. Do factors such as size, capital or implemented systems influence different assessments of the analyzed requirements toward suppliers?

The remainder of the sections are as follows. The second section provides an overview of the literature and theoretical developments. Then, we present the methodological approach used for this study. This section also described the descriptive analysis and data analysis. The fourth section discusses the findings, and then in the fifth section, conclusions are advanced.

2. Literature review and research gap

Manufacturing companies are moving towards downsizing and outsourcing. They have to depend more on the suppliers so that quality products/services can be delivered in a timely and cost-effective manner. They are also expecting enhanced performance from their suppliers in multi-dimensions like quality, reliability, flexibility, innovation, green capability, etc., to achieve a competitive advantage (Routroy & Pradhan, 2013). Buying enterprises, in addition to the requirements that are the criteria for the initial and periodic assessment of suppliers, increasingly expect them to take actions focusing on continuous improvement of products and processes (Lookman, Pujawan, & Nadlifatin, 2023). These expectations are often based on the requirements of quality and environmental management standards and other continuous improvement concepts, such as Kaizen or Lean Management. Quality management systems take into account the assumptions of the risk management concept in the context of building relationships with suppliers. These systems should ensure effective supervision over technical quality to guarantee the purchased products' safety (Sumaedi & Yarmen, 2015). For these reasons, buyers' expectations towards suppliers relate, in particular, to reducing the risk of hazards related to the product and reducing the risk of non-compliance in operational processes (such as customer service, design, purchasing, production and delivery). Reducing the risk related to the product is implemented through quality control activities. The scope of quality control includes assessing the technical parameters of deliveries, semi-finished products and finished products (Zimon, Madzik, & Sroufe, 2020). Ensuring the accuracy of quality control results requires the supervision of equipment for measuring and monitoring the quality of products. This ensures the credibility of the results qualifying for product evaluation status. This scope of supervision ensures the safety of products delivered to customers, which is important in the case of complaints. It allows suppliers to identify the cause of non-compliance related to the quality of products (Priede, 2012).

The expectations of the purchasing companies towards suppliers also concern the improvement of product innovation. For these reasons, suppliers are obliged to conduct research and development processes. Customers require special supervision from suppliers over research and development processes for new and modified products (Manders, de Vries, & Blind, 2016; van der Merwe, van Eeden, & Simpson, 2022). This applies to suppliers for the automotive, electromechanical and chemical sectors. In these sectors, there is very close cooperation between customers and suppliers in joint research and development projects on new and modified products. This ensures a high level of security for product innovations. The final results of the research and development process should be validated by both the supplier and the recipient. The result of the validation should determine the degree of compliance with the functional requirements and technical performance expectations of buyers/users, as well as the requirements of applicable legal regulations (Chen & Su, 2021; Wang & Shu, 2022).

Effective supervision over the quality of operational processes requires suppliers to standardize their activities and continuously improve them. Ensuring continuous improvement of processes is conditioned by suppliers taking actions to reduce risk by improving occupational safety and increasing the awareness and involvement of the supplier's staff (Zhou, Mei, Liu, & Wang, 2020; Yangailo, Kabela, & Turyatunga, 2023). The specification of job requirements and the selection of employees with appropriate qualifications, predispositions and motivation, especially in terms of personality development and teamwork to achieve the organization's goals is critical in this regard (Turusbekova, Broekhuis, Emans, & Molleman, 2007). It can be observed that with the development of the concept of sustainability, buyers' expectations towards suppliers focus on taking actions related to improving environmental impact (Bartos, Schwarzkopf, Mueller, & Hofmann-Stoelting, 2022; Verma, Kumar, Daim, Sharma, & Mittal, 2022; Chang *et al.*, 2023).

Traditionally, the decision of selecting suppliers relied heavily on economic aspects. However, due to the increasing pressure to follow environmental policies and other social concerns, organizations are forced to integrate supply chain activities with the sustainability triple bottom line factors (Singh, Kumar, & Verma, 2023). (Increasingly, suppliers are obliged to reduce the negative impact of products and processes on the environment (de Sousa Jabbour, Jabbour, Latan, Teixeira, & de Oliveira, 2014).

Most often, customers' expectations towards suppliers refer to reducing the negative impact on the environment of such environmental aspects as consumption of materials (Acar & Coskun, 2023), use of heavy metals such as lead, mercury or cadmium in the processes, gas emissions, in particular, carbon dioxide (Giuniperoa, Hookerb, & Denslow, 2012; Hajmohammad, Vachon, Klassen, & Gavronski, 2013). Suppliers are also expected to recycle production waste (Tseng, Lin, & Chiu, 2009), use renewable energy sources, implement electronic communication, raise employees' awareness, introduce environmental programs such as Responsible Care or Cleaner Production (Jum'a, 2023).

Increasingly, suppliers are obliged to shorten the cycles of operational processes and to reduce operating costs (related to order fulfillment). This is conditioned by implementing Kaizen and Lean Management concepts in supply chains (Machikita, Tsui, & Ueki, 2016; Kanchan, Chandan, & Aslam, 2022). Implementing these concepts makes it possible to improve the effectiveness and efficiency of processes carried out by partners cooperating in supply chains. The effectiveness of implementing these requirements is assessed by analyzing the Supplier Self-Assessment Questionnaire data and verified during supplier audits. For suppliers, the results of audits indicate to what extent they have met the customers' requirements and expectations and what areas require continuous improvement (Arimura, Darnall, Ganguli, & Katayama, 2016).

Enterprises that are buyers do not limit themselves to setting requirements and expectations for suppliers. Customers (especially multinationals) increasingly offer supplier development programs (Benton, Prahinski, & Fan, 2020). These programs allow suppliers to meet customer requirements and expectations better. These programs usually include training, consulting, and joint project teams (Saghiri & Wilding, 2021). These trainings aim to define customer expectations in terms of determining the possibilities of reducing risk and improving the efficiency and effectiveness of processes (Jafarian, Lotfi, & Pishvaee, 2021; Zhou, Bhuiyan, Medal, Sherwin, & Yang, 2022).

The work of joint teams focuses on the implementation of projects focusing on the implementation of product and process innovations (using the Toyota Production System and Lean Management concepts) by partners. These activities improve the functioning of supply chains and ensure the business continuity of processes (Sadeghi, Azadegan, Ojha, & Ogden, 2022). The article fills the research gap in the literature. The research results presented in the literature so far have focused on the expectations of enterprises towards suppliers in terms of meeting the criteria for their initial and periodic assessment. The research gap in the article is the result of empirical research presenting manufacturers' expectations towards suppliers in terms of improving their processes. The expectations towards suppliers in terms of improving their processes were presented from the perspective of the requirements set by enterprises (producers) that have implemented management improvement tools (management systems compliant with ISO standards, Kaizen or Lean Management concepts). This approach to manufacturers' expectations towards suppliers should shape positive relationships and cooperation between partners by improving the quality of products and processes.

The study results analyzed in the article regarding manufacturers' expectations towards suppliers fit into the current research issues related to implementing the sustainability concept in supply chains.

In the context of supply chains, this concept still requires research into the activities undertaken by enterprises to improve the quality of products and processes, reduce the risks associated with them and limit the negative impact on the environment.

3. Methodology of research and discussion of the results

The research used the Computer Assisted Telephone Interview (CATI) technique. The research covered 150 manufacturers (employing over 50 people) who were suppliers for enterprises from the automotive, electromechanical and chemical sectors operating in the Polish business-to-business (B2B) market. Almost half of the surveyed economic entities were enterprises with foreign capital (including large international concerns with global activity). The actions that manufacturers expect from their suppliers were assigned a rank on a scale from one (the least important criterion) to five (the most significant). The study was commissioned by a specialized research agency that conducted a targeted selection of companies registered in the Bisnode database, a business directory search platform.

The data structure based on the processing of the questionnaires is shown in Table 1. This table contains a list of variables and their codes that will be used later in evaluating the results. The list of variables was created based on the literature search. Direct or indirect expectations of manufacturing companies towards suppliers in terms of implementing improvement activities were examined. A study by Wang and Yan (2009) drew attention to the need to improve cycles of operational processes. Reducing the risk of hazards associated with the product is one of the current challenges in the field of SCM, and product risk has been the subject of research (Chen, Lan, Li, Shang, & Shen, 2022). Recent research also points to expectations in the area of increased awareness and commitment of the supplier's staff, limiting operational costs (Azam, Hasan, & Qureshi, 2023) and improving product innovation (Nguyen, Onofrei, Akbari, & McClelland, 2022). Attention is also paid to safety standards in the field of work safety (Holah, 2023) or quality (Vanichchinchai, 2021). An important aspect is also reducing the risk of non-compliance in operational processes (Rezaei Vandchali, Cahoon, & Chen, 2021). And last but not least, the literature also points to the need to eliminate

Variable	Code	Measure
Capital	Capital	Nominal
Size	Size	Ordinal
ISO9001	ISO9001	Nominal
ISO14001	ISO14001	Nominal
ISO45001	ISO45001	Nominal
Kaizen	Kaizen	Nominal
Lean	Lean	Nominal
Sector	Sector	Nominal
Shortening the cycles of operational processes (related to the execution of the contract)	SCOP	Scale
Reducing the risk of hazards associated with the product	RRHP	Scale
Increased awareness and commitment of the supplier's staff	IASS	Scale
Improving work safety at the supplier	IWS	Scale
Improving product innovation	IPI	Scale
Limiting the negative impact of processes on the environment	LNIPrE	Scale
Improving the standardization of activities	ISA	Scale
Reducing the risk of non-compliance in operational processes	RRNC	Scale
Limiting the negative impact of products on the environment	LNIPE	Scale
Limiting the negative impact of your activities on the environment	LNIAE	Scale
Limiting operational costs (related to the execution of the contract)	LOC	Scale

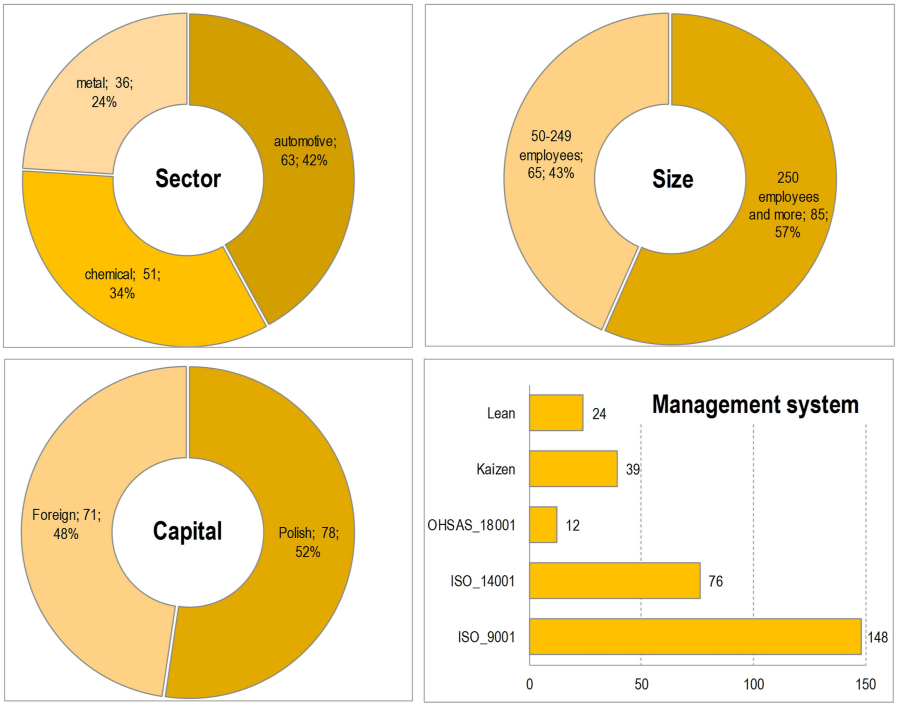
Source(s): Authors' own elaboration

Table 1.
Overview of variables

the negative impacts of processes, products and own activities (Fernando, Halili, Tseng, Tseng, & Lim, 2022). Each variable has a type of measure, which defines the possibilities of using statistical procedures. The Capital variable was a nominal measure with two options – Polish and foreign. The number of employees was measured on two levels (50–249 employees and more than 250 employees). A nominal measure with a dichotomous character (yes/no) was used for the types of implemented systems. Other variables that had an ordinal measure were measured using a five-point Likert scale, as mentioned above.

An overview of the main identification variables of the involved organizations can be found in Figure 1. The results show that the sample consists primarily of organizations operating in the automotive sector (42%), but the representation of the least numerous metal categories is sufficient (24%). Other identifying features of the involved organizations, such as size and capital, are shown in other pie charts. The figure shows that almost all the surveyed organizations have an implemented system according to ISO 9001. It is also necessary to mention that over half of the organizations have an implemented ISO 14001 system. Other systems, such as Kaizen, Lean or ISO 45001, were represented to a lesser extent.

The sample of 150 participating organizations is of medium size. To test the non-response bias that could affect the results, the dataset was split into early responses ($n = 75$) and late responses ($n = 75$). Subsequently, we randomly selected six scale variables for which we tested non-response bias. The t-test and p-values were higher than 0.05, indicating that the non-response bias is not significant and the sample is reliable. We tested the scale's reliability with a separate test for all 11 variables of the "scale" type. Cronbach's alpha reached 0.911,



Source(s): Own elaboration

Figure 1.
Main characteristics of the sample

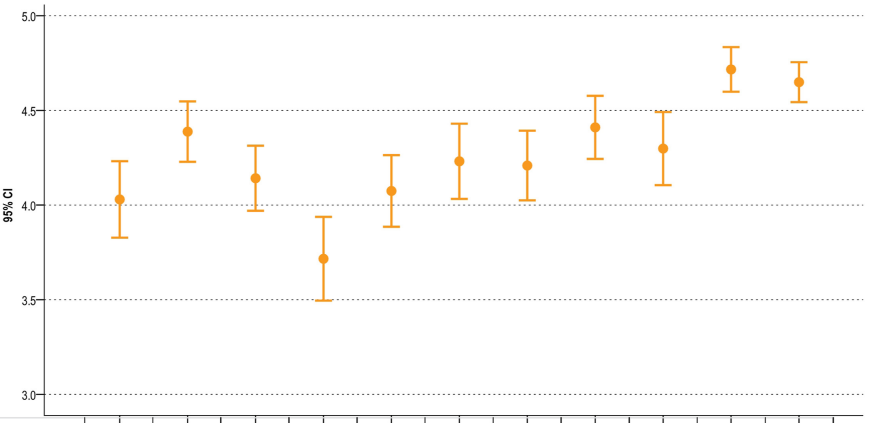
which indicates a high level of reliability. To assess the consistency of the variables, a test was also implemented that separately evaluated the scale's reliability if the given variable was deleted from the dataset. The results in Table 2 show that removing any variable would not significantly increase Cronbach's alpha. All 11 variables are, therefore, suitable for further analysis from the point of view of scale reliability.

Figure 2 shows the essential statistical characteristics of the monitored actions manufacturers expect their suppliers to implement. All the monitored actions achieved above-average values on a scale (from 1 to 5). However, for a more straightforward interpretation, we could divide the given action into three groups: critical (average values

Variable	Scale Mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
SCOP	42.84	58.063	0.495	0.912
RRHP	42.48	57.274	0.725	0.899
IASS	42.72	55.555	0.789	0.896
IWS	43.15	54.459	0.641	0.905
IPI	42.79	56.813	0.620	0.905
LNIPrE	42.63	53.873	0.771	0.896
ISA	42.66	53.971	0.838	0.892
RRNC	42.46	56.881	0.718	0.900
LNIPE	42.57	53.616	0.815	0.893
LNIAE	42.15	62.835	0.465	0.911
LOC	42.22	63.930	0.414	0.913

Source(s): Authors' own elaboration

Table 2.
Testing of reliability if item deleted



Characteristic ↓	SCOP	RRHP	IASS	IWS	IPI	LNIPrE	ISA	RRNC	LNIPE	LNIAE	LOC
Mean	4.03	4.39	4.14	3.72	4.07	4.23	4.21	4.41	4.30	4.72	4.65
Median	4.00	5.00	4.00	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00
Geometric Mean	3.75	4.23	3.95	3.38	3.83	3.96	3.98	4.23	4.03	4.63	4.60
Harmonic Mean	3.29	3.95	3.62	2.88	3.42	3.47	3.57	3.89	3.53	4.44	4.54
Std. Deviation	1.18	0.93	1.00	1.30	1.11	1.16	1.08	0.97	1.13	0.69	0.62
Skewness	−1.28	−1.81	−1.46	−0.89	−1.40	−1.66	−1.64	−1.99	−1.91	−3.33	−1.76
Kurtosis	1.00	3.44	2.23	−0.17	1.59	1.99	2.38	3.88	2.96	13.23	2.81

Source(s): Own elaboration

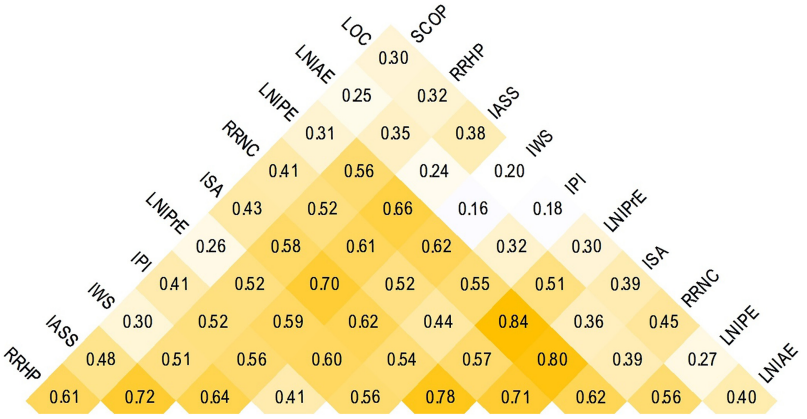
Figure 2.
Results of variables analysis

higher than 4.50), important (average values between 4.00 and 4.50) and expected (average values lower than 4.00). According to this breakdown, two types of actions are critical: Limiting the negative impact of your activities on the environment (LNIAE) and Limiting operational costs (related to the execution of the contract) (LOC). Polish manufacturing companies, therefore, see the importance of sustainable development in running business activities. Interestingly, the reduction of the negative impact on the environment is compiled along with reducing operating costs. It, therefore, appears that suppliers' investments in sustainable development activities must not be too costly financially. In the second group marked as "important", we could include a relatively wide range of actions – SCOP, RRHP, IASS, IPI, LNIPrE, ISA, RRNC and LNIPE. Therefore, the result suggests that manufacturing companies place pretty high demands on their suppliers and expect them to develop comprehensively in all important areas to guarantee the continuity of cooperation. Suppliers must, therefore, develop evenly and adhere to high standards to meet the requirements of manufacturing companies. According to the results, we included Improving Work Safety (IWS) at the supplier among actions that are naturally expected. The research shows that the only factor that does not directly impact supplier–recipient cooperation was rated the lowest. Manufacturing companies approach cooperation practically and place the smallest requirements on a factor that fully depends on the supplier. It is worth noting, however, that its rating was not low enough to conclude that manufacturing companies underestimate the safety issues of employees employed at the supplier.

To understand manufacturers' perceptions of individual actions, we analyzed the relationships between these actions. We used the bivariate linear correlation analysis, while the Pearson correlation coefficient was chosen as the primary metric. The results can be found in Figure 3.

The correlation analysis revealed relatively strong positive correlations between the investigated actions. This indicates the existence of latent factors. We, therefore, explored such a possibility through exploratory factor analysis. Kaiser-Meyer-Olkin Measure of Sampling Adequacy reached a value of 0.87. Bartlett's Test of Sphericity reached a value of Approx. Chi-Square 969.05 with a significance level of <0.001. These measures reached sufficient levels for performing a factor analysis.

The factor analysis was performed on 11 actions (variables), and its goal was to reveal hidden factors that would explain the complex intercorrelation structure. The principal component analysis was used to extract such factors. The number of factors was determined



Source(s): Own elaboration

Figure 3.
Correlation map of analyzed variables

based on eigenvalues greater than value 1. Varimax was used to rotate the factor matrix to achieve optimal factor parameters. Missing values were excluded by the listwise method. Table 3 shows the factor analysis results, while detailed statistics are found only for the factors for which the eigenvalue was higher than 1.

From the results of the table, we can see that the factor analysis revealed three factors that explain 73.67% of the variability. This is a good level of explanation that can produce valid results. Table 4 captures the composition of the extracted factors in the form of a rotated factor matrix.

The three factors that were extracted should be named for better interpretation. When naming the factors, the composition of the variables that make up the factor, their intensity, and, above all, a certain common characteristic should be taken into account. After considering these criteria, we named the three latent factors as follows:

(1) *Risk reduction (Factor 1)* – this factor consisted mainly of the following variables: Limiting the negative impact of products on the environment (LNIPE); Improving the standardization of activities (ISA); Limiting the negative impact of processes on the environment (LNIPrE); Increased awareness and commitment of the supplier's staff

	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
Factor	Total	% of var.	Cum. %	Total	% of var.	Cum. %	Total	% of var.	Cum. %
1	5.97	54.29	54.29	5.97	54.29	54.29	4.19	38.11	38.11
2	1.08	9.81	64.10	1.08	9.81	64.10	2.16	19.66	57.77
3	1.05	9.57	73.67	1.05	9.57	73.67	1.75	15.90	73.67
4	0.78	7.07	80.74						
5	0.50	4.57	85.31						
6	0.44	4.04	89.35						
7	0.35	3.18	92.53						
8	0.33	3.02	95.55						
9	0.23	2.05	97.60						
10	0.15	1.35	98.95						
11	0.12	1.05	100.00						

Source(s): Authors' own elaboration

Table 3.
Results of factor analysis

Variable/factor	Factor 1	Factor 2	Factor 3
LNIPE	*0.869*	0.099	0.343
ISA	*0.856*	0.045	0.344
LNIPrE	*0.790*	0.315	0.275
IASS	*0.772*	0.275	−0.088
IWS	*0.664*	0.576	0.087
RRHP	*0.602*	0.364	0.092
RRNC	*0.569*	0.386	0.390
IPI	0.134	*0.854*	0.160
LNIAE	0.493	*0.689*	0.147
LOC	0.309	−0.021	*0.820*
SCOP	0.031	0.397	*0.737*

Note(s): Extraction method: principal component analysis; rotation method: Varimax with Kaiser normalization; a rotation converged in four iterations

Source(s): Authors' own elaboration

Table 4.
Rotated factor matrix

(IASS); Improving work safety at the supplier (IWS); Reducing the risk of hazards associated with the product (RRHP); Reducing the risk of non-compliance in operational processes (RRNC). What all these actions have in common is that they are directly or indirectly related to risk management.

(2) *Product innovation (Factor 2)* – two variables affected this factor the most: Improving product innovation (IPI); Limiting the negative impact of your activities on the environment (LNIAE). Let's look at the intensity of the influence of these variables on the given factor. The more significant variable is the IPI, and for this reason, this variable was taken into account when naming the factor.

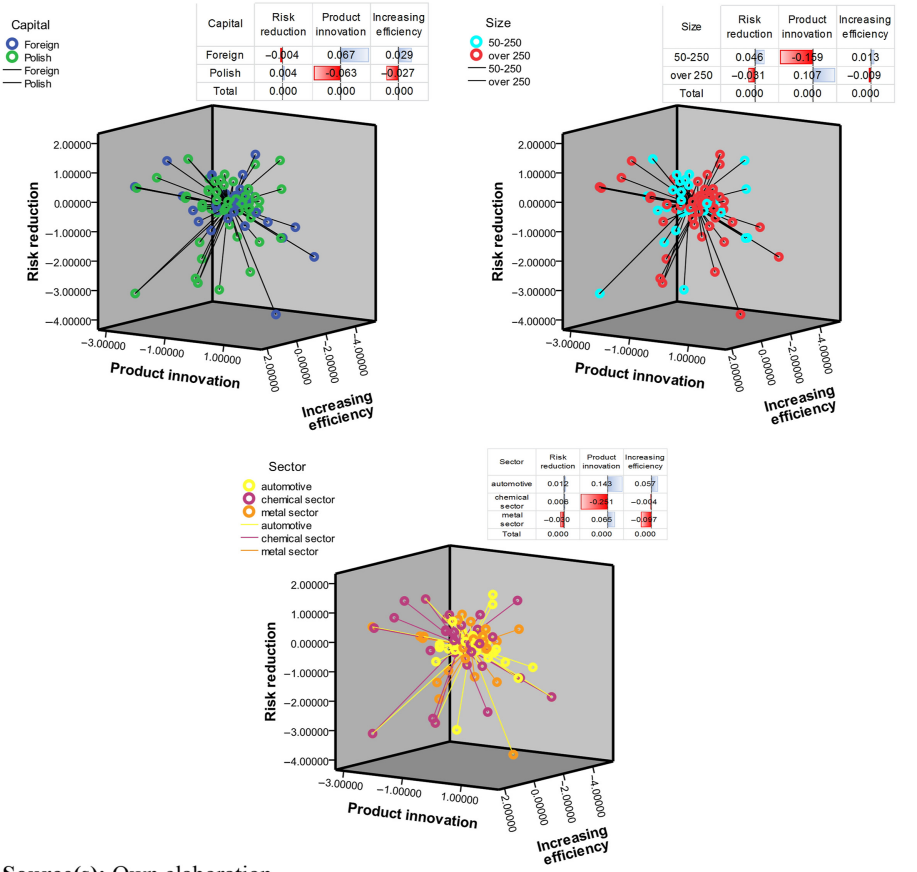
(3) *Increasing efficiency (Factor 3)* – this factor was most affected by: Shortening the cycles of operational processes (related to the execution of the contract) (SCOP); Limiting operational costs (related to the execution of the contract) (LOC). Both of these actions are directly related to efficiency.

Factor analysis revealed that on a macro level, manufacturers primarily expect actions from their suppliers related to risk reduction (factor 1), product innovation (factor 2), and increasing efficiency (factor 3). Representatives of manufacturing companies, therefore, recognize that the way to maintain business continuity and achieve the assumed business results is effective risk management as part of cooperation with suppliers. The costs of wrong decisions, as well as failure to fulfill obligations, may lead to significant material losses and loss of credibility as a business partner. It is, therefore, necessary to establish rules and implement methods and systems to minimize risk in cooperation with suppliers. Another essential aspect is product innovation. Suppliers can play an active role in its creation by shortening the time of service delivery, knowledge and technology transfer or minimizing costs. However, their role in creating product innovations is quite limited in relation to manufacturing companies. This does not change the fact that effective cooperation in this aspect may contribute to an increase in the effectiveness of implemented activities. According to entrepreneurs, the last factor that suppliers should improve is increasing efficiency. Suppliers should, therefore, focus on implementing modern technologies and management systems to achieve the abovementioned aspects.

We also looked at these three factors from the point of view of identifying features. We analyzed the intensity of the factors through their stratified average values with respect to capital, size, and sector. The results can be found in Figure 4.

We tested the size of the differences using Levene's test (capital, size) and one-way ANOVA (sector). Although the results indicated partial differences in expectations of product innovation, these differences were within the statistical error. This leads us to conclude that organizations, in terms of capital, size, and sector, perceive the equal importance of these three factors. We followed the same logic when analyzing the differences in the perception of these factors when considering the implemented system. In our survey, we investigated the implementation of five systems – ISO 9001, ISO 14001, ISO 45001, Kaizen, and Lean. Using Levene's test, we also tested differences in assessing the importance of actions for suppliers. The results are shown in Table 5.

The results in the table show that the differences in the perception of the three factors of action are negligible, considering almost all implemented systems. In the case of ISO 9001, it was impossible to assess the differences because only two organizations did not implement this system, which was insufficient for implementing the *t*-test. However, our analysis revealed that organizations that have implemented Kaizen have higher expectations from their suppliers in the area of product innovation than organizations without Kaizen. This difference is not surprising because the Kaizen philosophy aims to search for ways to improve by integrating different parts of the enterprise. Therefore, manufacturing companies



Source(s): Own elaboration

Figure 4.
Analysis of three factors compared to organizations capital, size and sector

System	Risk reduction	Product innovation	Increasing efficiency
ISO9001	NA	NA	NA
ISO14001	0.936	0.289	0.613
ISO 45001	0.476	0.471	0.925
Kaizen	0.080	*0.049*	0.368
Lean	0.150	0.237	0.679

Source(s): Authors' own elaboration

Table 5.
The *p*-values of Levene's *t*-test for equality of means

that adhere to the guidelines of the Kaizen philosophy require from their suppliers what they implement themselves, i.e. the implementation of improvement solutions, including those that stimulate the growth of product innovation.

4. Discussion

Nowadays, a typical manufacturing company purchases most of its components and semi-finished products from external suppliers (Dey, Bhattacharya, Ho, & Clegg, 2015; Baghizadeh, Ebadi, Zimon, & Jum'a, 2022). Considering the integration of the supplier's efficiency and its alignment with manufacturing companies' objectives related to quality, innovation, cost reduction, sustainable development and more, this aspect emerges as a crucial factor influencing competitive advantage in the contemporary market. When it comes to implementing improvement initiatives, manufacturing businesses frequently have high expectations of their suppliers (Lockström, Schadel, Harrison, Moser, & Malhotra, 2010). These demands are brought on by the requirement for a dependable and effective supply chain and the need to continuously improve product quality, lower prices and keep a competitive edge. Suppliers for the manufacturing industry are expected to deliver high-quality goods or parts regularly. Suppliers are frequently urged to put quality control systems in place, such as Six Sigma or TQM principles, to lower defects and raise the caliber of the finished product as a whole. With this in mind, the article aimed to determine what expectations the representatives of manufacturing companies have towards their suppliers. In the work, the assessment of requirements was undertaken against 11 factors. Research has shown that manufacturing companies have high expectations in virtually all aspects studied. Still, three groups can be distinguished in terms of the importance of indications.

The first (most important) group includes factors such as limiting your activities' negative impact on the environment and operational costs. The management of the surveyed enterprises is therefore aware that increasingly restrictive environmental regulations and a change in consumer attitudes mean that ignoring environmental issues can have a noticeable impact on the image and business operations. The surveyed enterprises also have the awareness that sustainable management requires extensive and comprehensive cooperation in the process of caring for the environment; therefore, other links in the supply chain must be included (Sancha, Wong, & Gimenez, 2019; Zimon, Tyan, & Sroufe, 2019; Jamalnia, Gong, & Govindan, 2022). The role of suppliers in this aspect is quite significant because, as highlighted by Blome, Paulraj, Preuss, and Roehrich (2023), manufacturing companies are increasingly concerned about their suppliers' compliance with environmental and ethical standards. Jamalnia *et al.* (2022) emphasize that suppliers may violate the principles of sustainable development adopted by manufacturing companies on many levels.

For this reason, these suppliers are under increasing pressure to support socially conscious policies and environmental objectives. This may entail lessening the influence on the environment, helping moral employment practices and abiding by pertinent laws and standards. According to Urbaniak *et al.* (2021), the implementation of quality and environmental management systems enables the standardization of activities in the field of sustainability transparency and improvement of supply chain management efficiency. Therefore, the great emphasis put on improving environmental issues by suppliers by the surveyed production companies seems right and justified. Another equally important aspect for the surveyed enterprises was the reduction of operating costs. The combination of these two aspects creates a dilemma for suppliers investing in new, cleaner technologies or management systems, which usually require significant expenditures (Wang, Nie, & Xia, 2022), which will pay off in the future, provided that they are properly implemented and improvement actions are taken (Zhang, Pan, Jiang, & Feng, 2020; Zimon *et al.*, 2022). Therefore, manufacturing companies and suppliers must look for compromises between implementing new solutions and minimizing costs (Teng & Tsinopoulos, 2022). Suppliers for the manufacturing industry may need to be flexible in response to shifting market conditions and customer needs (Jha, Sharma, Kumar, & Verma, 2022). Suppliers should be able to vary production rates, react to last-minute changes in orders and conform to changing industry norms and rules. Suppliers are frequently expected to offer thorough cost breakdowns and

pricing transparency by manufacturers. This openness makes it easier to spot areas where costs might be cut and to comprehend the elements that make up the overall cost structure.

The second group (important factors) includes practically all the examined aspects, except for factors such as Improving Work Safety at the supplier. On this basis, it can be concluded that suppliers must improve their processes at all levels and comprehensively approach this issue to meet the requirements of manufacturing companies. Based on the data obtained, it can also be concluded that the management of the surveyed organizations showed a rather pragmatic approach, recognizing the safety of employees at the supplier as the least important factor (however, the assessment of this factor was still relatively high). It is worth emphasizing, however, that this factor should not be underestimated as it affects both the reduction of company costs (by reducing the number of accidents) and the comprehensively perceived issue of sustainable development (Micheli, Farné, & Vitrano, 2022; Urbaniak, Rogala, & Kafel, 2023).

The deepening of the research process made it possible to distinguish three factors essential for production companies in the context of cooperation with suppliers. The first group of factors was associated with risk reduction. This is not surprising for several reasons. Firstly, the Covid-19 pandemic has shown the importance of risk management within the supply chain (Naveen, Selvan, & Senanayake, 2022); secondly, almost all the surveyed production companies implemented the requirements of the ISO 9001 standard, which highlights the importance of risk management in the enterprise (Dellana, Kros, Falasca, & Rowe, 2020; Zimon & Madzík, 2020), thirdly, supply chain disruptions can be serious consequences in extreme cases, leading enterprises to bankruptcy (Berger, Schulze-Schwering, Long, & Spinler, 2023). Companies that manufacture goods want their suppliers to proactively identify and reduce risks associated with their goods or services. In doing so, it is essential to address any potential supply chain disruptions, quality problems or other problems that might influence manufacturing operations (Urbaniak *et al.*, 2023). It seems, therefore, that suppliers should reach for solutions that enable them to do effective risk management; these include, for example, standardized IT systems management systems or more efficient logistics activities (Zimon & Madzík, 2020; Shan, Xiong, & Zhang, 2023; Li, Li, & Liu, 2022; Tébar-Rubio, Ramírez, & Ruiz-Ortega, 2022). Manufacturers and suppliers should also join forces to develop joint long-term strategies to address disruptions and risks in the supply chain (Bø, Hovi, & Pinchasik, 2023). This will allow for more effective risk management and, as Freije, de la Calle, and Ugarte (2022) claimed, cooperation within the supply chain can increase product innovation.

As the research presented in this article shows, product innovation is the second group of important aspects that manufacturing companies expect from suppliers. Suppliers should take a proactive role in attempts to innovate and continuously improve. To improve product performance or lower costs over time, investigating new technologies, materials and processes is suggested (Urbaniak *et al.*, 2023). It is worth noting that suppliers themselves have a limited impact on product innovation, but their cooperation with manufacturing companies can noticeably increase the innovativeness of their products (Sabahi & Parast, 2022). The research conducted in the article also shows that aspects affecting the increasing efficiency of suppliers are essential for manufacturing companies. Still, they are less important than risk management or product innovation. Manufacturing companies put activities aimed at effective customer service as their first priority. Interestingly, further deepening of the research process established that the hierarchy of the described factors is unchanged. Regardless of their size, capital or implemented systems, manufacturing enterprises perceived the importance of the studied factors in the same way. The only observed difference was the companies that followed the guidelines of the Kaizen philosophy, which put more emphasis on product innovation. According to Kong and Muthuveloo (2022), the Kaizen philosophy supports and develops innovative activities, therefore, companies that follow its guidelines consider innovation as an important factor in cooperation within the supply chain.

4.1 Implications

The considerations undertaken in the article have a number of both theoretical and practical implications. The research results will help managers of companies supplying manufacturing enterprises choose strategies for improving internal processes that are compatible with the requirements of manufacturing enterprises. Suppliers must be aware that they should invest in pro-ecological solutions while optimizing costs. Cost minimization should not, however, take place at the expense of improving other processes because manufacturing companies require high quality. The management of manufacturing companies will receive information on the impact of such aspects as size, industry or implemented systems on the suppliers' requirements. In addition, representatives of both surveyed groups will understand that cooperation allows for synergies and stronger support for implementing such key processes as sustainable management, risk management and product innovation. The main contribution to the development of the theory is a broader understanding of the expectations of manufacturing enterprises towards suppliers and determining the impact of factors such as size, industry or implemented management systems on the requirements towards suppliers. Based on the findings of the presented study, development trends and implications for managers responsible for purchasing processes and relationships with suppliers can be determined. These implications assume that effectively fulfilling suppliers' expectations of purchasing enterprises undoubtedly requires close cooperation between the partners. Managers should pay special attention to implementing joint initiatives that lead to increased product innovation, cost minimization, risk reduction and SSCM. The results obtained from the research will also enrich the theory in the field of management systems. The study showed that the only aspect that affects the expectations towards suppliers is implementing the Kaizen philosophy. This is an important observation and contributes some theory about the rationale for implementing the guidelines of this philosophy. It is worth mentioning that supplier development is a long-term, resource-consuming business activity that requires commitment from both manufacturing firms and suppliers. It requires manufacturing firms to invest significant amounts of resources in suppliers (Talluri, Narasimhan, & Chung, 2010). The research results will allow suppliers and production companies to make optimal decisions regarding potential investments in management systems or the development of specific processes.

5. Conclusion, limitations of the analysis and areas for further research

The article presents the research results, which covered the expectations of manufacturing companies regarding the improvement of processes by suppliers. The research consists of three phases in which the importance of individual processes was successively assessed, three groups of factors particularly important for manufacturing companies were distinguished, and the impact of several variables on the hierarchy of requirements was examined. The research process allowed us to formulate several conclusions (discussed in more detail in the discussion section). Based on the research conducted, the research questions were also answered:

RQ1. What kind of improvement of activities do the surveyed producers expect from their suppliers?

(1) Manufacturing companies have high expectations in practically all respondents' aspects, however, three groups can be distinguished in terms of the importance of indications;

(2) Limiting the negative impact of your activities on the environment and limiting operational costs were considered the most important processes that suppliers must improve;

RQ2. Do factors such as size, capital or implemented systems influence different assessments of the analyzed requirements toward suppliers?

(3) Manufacturing enterprises, regardless of their size, capital or implemented systems, yes, they themselves perceived the importance of the examined factors. The only difference observed is companies that follow the guidelines of the Kaizen philosophy.

It is also worth emphasizing that the manufacturing process depends on the delivery of materials or components being dependable and on time. Suppliers must routinely meet or beat delivery deadlines to reduce production hiccups and delays. Suppliers are expected to keep lines of communication open and transparent by manufacturers. Collaboration is crucial for exchanging ideas for improvement, dealing with problems and cooperating to enhance outcomes and procedures. The key contribution to the existing literature of this study is to deepen the understanding of the expectations of manufacturing companies towards suppliers that focus on improving processes. They have previously conducted research focused on supplier evaluation by purchasing companies. This study contributes to the theory by filling the existing gap between important improvement actions that manufacturing companies expect their suppliers to take in the future and well-known requirements that are used in supplier assessment processes.

Despite the exploratory findings presented in previous chapters, our study also has certain limitations. The first of them is the characteristics of the sample. Organizations with more than 50 employees operating in Poland were included in the survey. These attributes may be limiting, and the results may be influenced by the geographical and economic aspects of the country where the research was conducted. Another limitation is the list of improvement activities. It must be said that this list is the result of a literature review. However, the internal and external environments of organizations are subject to dynamic changes under technological, economic or environmental influences. The rapid development of technologies and the digital transformation that organizations are going through means that the approach to the improvement process itself is also changing. Therefore, improvement activities are also changing. Our study analyzed 11 improvement activities; however, regarding the above context, it cannot be ruled out that several others could have been included. Our analysis included the most frequently used management systems in manufacturing organizations in Poland. Along with expanding the analyzed variables, there is room for further research considering other management systems.

Further research opportunities can still be seen in a different approach to methodological processing. Our analysis was exploratory, and its result is three latent factors – risk reduction, product innovation and increasing efficiency. In our study, these factors are characterized through measured items. They can form the basis for further research based on the creation of conceptual models, which will be verified through the structural equation modeling approach. At the same time, these factors can be integrated into broader conceptual models focused on supply chain research or development. Last but not least, considering current trends in supply chain management and expanding research into areas such as digitization, supply chain resilience or sustainable issues in SCM can also be vital ideas for further research.

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