

Comparative analysis of the current approach of customers and SMEs from the V4 countries to pro-environmental improving products' quality

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Abstract

Modernizing the management of organisations and promoting the principles of sustainable development are increasingly desirable in the countries of the Visegrad Group. However, the challenge lies in determining a single, coherent direction for the organization's development to ensure it meets market requirements while simultaneously being environmentally friendly. Therefore, the purpose was to analyse current activities for quality and natural environment making by SMEs from the electromechanical industry from V4 countries (Poland, Czech Republic, Slovakia and Hungary) and current customers' satisfaction with the quality of environmentally friendly products. The method of research included survey research among SMEs in the electromechanical industry of V4 countries and their customers or potential customers. In the period from March to July 2023, a research sample of 1,078 respondents was obtained. The U-Mann-Whitney test was used to test the relationship, where the analyses were performed at the significance level of $\alpha=0,05$. Based on the analysis, it was concluded that the current actions in the area of qualitative-environmental aspects of product improvement by mentioned enterprises are only slightly consistent with current customers' expectations. The originality of the research is that it determines the current direction of development of SMEs from the electromechanical industry from V4 countries with pro-ecological management of product quality, which will be in line with customers' requirements. The results from research can be useful for SMEs from V4 countries, which strive to continuously improve product quality according to the principles of sustainable development.

Keywords

sustainable development, customer expectations, quality, natural environment, making decision, SMEs, Visegrad Group



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Introduction

Currently, there is a significant increase in environmental and social challenges, which cause the development of society and international competition (Bednárová & Liberko, 2008; Richterová et al., 2021; Janovská et al., 2021; Stjepanovi et al., 2022; Bucheli-Calvache et al., 2023). However, the dissemination of sustainable competitiveness, which not only focuses on improving resource use but also aims at sustainable social development and sustainable use of the environment, is becoming increasingly crucial (Falkowski, 2023; Androniceanu et al., 2022; Matuszewska-Pierzynka, 2021). Therefore, sustainable competitiveness is a type of element of sustainable development, which refers to human progress, using resources and business interactions (Lepistö et al., 2023; Nowak & Kasztelan, 2022), whose purpose is to meet current and future needs of generations without a negative impact on the natural environment (Brodny & Tutak, 2023; Khan et al., 2021; Skare et al., 2023).

The Sustainable Development Goals (SDG) have a direct relationship with determining the role of business, mainly in the cause of goal 12, which refers to sustainable production and consumption (Lebel & Lorek, 2008; Stevens, 2010; Vergragt et al., 2014; Skvarciany et al. 2021). Despite this, small and medium enterprises (SMEs) are not fully aware of their own role in achieving SDG and have barriers while implementing rules and initiatives of sustainable development (Cheng et al., 2022; Sith et al., 2022; Szostek et al., 2023). These problems are occurring mainly in view of the role assumed by SMEs to achieve SDG, which is not adapted to achieve these goals. The conditions that generate these problems result from the organisational culture of SMEs (informal structure, day-to-day activities, and lack of a well-defined and long-term strategy) (Ključnikov et al. 2021; Civelek et al. 2021), which requires different resources as part of the effort to achieve the SDG, but also coherently adopted strategic actions (Alfazzi, 2023; Nygaard et al., 2022). For instance, when individuals notice the importance of sustainability, they can show more participative behaviour (Devkota et al., 2023). Therefore, it is important to implement actions supporting achieving goals in SMEs, which constitute the vast majority of all types of organisations. For this reason, although individual SMEs have a relatively small economic, social, and environmental impact, their aggregate potential impact is very large, and thus their environmental impact may be much greater than that of large enterprises (Rodrigues & Franco, 2023; Smith et al., 2022).

In addition, SMEs are recognised as key in development and economic growth, creating jobs, stimulating competition, innovations, and ventures (Ključnikov et al., 2023; Rigelsky et al., 2022, Song et al., 2023). They are recognised as a basic part of maintaining a good economy in developed and developing countries, such as, for instance, the Visegrad Group countries (Poland, Hungary, Slovakia and the Czech Republic) (Gavurova et al., 2022a,b; Kristóf & Virág, 2023; Philbin et al., 2022). Small businesses are motivated to use these innovative technologies (Krajčík et al., 2023) when sustaining their businesses (Azman & Majid, 2023). Among others from this cause, sustainable development is more often a priority in SMEs from Visegrad Group (V4). The mentioned V4 countries are an informal association of four countries from Central Europe, whose aim is to expand cooperation between these countries in order to support spatial integration as part of joint investments and achieve harmony in the development of selected areas of these countries (Belas et al., 2022; Gałaś et al., 2015; Song et al., 2023; Sukiennik et al., 2021; Mishchuk et al., 2023).

The mentioned involvement of V4 in sustainable development is causing an increasingly modern approach to the management of organisations and a greater emphasis on the implementation of the principles of sustainable development, not only in V4 countries but also throughout the world (Brodny & Tutak, 2023; Smith et al., 2022; Androniceanu & Sabie, 2022). In addition, customers also exert pressure (Siwiec & Pacana, 2021a, 2021b). However, to achieve the key goals of the organisation, it turns out to be insufficient to provide high-quality products (Siwiec, Pacana, & Gazda, 2023; Skare et al., 2023). It is also necessary to invest in sustainable development (Ključnikov et al., 2020; Korzynski & Pacana, 2010). Despite this, the approach of SMEs from V4 countries and their customers in this area is still different. Therefore, it is problematic to develop an unambiguous framework for the management of qualitative-environmental aspects of the improvement of the product, which will be in accordance with the SDG (Siwiec, Pacana, Simková, et al., 2023; Tkacova & Gavurova, 2023).

For this reason, the research aimed to analyse i) current activities toward quality and natural environment making by enterprises from V4 countries belonging to SMEs from the electromechanical industry and ii) current customers' satisfaction with the quality of environmentally friendly products. The research was carried out in the Visegrad Group. On the basis of the results obtained so far, a comparison was made of the current activities and expectations of SMEs and their customers from the V4 countries.

The article's originality lies in identifying aspects that assist in determining the consistency of the current approach of SMEs from the V4 countries with customer expectations and, simultaneously, with a pro-ecological approach to product quality management..

Method

Realised research refers to the general approach's qualitative-environmental aspects of product improvement. The research was carried out as a survey on paper and electronic form using MS FORMS. The survey was realised

among enterprises belonging to the electromechanical industry (machine processing industry) from Visegrad Group countries (Poland, Czech Republic, Slovakia, and Hungary) and among customers or potential customers from V4 countries (i.e., persons purchasing or likely to purchase products manufactured by the enterprises selected for the study).

In the article, the results of the analysis realised based on selected survey questions were presented, which were developed according to initial research, for example (Hajduk-Stelmachowicz et al., 2022; Siwiec et al., 2022; Siwiec et al., 2023) and based on literature review, for example (Benito-Hernández et al., 2023; Bryła, 2020; Hudakova et al., 2021; Saqib et al., 2023; Wysocki, 2018). The research aimed to answer the research questions, among others:

- Do company managers think in the same way as customers in the area of product quality improvement?
- Do company managers think the same way as customers in the area of pro-environmental product quality improvement?
- Do company managers ascribe the same importance as their customers to the conditions of pro-environmental product quality improvement?
- Do the enterprises' managers modify the products' pro-environmental quality in line with the customers' expectations?

These questions were formulated as research hypotheses that were verified as part of the analysis of differences and dependencies between the surveyed groups of respondents (SMEs from the V4 countries and customers from the V4 countries). The U-Mann Whitney test was used to test the dependence. The analyses were performed at the significance level of $\alpha = 0.05$.

Results

The results of the conducted research constitute the sample size obtained in the period from March to July 2023 in the V4 countries (Poland, Czech Republic, Slovakia and Hungary). During this period, 1,078 respondents participated in the survey, most of them customers from the V4 countries (75%), and every fourth respondent is an entrepreneur from V4 SMEs (Table 1).

Tab. 1. Characteristics of the surveyed group of respondents

Company	%	Customer	%
Country		Country	
Czech Republic	11%	Czech Republic	2%
Hungary	35%	Hungary	11%
Poland	39%	Poland	83%
Slovakia	15%	Slovakia	4%
Implemented ISO 9001:2015 system		Education	
yes	56%	elementary	17%
no	22%	medium	50%
during implementation	9%	higher	33%
I don't know	13%	-	
Implemented ISO 14001:2015 system or EMAS system		Number of people in the household	
yes	35%	one	3%
no	41%	two	12%
During implementation	7%	three	26%
I don't know	17%	4 and more	59%

SMEs from the V4 countries participating in the research declared that the overwhelming majority (56%) had implemented the ISO 9001:2015 system, of which approximately 9% are in the process of implementation. A smaller half of the companies (22%) indicated the lack of implementation of this system, whereas 13% of the companies surveyed did not know of the implementation status. However, in the case of the ISO 14001:2015 or EMAS system, only 35% of SMEs from the V4 countries have implemented these systems, while 7% are in the process of implementing them. Slightly more than half of the companies (41%) indicated that they had not implemented these systems, whereas 17% of the respondents had no knowledge of the status of their implementation.

In turn, customers from the V4 countries participating in the survey were mainly people with secondary education (50%), then higher (33%), or primary (17%). The vast majority (59%) were people living in families of four or more people.

Initially, it was searching for an answer to the question, "Do company managers think in the same way as customers in the area of product quality improvement?". In this aim, the respondents groups analysed (SMEs and

customers from V4) constructed a ranking of assessments of individual areas of product quality improvement. It is shown in Figure 1.



Fig. 1. Average ratings for individual areas of product improvement

Research shows that areas with higher assessments are different for respondent groups. Customers with the largest weight attached to the quality of products (3.84) then confirmed that customers would pay more if they get a high-quality product (3.83) and that customers are more likely to buy a high-quality product if it has been previously recommended/tested (3.80). On the other hand, they lowest rate the statement that they pay attention to the product's high-quality packaging (3.11).

In the group of SME entrepreneurs from the V4 countries, the statement is that a company strives to improve product quality (3.95) continuously and that a high-quality product is a product that meets the current requirements of customers (3.82). The surveyed companies least agree with the statement that high-quality products also have a high level of environmental friendliness (3.29).

Subsequently, in order to verify whether company managers and customers think alike about improving the quality of the products, an analysis of survey results was carried out using the Mann-Whitney U test. The results of the analysis are presented in Table 2.

Tab. 2. The results of the Mann-Whitney U test - type of group and opinions on improving the quality of products

No	Statement	p-value
1	All customers in the supply chain attach great importance to the quality of products	0.9959
2	Customers will pay more if they get a high-quality product	0.0006
3	A high-quality product is a product that meets the current requirements of customers	0.0000
4	Currently, high-quality products also have a high level of environmental friendliness	0.3264
5	Wealthy customers usually choose high-quality products	0.0095
6	Choosing a high-quality product can improve a customer's self-esteem	0.0561
7	Customers pay attention to the high-quality packaging of a product	0.0001
8	We, as a company, strive to improve product quality continuously	0.0000
9	The higher price of high-quality products significantly discourages customers from buying them	0.0000
10	Customers are more likely to buy a high-quality product if it has been previously recommended/tested	0.8145
11	Customers have much knowledge about the attributes of products that affect their high-quality	0.0000

The research shows that there are statistically significant differences in most of the statements; that is, customers will pay more if they get a high-quality product $p < \alpha$ ($p = 0.0006$), a high-quality product is a product that meets the current requirements of customers $p < \alpha$ ($p = 0.0000$), wealthy customers usually choose high-quality products $p < \alpha$ ($p = 0.095$), customers pay attention to the high-quality of packaging of product $p < \alpha$ ($p = 0.0000$), we as a company strive to continuously improve products' quality $p < \alpha$ ($p = 0.0000$), the higher price of

high-quality products significantly discourages customers from buying them $p < \alpha$ ($p = 0.0000$), and customers have a lot of knowledge about the attributes of products that affect their high-quality $p < \alpha$ ($p = 0.0000$).

In turn, the average ratings of the individual thematic areas broken down by type of respondent (SMEs and customers of V4) are presented in Figure 2.

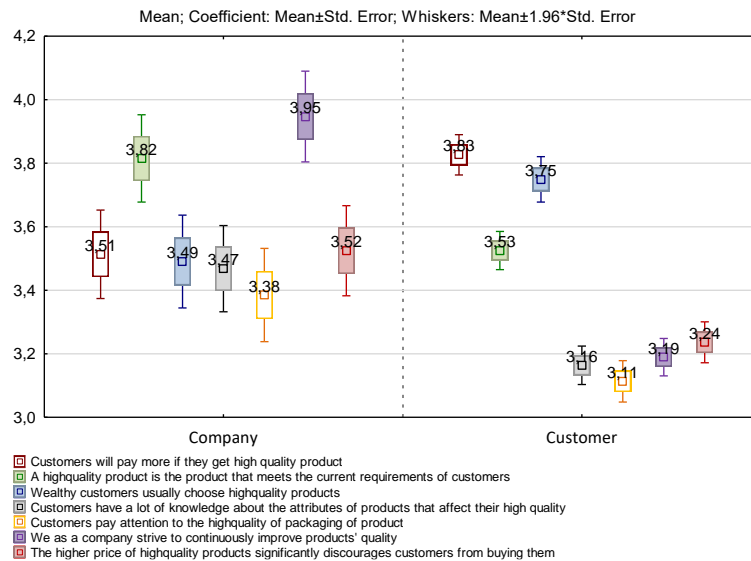


Fig. 2. Average ratings for individual areas by type of respondent

The analysis shows that entrepreneurs agree more with the statement that as a company strives to continuously improve the quality (3.95), a high-quality product is a product that meets the current requirements of customers (3.82), the higher price of high-quality products significantly discourages customers from buying them (3.52), customers have much knowledge about the attributes of products that affect their high quality (3.47), and that customers pay attention to the high-quality of packaging of product (3.38).

On the other hand, customers agree more with the statement that they will pay more if they get a high-quality product (3.83) and that wealthy customers usually choose high-quality products (3.75).

It was observed that the greatest discrepancy of opinions (difference of 0.75 value) between enterprises and customers was obtained for the statement that enterprises strive for continuous improvement of product quality. Businesses agree largely with this (3.95), but customers hardly recognise that they notice (3.19).

The next analysis aimed to verify whether the managers of SME enterprises in the V4 countries think similarly to their clients in the area of a pro-environmental improvement of product quality. For the analysed groups of respondents, a ranking of assessments (as in the case of the first analysis) of individual areas of pro-environmental improvement of product quality was constructed.

It was observed that the areas with the highest assessments were the same for respondent groups. In these groups (SMEs and customers from V4), in the first place, there were statements that the higher price of pro-ecological products significantly discourages customers from buying them (customer – 3.41- company 3.65). Customers are more likely to buy a pro-ecological product if it has been previously recommended/tested (customer – 3.35- company 3.53), and choosing a pro-ecological product can improve a customer's self-esteem (customer – 3.32- company 3.49).

However, customers do not agree with the statement that customers have much knowledge about the attributes of products (2.79). In turn, entrepreneurs least agree with the statement that customers will pay more if the product is pro-ecological (2.97).

Furthermore, the research shows statistically significant differences in most of the statements analysed, as presented in Table 3.

Tab. 2. Mann-Whitney U test results. Type of group and opinions on whether company managers think similarly to customers in the area of pro-environmental improvement of product quality

No	Statement	p-value
1	Customers attach great importance to the pro-environmental actions of the analysed enterprise	0.7515
2	Customers will pay more if the product is pro-ecological	0.7955
3	A pro-ecological product is a product that meets the current requirements of customers	0.0242
4	Currently, pro-ecological products also have a high level of quality	0.3288

5	Wealthy customers usually choose pro-ecological products	0.1112
6	Choosing a pro-ecological product can improve a customer's self-esteem	0.0150
7	Customers pay attention to the pro-ecological packaging of a product	0.0204
8	We, as a company, strive to produce pro-ecological products	0.0332
9	The higher price of pro-ecological products significantly discourages customers from buying them	0.0004
10	Customers are more likely to buy a pro-ecological product if it has been previously recommended/tested	0.0009
11	Customers have much knowledge about the attributes of products	0.0000

Statistically significant differences were observed for the following statements: a pro-ecological product is a product that meets the current requirements of customers $p < \alpha$ ($p = 0.0242$), choosing a pro-ecological product can improve a customer's self-esteem $p < \alpha$ ($p = 0.0150$), customers pay attention to the pro-ecological packaging of product $p < \alpha$ ($p = 0.0204$), we as a company strives to produce pro-ecological products $p < \alpha$ ($p = 0.0332$), the higher price of pro-ecological products significantly discourages customers from buying them $p < \alpha$ ($p = 0.0004$), customers are more likely to buy a pro-ecological product if it has been previously recommended/tested $p < \alpha$ ($p = 0.0009$), and customers have much knowledge about the attributes of products $p < \alpha$ ($p = 0.0000$).

In turn, the results of the average assessments of individual pro-environmental areas by type of respondent are presented in Figure 3.

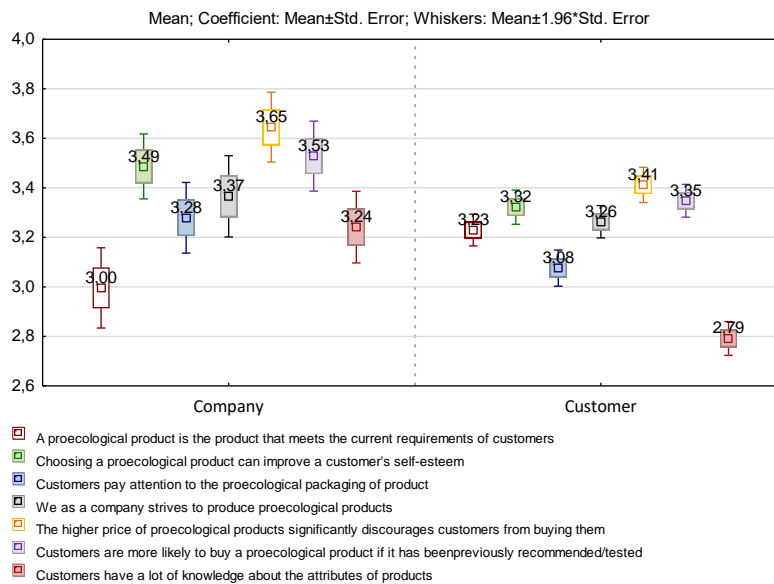


Fig. 3. Average ratings of individual pro-environmental areas by type of respondent

SMEs in V4 countries gave the highest rating to the statement that the higher price of pro-ecological products significantly discourages customers from buying them (3.65). In addition, the claims that choosing a pro-ecological product can improve a customer's self-esteem (3.49), or we as a company strive to produce pro-ecological products (3.37), or slightly less that customers are more likely to buy a pro-ecological product if it has been previously recommended/tested (3.35). Similarly, customers agree most with the statement that the higher price of pro-ecological products significantly discourages customers from buying them (3.41). A noticeable discrepancy of opinions (0.45) between the surveyed groups of respondents was observed in the case of customers' knowledge of the product criteria. Most of the customers stated that they had no knowledge about the product criteria (2.70), while the enterprises believed relatively unanimously that customers had knowledge about the product criteria (3.24).

Later, the analysis of the results of the conducted research was aimed at determining whether the managers of SMEs from the V4 countries attach the same importance as their customers to the conditions for pro-environmental improvement of product quality.

For the analysed respondent groups, the assessment weights were ranked (as in the first analysis) for conditions of pro-environmental areas of product quality improvement. From the results, in the first place, for both enterprises and customers, the largest weight is the price of the product (customer – 3.43 a company – 3.98). However, the next factors (aspects) are other in the studied groups. Customers in second place give product satisfaction (3.20), and those in third place give a guarantee period (3.09). The lowest rating is the period during

which the product is on the market (2.57). Entrepreneurs placed legal and other requirements (3.86) second, and individual customer needs third place (3.78). They assigned the least importance to current practices and prevailing trends (3.29).

Subsequently, a statistical analysis was carried out using the Mann-Whitney U test, the results of which are presented in Table 4. The results indicate that the differences in the assessment of the weights of individual factors differ in each area of $p < \alpha$.

Tab. 3. Mann-Whitney U test results. Group type and opinions on whether company managers attach the same importance as their customers to the conditions for pro-environmental improvement of product quality

No	Statement	p-value
1	Opinion of other customers	0.0000
2	Individual customer needs	0.0000
3	Satisfaction with the product so far	0.0000
4	The image of the production company	0.0000
5	Renown (prestige) of the product brand	0.0000
6	Product price	0.0000
7	Expert opinion	0.0000
8	The period during which the product is on the market	0.0000
9	The modernity of the product	0.0000
10	Timely delivery	0.0000
11	Payment method	0.0000
12	Guarantee period	0.0000
13	Design	0.0000
14	Current practices and prevailing trends	0.0000
15	Legal and other requirements	0.0000

From the analyses conducted, it was concluded that entrepreneurs were assigned significantly higher weights than customers in all the factors studied. This is shown in Figure 4.

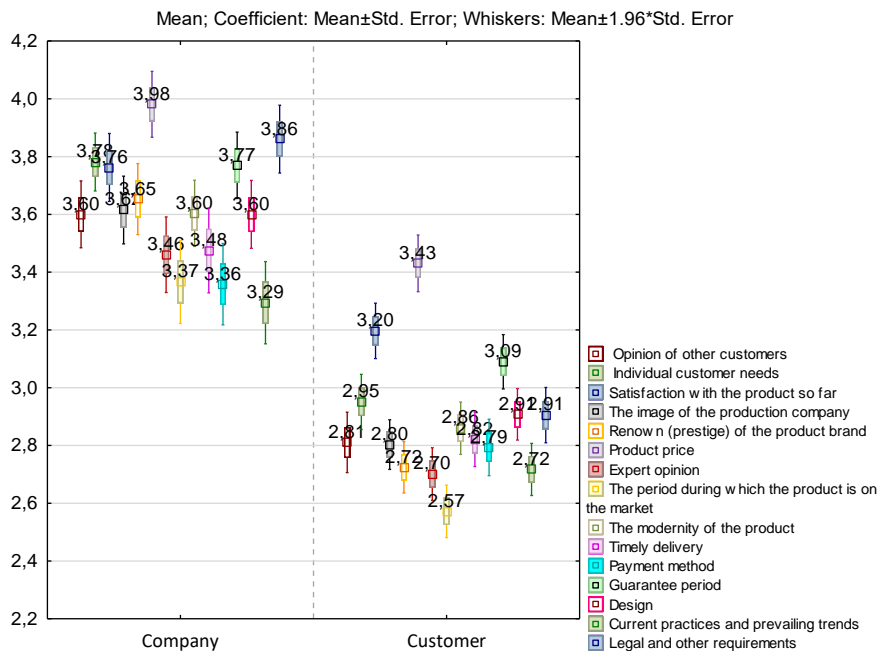


Fig. 4. Average ratings for individual factors in the group of customers and entrepreneurs from the V4 countries

The least difference in ratings between entrepreneurs from SMEs from V4 countries and their customers are in the assessments of product price (0.55), satisfaction with the products so far (0.56), or guarantee period (0.68). The SMEs from the V4 countries have the largest meaning described to aspects, i.e., product price (3.98), legal

and other requirements (3.86), individual customer needs (3.79), guarantee period (3.77) or satisfaction with the products of far (3.76). The least weight has current practices and prevailing trends (3.29).

Customers from the V4 countries the largest meaning noted for factors, i.e., product price (3.43), satisfaction with the products so far (3.20), or guarantee period (3.09), where the least weight received a statement that the period during which the product is on the market (2.57).

Later, it was analysed if managers of SMEs from the V4 countries modify the pro-environmental quality of products according to the expectations of their customers. In this aim, a ranking of the ratings (as in the case of the first analysis) of modification of the pro-environmental quality of products according to customers' expectations was created. Some evaluation results are different between groups. In the customers group, the highest rated were the implementation of modern, energy-saving machines and devices (3.72), the use of energy-saving lighting (3.67), and the use of pro-environmental sources to generate energy, heating, and cooling (3.58).

Entrepreneurs, on the other hand, assigned the greatest importance to the use of energy-saving lighting (3.94), compliance with the law (3.86) and similar as in the case of customers to the use of pro-environmental sources to generate energy, heating, cooling (3.70).

Furthermore, the research showed statistically significant differences in four statements: the use of energy-saving lighting $p < \alpha$ ($p = 0.0004$), implementation of the closed loop (closing the cycle in the production) $p < \alpha$ ($p = 0.0001$), implementation of modern, energy-saving machines and devices $p < \alpha$ ($p = 0.0156$), and compliance with the law $p < \alpha$ ($p = 0.0000$). It is shown in Table 5.

Tab. 4. Mann-Whitney U test results. Type of group and opinions on whether company managers modify the pro-environmental quality of products in line with customer expectations

No	Statement	p-value
1	The use of renewable energy sources in the production process	0.5761
2	The use of pro-environmental sources to generate energy, heating, cooling	0.2525
3	The use of energy-saving lighting	0.0004
4	Implementation of the closed loop (closing the cycle in the production)	0.0001
5	Implementation and functioning of a quality management system	0.2494
6	Implementation and functioning of an environmental management system	0.4356
7	Reducing the use of materials and raw materials	0.3499
8	Implementation of modern, energy-saving machines and devices	0.0156
9	Ongoing customer satisfaction surveys and customisation of products to their needs	0.0789
10	Popularisation of actions introduced for the improvement quality of products and minimising the negative impact on the natural environment	0.0715
11	Applying the principles of Lean Manufacturing	0.1550
12	Striving to meet market requirements on a national scale	0.1871
13	Striving to meet market requirements on an international scale	0.8947
14	Compliance with the law	0.0000
15	Other	0.0643

In turn, the results of the average ratings of individual factors in the group of customers from the V4 countries and entrepreneurs from SMEs are presented in Figure 5.

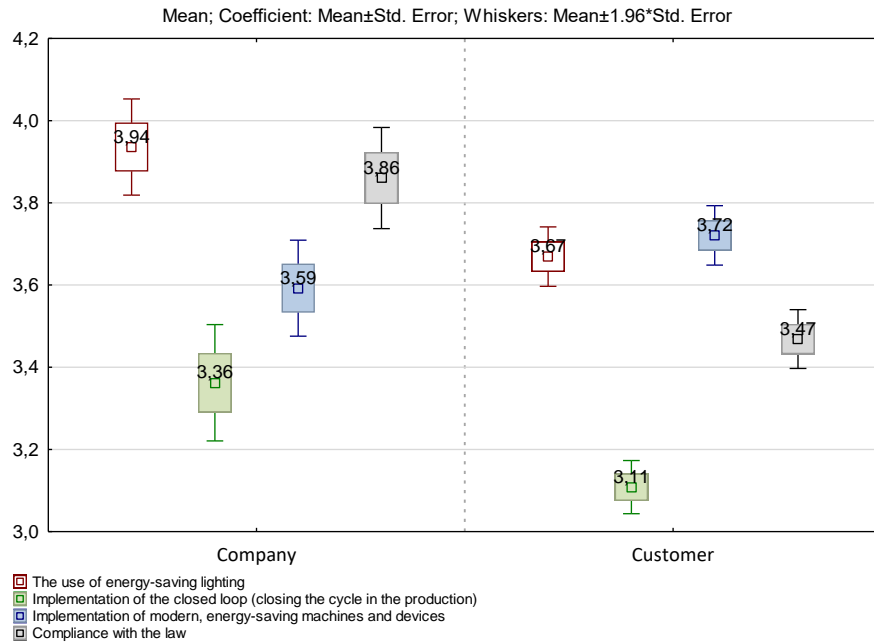


Fig. 5. Average ratings of individual factors in the group of customers and entrepreneurs

It was concluded that entrepreneurs rate the use of energy-saving lighting more highly (3.94), implementation of the closed loop (closing the cycle in production) (3.36), and compliance with the law (3.47). Customers rated the higher statement, that is, implementation of modern energy-saving machines and devices (3.72). The greatest differences between the results obtained in the study groups were observed for compliance in law (0.39), where it was more important for enterprises than for customers.

Discussion

The modern approach to the management of enterprises and the increased participation in the principles of sustainable development have become a major undertaking in the countries of the Visegrad Group (V4) (Korzynski et al., 2009; Smith et al., 2022). It turns out that it is necessary to meet customers' expectations about product quality and simultaneously take care of the natural environment (Goh & Chong, 2023; Weina & Yanling, 2022). However, it is problematic to unequivocally state a good approach which allows customers' satisfaction and limits the negative impact of products on the natural environment (Ostasz et al., 2022; Pacana, 2015; Pacana & Siwiec, 2022). Therefore, the research aimed to analyse i) current activities toward quality and natural environment making by enterprises from V4 countries belonging to SMEs from the electromechanical industry and ii) current customers' satisfaction with the quality of environmentally friendly products.

It was shown that managing SMEs from V4 countries, mostly of analysed statements, do not think like their customers in the area of quality product improvement. For example, significant differences were obtained in case the statements, i.e. customers will pay more if they get a high-quality product, a high-quality product is the product that meets the current requirements of customers, customers pay attention to the high-quality packaging of the product, or the higher price of high-quality products significantly discourages customers from buying them.

In this case, it was concluded that customers with the highest weight attached to the quality of the products (3.84) confirmed that they would pay more if they got a high-quality product (3.83). In turn, SMEs from V4 countries concluded that, as a company, it strives to improve product quality (3.95) continuously and also confirmed that a high-quality product is a product that meets the current requirements of customers (3.82).

Importantly, it is mentioned that enterprises least agree with the statement that currently, high-quality products also have a high level of environmental friendliness (3.29). It was shown that the greatest discrepancy between the opinions of companies and customers was obtained from the statement that companies strive to improve the quality of products continuously.

Then, an analysis of survey results shows that SMEs from the V4 countries do not think similarly to their customers in pro-environmental areas of product quality improvement. It was observed that significant statistical differences were in the case of statements; for instance, a pro-ecological product is the product that meets the current requirements of customers, choosing a pro-ecological product can improve a customer's self-esteem, the higher price of pro-ecological products significantly discourages customers from buying them, or customers are more likely to buy a pro-ecological product if it has been previously recommended/tested.

At the same time, in the case of the highest-rated areas, they are the same in both groups (SMEs and customers from the V4 countries), where the assessment of the statement that the higher price of pro-ecological products significantly discourages customers from buying them (customer – 3.41- company 3.65), then customers are more likely to buy a pro-ecological product if it has been previously recommended/tested (customer – 3.35- company 3.53), and choosing a pro-ecological product can improve a customer's self-esteem (customer – 3.32- company 3.49).

The analysis of the research results also shows that SMEs from the V4 countries noted much more weight than customers to conditions of pro-environmental improving product quality. In the studied groups, only the product assessment (customer – 3.43 a company – 3.98) was evaluated as the most important, whereas other aspects of the analysis were different in the studied groups.

It was concluded that the managers of SMEs from the V4 countries modify the pro-environmental quality of products according to the customers' expectations. From the results of the analysis, out of the fifteen statements, significant differences were found only for the four aspects, which concerned the use of energy-saving lighting, implementation of the closed-loop (closing the cycle in the production), implementation of modern, energy-saving machines and devices, and compliance with the law.

Therefore, it was concluded that the current activities in the area of quality and environmental aspects of the improvement of the product undertaken by SMEs from the electromechanical industry in the V4 countries (Poland, Slovakia, Hungary, and the Czech Republic) are relatively inconsistent with the current expectations of their customers.

Conclusions

Striking for high-quality products and reducing negative environmental impacts are also becoming essential. The turbulent environment and the following climate change are intensifying qualitative-environmental actions, which can be perceived differently by enterprises and customers. Hence, the research aimed to analyse i) current activities on quality and natural environment making by enterprises from V4 countries belonging to SMEs in the electromechanical industry and ii) current customers' satisfaction with the quality of environmentally friendly products. The research was carried out in the form of surveys in Visegrad Group countries, i.e., Poland, Hungary, Slovakia, and the Czech Republic. Based on the results obtained so far, a comparison was made of the current activities and expectations of SMEs and their customers from the V4 countries.

The main conclusions from the conducted analyses indicate that managers of SME enterprises from the V4 countries (Poland, Slovakia, Hungary, and the Czech Republic) mostly:

- do not think like their customers in the area of improving the quality of products,
- do not think like their customers in the area of pro-environmental improvement of product quality,
- attach much more importance than customers to the conditions of pro-environmental improvement of product quality,
- modify the pro-environmental quality of products in accordance with the expectations of their customers.

It was shown that the approach of SMEs and customers from the V4 countries to qualitative-environmental aspects of product improvement is relatively inconsistent. For this reason, it is advisable to continue research to observe trends and relationships that will allow the formulation of quality and environmental rules for these enterprises.

Hence, future research will rely on obtaining more data by survey research to extend the sample size (SMEs from the electromechanical industry from the V4 countries and their customers). In addition, it is planned to analyse other qualitative-environmental aspects to determine the current state of approach SMEs from the V4 countries and its conformity with customers' expectations and simultaneously with a pro-ecological approach to product quality management.

The results presented in the study and the conclusions developed can be useful to the management of electromechanical industry SMEs in the V4 countries to establish new activities that will allow product quality management in a manner consistent with current customer expectations and simultaneously environmentally friendly. Furthermore, the conducted analyses can be used by other types of companies that strive to continuously improve the quality of products according to the principles of sustainable development.

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