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A DIFFERENTIATION OF THE BENEFITS OF ISO 14001 ADOPTION IN MANUFACTURING COMPANIES

This article aims to analyze the benefits of implementing Environmental Management Systems (EMS) in accordance with the ISO 14001:2015 standard in Polish manufacturing companies. The study focuses on identifying how the internal characteristics of a company, and its financial situation, influence the variety of benefits obtained from ISO 14001 implementation. The main goal is to understand the role of EMS in the context of the broadly defined Qstrategy of sustainable development (SD) of enterprises. Filling the research gap also involves determining the factors differentiating the scale of benefits, considering both the attributes of enterprises and the parameters of their financial situation. The research methodology uses primary data, collected through a questionnaire survey of enterprises, and secondary data, including financial information. Mann-Whitney and Kruskal-Wallis statistical tests are used to analyze and evaluate the differentiation of benefits. The results indicate significant differences in perceptions of the advantages of implementing ISO 14001, depending on factors such as the enterprise's origin of capital, the geographical scope of its activity, and its financial condition. Among the most significant benefits mentioned are compliance with legal requirements, an improved company image, increased customer numbers, and growth in operational efficiency. The article contributes to the literature on environmental management, emphasizing the importance of diversification of a company's internal and external factors in the context of the benefits arising from EMS. The implications of this study are significant, both for the theory of environmental management and for business practices; it offers insight into how companies can maximize the benefits of implementing the ISO 14001 standard.

Keywords: environmental management system, ISO 14001 benefits, companies, environment, social and government (ESG), organizational eco-innovations.

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1. INTRODUCTION

A company's ability to sustain itself in an increasingly competitive market relies on several factors. These include not only internal factors such as resources, technology, level of costs, price setting, and distribution networks but also external factors, namely market preferences, availability of substitutes, and offers from competitors. The role and significance of these factors are interchangeable, with some losing value while others gain. One factor growing in importance in companies' development is the organizational attitude aimed at respecting principles of environmental protection (e.g., Johnstone and Hallberg, 2020; Su et al., 2015; Wang, Zhao, 2020). Add to this the increasing significance of environmental protection issues in national and EU legislature, and changing organizational attitudes are also due to the growing societal ecological awareness that continues to influence established companies and entrepreneurs.

Environmental management aims to design and implement integrated solutions that fulfill requirements for sustainable development (SD), namely activities aimed at reducing pollution and minimizing negative impacts on the natural environment, economy, and society (Ociepa-Kubicka et al., 2021; Stec, Grzebyk, 2022). Companies, in their attempts to comply with principles of environmental protection, undertake varied activities aimed at better utilization of resources and production materials or at improved efficiency of initiated processes that constitute the organization's pro-environmental activities. Such endeavors include, amongst others, elimination of pollution through investment activities in efforts to change the physical properties of processes/products, recycling of materials involving the accumulation and management of physical waste products for re-use, reduce the overall quantity of waste generated by introducing changes to ongoing processes, reducing fuel and energy consumption through the application of innovative solutions and limiting water usage (Schoenherr, 2012; Wu et al., 2022; Bravi et al., 2020; Camilleri, 2022). Organizations are supposed to transform toward energy consumption that is environmentally friendly and renewable (Wang, 2020).

Environmentally friendly companies conduct their business with the intent to minimize their burden on the natural environment, which ultimately proves to be profitable for them (Matuszak-Flejszman, 2009). Moreover, such organizations gain further, benefitting from their improved ecological image by winning the confidence of their customers, investors, and other stakeholders (e.g., Mosgaard et al., 2022). Therefore, a company's obligation to conduct business while respecting natural resources is more often demonstrated. It is more the case with companies whose activities impact the natural environment. Companies undertake varied initiatives to protect the environment by implementing certified systems and programs, including environmental management systems (EMS) in compliance with ISO 14001:2015.

The ISO 14001 standard is a set of management processes and procedures that enable organizations to analyze, monitor, and reduce environmental impacts of their production and service activities, aimed at reducing manufacturing costs, improving production efficiency, reducing the volume of waste generated, thus ensuring compliance with legal and other requirements which the organizations have committed themself to (Melnyk et al., 2003; Zobel, 2013; Will et al., 2021).

This system is a worldwide solution suitable for application in any organization to obtain improvements in environmental outcomes (Testa et al., 2014). It is voluntary and based on the continual progress in minimizing pressure on the natural environment; however, the reduction scale depends on the company (Matuszak-Flejszman, Paliwoda,

2022). The ISO 14001 standard is implemented by organizations regardless of their business profile. However, using ISO 14001 certificates is visible mainly in manufacturing sectors (31–33 according to the North American Industry Classification System – NAICS) (Su et al., 2015).

Manufacturing companies are aware of the importance of environmental requirements requirements. They reduce the negative impact of industrial activity on the natural environment and thus adopt environmental management systems. Companies that have decided to implement the ISO 14001 standard must identify processes that significantly affect the natural environment and define procedures for their continuous improvement (Brodnicka, Jakubiec, 2016; ISO Survey, 2021).

Entrepreneurs, as such, focus on management geared toward SD (Bravi et al., 2020; da Fonseca et al., 2015; Kiselakova et al., 2020; Ociepa-Kubicka et al., 2021). The activities of companies can be defined by considering the economic, environmental, and social aspects of sustainability at its core (Fonseca et al., 2021; Pagell and Gobeli, 2009; Sroufe 2018). Structural change can foster environmentally friendly economic growth by shifting from carbon-intensive industries to greener alternatives (Villanthenkodath et al., 2022).

Standardization nowadays should be seen not only as a tool for the achievement of SD, strengthening green growth, or stimulating eco-innovations (Hajduk-Stelmachowicz et al., 2022) but also as a significant factor bringing us closer to the implementation of the assumptions of the circular economy (Szczygieł et al., 2022). Companies that adopt ISO 14001 standards signal their dedication to environmental excellence, foster trust within the broader community, and nations with numerous certifications exhibit an increased likelihood of attaining more sustainable economic development (Wang and Zhao, 2020). Technological advancements correlate with eco-friendly growth, and ISO 14001 is also significantly associated with SD (Abid et al., 2022; Szpilko, Ejdys, 2022).

Implementing environmental standards in the enterprise can lead to many benefits. Among them, there are tangible benefits and intangible ones. The implementation and use of this system allow for improving the company image. By adopting the ISO14001 system, the company can stand out from the competition, increase its market share, enter new markets, and reduce pressure on the natural environment (Sam, Song, 2022).

Achieving these and other benefits, however, depends on the actual commitment of the company to minimize the negative impact on the environment. Improving environmental performance can, therefore, translate into improving the company's economic performance (Sroufe, 2003). Only then will the system improve the company's competitiveness and will not be an additional burden or source of further costs. However, the scale of benefits achieved by enterprises varies (Johnstone, Hallberg, 2020). This differentiation may result from the company's involvement in pro-environmental initiatives and external and internal conditions (Fura, 2020). Different results can also come from the extent to which a company integrates environmental and governance improvements across business functions and operations (Srofue, 2018).

Within this study, we aim to recognize the benefits of implementing and using the ISO 14001 EMS in Polish manufacturing companies. Moreover, we define and look at the differentiation of these benefits depending on the internal characteristics of companies. Thus, we attempt to make contributions to this field of research by answering the following research questions:

1. What are the main benefits of implementing ISO 14001 and being certified for manufacturing companies in Poland?

2. Do firm features such as size, legal form, the source of capital, and conducting export activity impact the benefits of implementing ISO 14001?
3. Does the financial performance of certified companies impact the scope of benefits?
4. Does the maturity of the EMS of certified companies impact the scope of benefits?

This study is structured into five sections: an introduction followed by a literature review, the research method used in this study, the results and discussion of results, and, finally, the conclusions.

2. LITERATURE REVIEW

The benefits of adopting ISO 14001 systems have evolved. Danish research shows that the most common EMS objectives focus on energy/climate, waste, and water consumption, and the least common refers to external and product-related areas (Mette et al., 2022). Among the most frequently mentioned benefits is a reduction in operating costs. Pollution prevention, one of the foundations of EMS, creates mechanisms that minimize the consumption of raw materials and energy (Petraru, Gavrilescu, 2010). By improving the efficiency of current processes and implementing new, more effective processes, the system can thus influence the reduction of production costs (Christmann, 2000) and the improved quality of products/processes (Sartor et al., 2019). It starts from designing products and services in the most effective way to optimize/reduce the consumption of natural resources and energy without compromising quality, proper waste management, optimization of the selection of raw materials, materials and products, increasing the efficiency of the infrastructure used, storage, packaging and transport processes, reducing the level of wastage or non-value-added activities, struggle for cost-saving through enhancing the level of productivity and efficiency (Chen et al., 2022; Dev et al., 2020; Rossi et al., 2022).

Using an EMS makes it easier for the company to meet legal requirements (Jagodzińska, 2019; Matuszak-Flejszman, 2009). Regular supervision over compliance with environmental regulations should ensure that the company has a whole picture of its obligations in this area. It may help the company avoid fines and an unfavorable image regarding violating environmental protection regulations.

Developing an appropriate culture and pro-ecological awareness among the management and staff allows for the prediction of and often also influences future legal regulations in the field of environmental protection. This, in turn, allows harmonizing and adapting the development plans of enterprises to these regulations. An additional benefit is the possibility of gaining an advantage over competitors who begin adapting activities to the new regulations only when they are introduced (Psomas et al., 2011). The findings suggest that firms with a more substantial commitment to environmental performance are more likely to embrace ISO 14001 certification (Simpson, Sroufe, 2014; Vílchez, 2017).

Other benefits of implementing and using an EMS include environmental risk prevention through better management of environmental activities (Bravi et al., 2020) and risk reduction (Zębek, 2021). The EMS requires the identification of potential threats related to the company's operations and preparation against such threats. Therefore, the probability of situations that could harm the environment is reduced.

Banks, insurance companies, and potential investors base their decisions on risk assessment. Therefore, a systemic approach to the problem of minimizing potential threats puts the company in a favorable position regarding the abovementioned entities. Nevertheless, organizations in Poland seldom confirm discounts granted by the insurer

for being certified (Matuszak-Flejszman, 2009; Hajduk-Stelmachowicz, 2013; Hajduk--Stelmachowicz, 2017; Lemkowska, 2020). There is a need to build integrated environmental risk management tools based on awareness (including the risk of liability for environmental damage and its severity).

The ESMS – like the Environmental, Social, Governance (ESG) reporting system currently being promoted in the European Union (EU) – is based on risks and opportunities analyses and requires organizations to manage the environmental risks associated with their activities. The integrated management approach in ESG and an ISO 14001 – certified EMS indicates that organizations should consider environmental and social factors and their impact on the company's overall management and growth strategy. This approach provides the basis for setting SD goals in the coming years (Corporate Sustainability Reporting Directive – CSRD, 2022).

The number of organizations requiring their suppliers or partners to implement the ISO 14001 EMS is growing fast. The possession of such a system is more and more often a condition for maintaining or establishing cooperation (Seroka-Stolka, Gajda, 2015). Companies that supply large, transnational organizations often belong to the small and medium-sized enterprise (SME) sector. The situation may expand and result from the global tendency to introduce the principles of SD. On the other hand, there is growing evidence suggesting a gap between the sustainability commitments claimed by supplier companies and their real-world practices (Shalique et al., 2022).

The possibilities mentioned above of reducing own costs and improving relations with regulators, recipients, and society create conditions for strengthening or improving companies' market position. Moreover, a certificate of compliance with the ISO 14001 standard may also become a strong argument in applying for public contracts (Sorooshian, Ting, 2018).

According to research results (based on empirically tested on an international sample of 583 listed companies in 46 countries throughout 2009–2018), it was proven that ISO 14001 adoption "(1) contributes to reducing firm carbon emission intensity and increasing firm profitability; (2) the impact of ISO14001 on profitability is greater for companies from countries with high environmental awareness of the society and for larger firms; and (3) the impact of ISO 14001 on carbon intensity is greater for headquartered in countries with low environmental awareness of the society" (Arocena et al., 2021).

Benefits from implementing and certifying an EMS according to ISO 14001 from Brazil's companies were attributed to developing preventive cultures, methodologies for addressing environmental concerns, emergency preparedness, and effective document control. These measures potentially led to fewer penalties from the São Paulo State Environmental Agency (Rino, Salvador, 2017).

Environmental organizations in Poland are not very strong yet, but their role is undoubtedly growing. Examples from Western Europe show that they have a considerable impact force, and – if significant irregularities are detected in the use of the environment – conflict with them may turn out very unfavorable for enterprises. The research results on Norwegian companies indicate that companies facing greater complexity or environmental risk tend to derive more significant overall benefits from the ISO 14001 implementation than those with lower complexity or lower environmental impact (Gudeta, 2019).

The natural environment is primarily a concern of the societies of developed countries. Research in EU countries has shown that the environmental management idea motivates employees much more than the commercial aspects regarding quality assurance systems.

When internal stakeholders, e.g., employees, are aware of environmental problems, especially local ones (after training regarding environmental preservation and resource optimization), it is relatively easy to involve them in environmental protection activities (Awan et al., 2021). On the other hand (according to some research), difficulty in boosting employee/employers' environmental awareness and willingness is highlighted as one of the main barriers to ISO 14001 implementation (next to increased bureaucracy and increased complexity of environmental procedures) (Bravi et al., 2020; Camilleri, 2022). However, it requires an attitude from the management that proves that care for the environment is a part of the company's strategy and not just a temporary change in the practice.

Not all the benefits mentioned above will be visible immediately after implementing the system or receiving the ISO 14001 certificate. The benefits of putting the legal situation in order are usually indisputable and almost immediate. However, the benefits related to improving the image, motivating employees, employee support, enhancing talent attraction, retention, and productivity, improving the relations with stakeholders, or increasing market share take much longer.

The literature clearly shows that investment in environmental management leads to better business performance. The involvement of enterprises in environmental management practices can be explained by various reasons, particularly factors connected with a potential improvement in the enterprises' economic performance (Sarkis and Sroufe, 2004). The enhancement of internal processes, strengthening of results, prevention of potential problems, and a large number of stakeholders indicate serious performance improvements (Reis et al., 2018).

Results show that the benefits appeared in certified companies classified into internal, external, and relations issues. However, certification's impact on enterprises' economic performance is positive according to one study, negative according to others, and neutral according to another. It is suggested that the ISO 14001 standard has clear benefits on operational performance, people, and customer results and that the effects on financial performance are inconclusive (Szubart, Fura, 2016; Hajduk-Stelmachowicz, 2017). This situation results from the diversified context of the research along with internal and external conditions for the functioning of enterprises. Therefore, the paper fills the existing research gap by identifying the factors influencing the differentiation of benefits resulting from the ISO 14001 certificate implementation.

3. METHODS

The research within this study makes use of both primary and secondary data. The data was obtained using a questionnaire. The analysis was conducted mainly by applying computer-assisted telephone interviewing (CATI). Company respondents were asked to assess ISO 14001 benefits according to the scale with values from -2 to 2, where -2 – definitely do not agree, -1 – do not agree, 0 – neither yes nor no, 1 – agree, 2 – definitely agree.

The empirical analysis of the primary data was based on the Mann-Whitney and Kruskal-Wallis tests. The Mann-Whitney test is a non-parametric equivalent of the Student's t-test applied in case of two comparative groups, and the Kruskal-Wallis test is a non-parametric equivalent of a variance analysis used in case of three or more groups (Aczel, 2000). Apart from their parametric equivalents, the tests do not require many restrictive assumptions (Jóźwiak, Podgórski, 2012). If the Kruskal-Wallis test was

significant, then a post hoc analysis was used additionally to indicate different groups (Stanisz, 2006).

Secondary data, i.e., data from the companies' financial statements, was also used. They were available in the Emerging Markets Information Service (EMIS) database. In this way, information about liquidity, profitability, debt level, and business efficiency was obtained, making it possible to assess the average financial situation of the companies in the years 2012–2017. The assessment was performed by using the E. Mączyńska discriminant function. This model is defined by the linear function (Mączyńska, 1994):

$$ZM = 1.5X_1 + 0.08X_2 + 10.0X_3 + 5.0X_4 + 0.3X_5 + 0.1X_6 \quad (1)$$

where: X_1 – (gross profit + depreciation)/total liabilities,
X_2 – gross profit/total liabilities,
X_3 – gross profit/balance sheet total,
X_4 – gross profit/sales revenues,
X_5 – value of inventory/sales profit,
X_6 – sales revenues/balance sheet total.

A negative value of ZM means that a company is at risk of bankruptcy; a positive value of ZM, yet less than 1, represents a weak company but not at risk of going bankrupt; a positive value within the range of 1–2 means a relatively sound company, and a value above 2 shows that a company is in a very good situation. To classify the companies, two groups were distinguished, i.e., companies in a good financial situation ($ZM \geq 1$) and companies in a bad financial situation ($ZM < 1$).

4. RESULTS AND DISCUSSION

Sample selection

The research was nationwide. The statistical population included 21,317 entities conducting business operations, which, as of 21st January 2018, were classified in the EMIS database in the manufacturing sector (31 according to the NAICS). For the above-mentioned statistical population, the minimum size of the sample was assessed to include 1,016 entities (Sample Size Calculator, 2018). Due to the number of companies registered in the macroregions (NUTS 1, 2018), the representative sample was drawn using an online generator of random numbers (Random Number Generator, 2018). The response rate was 76.8%, and the size of the examined sample was 780 entities (Table 1).

Table 1. Structure of the sample/population by macro-region and voivodeship

Macroregion	Population	Sample	%	Voivodship	Population	Sample	%
North	3919	187	18.38	małopolskie	1412	67	6.62
				śląskie	2507	119	11.76
North-west	4135	197	19.40	wielkopolskie	2790	133	13.09
				zachodniopomorskie	834	40	3.91
				lubuskie	511	24	2.40
South-west	2326	111	10.91	dolnośląskie	1770	84	8.30
				opolskie	556	26	2.61

Table 1 (cont.). Structure of the sample/population by macro-region and voivodeship

Macroregion	Population	Sample	%	Voivodship	Population	Sample	%
North	3897	186	18.28	kujawsko-pomorskie	1335	64	6.26
				warmińsko--mazurskie	644	31	3.02
				pomorskie	1918	91	9.00
Central	1670	80	7.84	łódzkie	1251	60	5.87
				świętokrzyskie	419	20	1.97
East	1944	93	9.12	lubelskie	598	29	2.81
				podkarpackie	869	41	4.08
				podlaskie	477	23	2.24
Mazowieckie vivodeship	3426	163	16.07	mazowieckie	3426	163	16.07
Total	21317	1016	100.00	Total	21 317	1016	100.00

Source: own studies.

Sample Characteristics

Out of 780 surveyed companies, 300 had implemented the ISO 14001 EMS. The remaining 312 companies did not implement the system, and 168 declared the implementation of other management systems. Among ISO 14001-certified enterprises, small companies accounted for almost 13.34%, medium entities for 35.33%, and 51.33% were large companies.

Among the enterprises with the ISO 14001 system implemented, the highest percentage constituted companies that had implemented the ISO 14001 environmental management system for over 12 years (32.0%). Companies that used the system for 9 to 12 years accounted for another percentage, i.e., 20.3%. Those who used the system from 6 to 9 years and 3 to 6 years accounted for 16.3% each. The smallest share (12.0%) constituted companies that used it for the shortest time, i.e., less than 3 years. The rest were missing data (3.1%).

The sample dominated companies operating on an international scale, constituting 84.35%. The remaining 15.7% of companies were acting on a local, regional, or national scale.

Export activity was related to the spatial scale of the companies' activity. Among the entities with the ISO 14001 certificate, only 5.7% did not conduct export activities. Such activity was the domain of 92.7% of companies. The remaining percentage was missing data.

Among the entities with an implemented ISO 14001 EMS, 61% were companies with a majority of Polish capital, 38.3% had a predominance of foreign capital, and 0.7% had missing data.

Limited liability companies dominated the sample. They constituted 63% of companies with the ISO 14001 certificate, 24.3% of joint-stock companies, and 12.7% represented a different legal form.

ISO 14001 Benefits

The potential benefits achievable from implementing ISO 14001 are shown in Table 2.

The surveyed organizations believed compliance with legal obligations and contractual agreements was the highest advantage of operating an EMS based on ISO 14001. More than 90% of enterprises strongly agreed and agreed that such a benefit would occur. It is surprising because, in the light of applicable regulations, each organizational unit is supposed to operate under applicable legal provisions. On the other hand, implementing ISO 14001 requirements helps companies better identify and understand legal requirements regarding environmental protection that apply in their area of activity (e.g., industry or market). Thanks to this, enterprises can not only adapt their processes and activities to current legal and other requirements but also prepare for planned changes, avoiding the risk of violating the law, possible sanctions (including financial image), or generating the effect of priority on the market compared to increasingly stringent legal requirements, which may require significant changes in the area of, for example, the production process or pro-ecological evolution of the product.

Table. 2. ISO 14001 benefits

Benefits	I definitely do not agree	I do not agree	Neither yes nor no	I agree	I definitely agree	N.A.
Improving the properties of products	12	25	103	138	21	1
	4.00%	8.33%	34.33%	46.00%	7.00%	0.33%
Improving product quality	7	36	98	137	21	1
	2.33%	12.00%	32.67%	45.67%	7.00%	0.33%
Improving the image of the company	0	1	57	181	60	1
	0.00%	0.33%	19.00%	60.33%	20.00%	0.33%
Reducing pressure on the environment	0	7	48	199	45	1
	0.00%	2.33%	16.00%	66.33%	15.00%	0.33%
Increasing productivity / efficiency	2	28	91	154	24	1
	0.67%	9.33%	30.33%	51.33%	8.00%	0.33%
Increase in the number of customers/increase in market share	1	26	68	152	52	1
	0.33%	8.67%	22.67%	50.67%	17.33%	0.33%
Increasing work safety	2	19	62	179	36	2
	0.67%	6.33%	20.67%	59.67%	12.00%	0.67%
Improving relationships with stakeholders	0	11	47	152	88	2
	0.00%	3.67%	15.67%	50.67%	29.33%	0.67%
Compliance with legal requirements	1	0	25	155	117	2
	0.33%	0.00%	8.33%	51.67%	39.00%	0.67%

Source: own studies.

Identification of stakeholders, and thus a better understanding of their needs and changing expectations over time, reduces the risk of conflicts and improves relations with them. It should translate into a greater level of mutual trust and better cooperation.

The second most important benefit in the opinion of the surveyed enterprises was the reduction of pressure on the natural environment (e.g., by managing the impact of the organization's activities on the natural environment, reducing costs by preventing pollution, e.g., reducing greenhouse gas emissions, efficient use of resources, waste management, biodiversity protection, and other activities on for SD and environmental protection). 81.33% of enterprises strongly agreed with the occurrence of such a benefit.

Two further benefits, which received 80.33% and 80% strongly affirmative and affirmative ratings, respectively, were the company's image improvement and improved relations with interested parties (including customers, suppliers, investors, local community, and employees). As previously mentioned, a properly functioning environmental management system is increasingly perceived as a crucial element of the ESG strategy. More and more investors and financial institutions pay attention to ESG factors when making investment decisions. Companies focusing on ESG can attract more informed investors, increase market value, and build a better image. Taking ESG into account over the long term can contribute to a more sustainable and SD of both companies and society. It should be remembered that subsequent generations of individual customers (e.g., Generation Z) are increasingly sensitive to the pro-ecological image of the company confirmed by an independent and trustworthy certification organization.

In the opinion of 71.67%, the implementation, operation, and improvement of EMS contributes (12.00%) and contributes (59.67%) to increasing work safety. The proper functioning of the EMS is based on training. As a result, employees may be better prepared to deal with environmental and work-related threats. The actual involvement of management in the continuous improvement of the system, in the actual implementation of goals, and in providing employees with the resources necessary to manage risk (after its correct identification) should translate into increased awareness of threats, understanding the essence of prevention and changing undesirable behaviors to those that improve the quality and safety of work. Integrating policies and strategies within both systems (quality and environmental management) reinforce each other, leading to a coherent approach to safety, health, and environmental protection and generating a synergy effect.

Based on the opinions of the surveyed company respondents, there was an increase in the number of customers/market share. 17.33% of enterprises fully agreed with this benefit, and 50.67% agreed. In total, 68% of the surveyed entities noted such a benefit. In some industries and regions, ISO 14001 certification is required or preferred by customers, suppliers, or public authorities. For enterprises, this may open new markets (including international ones) or enable participation in tenders (public procurement) that require such certification.

According to the respondents, ongoing development of the formal EMS under discussion produced financial advantages in addition to image benefits. A total number of 59.33% of enterprises recorded an increase in efficiency/productivity. This value comprised 8% of "I definitely agree" responses and 51.33% of "I agree" responses. Modifying the processes implemented in the company to make them more environmentally friendly can lead to improved product properties. Such a benefit was confirmed by a total of 53% of respondents. The advantage that received the fewest affirmative answers was the product quality improvement. In total, 52.67% of the surveyed enterprises answered definitely agree and agree. It was also in the case of this benefit that the most answers were "neither yes nor no" – 34.33%, as well as the answers "I disagree" and "I definitely disagree."

It can be assumed in simple terms that the operation of an EMS based on ISO 14001 aims to reduce the negative environmental impact of a company's activities. Some researchers stress that an EMS is not directly related to improving product quality. The reasons that may result in a lack of noticeable improvement in product quality due to ISO 14001 certification include:

- Focus on environmental aspects: Enterprises may focus mainly on meeting requirements related to environmental management and reducing the negative impact on the environment (mainly in the context of meeting legal issues), forgetting about the simultaneous improvement of product quality (lack of integration of environmental and quality aspects within the PDCA cycle).
- Lack of link between the ISO 14001 standard and product quality: ISO 14001 focuses on environmental issues and refers to a management system, while improving product quality is usually related to other norms, such as ISO 9001, which refers to quality management (no actual integration of quality and environmental management systems).
- Failure to properly implement and supervise the operation of the system: If the company has not implemented ISO 14001 adequately or does not provide adequate resources and adequate supervision of the processes, this may lead to a lack of visible benefits, including improvements in product quality (in this context, internal audits do not fulfill their function and management commitment is illusory).
- Lack of measurement and product quality monitoring (area for improvement: operational control). Companies may fail to monitor and measure the quality of their products adequately (e.g., considering quality-environmental metrics), which prevents the identification of quality improvements to ISO 14001 certification.
- Focus on short-term goals (as exemplified by a *greenwashing strategy*): Some companies may focus on achieving minimum regulatory requirements to meet certification requirements or customer expectations rather than aiming for long-term improvements in the quality environmental characteristics of products throughout their life cycle – to eliminate this problem, the application of a Provenance-By-Design approach to EMS may be an exciting solution (Moreau et al. 2023).
- Lack of adequate employee involvement: Effective product quality improvement requires employee involvement at all levels of the organization. Suppose employees are not adequately involved in the quality improvement process. In that case, this can hinder noticeable results (employees perceive differences between statements and actual actions – lack of a strategic, systemic, and process approach to environmental-quality issues). In this context, cultural factors influencing the perception of quality should be kept in mind (Małkowska et al. 2022) – quality is approached differently in Japan, Ukraine, and Georgia.

According to the researchers, there is a need for further research so that it is possible to adjust the quality and environmental approach (integrating qualitative-environmental actions in all decision-making processes) when improving the quality of products, especially in SMEs (Siwiec et al., 2022; Hajduk-Stelmachowicz et al., 2022).

Differentiation of Benefits

The assessment of the variation in the benefits of implementing ISO 14001 EMS was first carried out about the variables source of capital of the enterprises, export performance,

financial situation of the surveyed enterprises, and spatial extent of business activity. The Man-Whintey test was used to assess differentiation (Table 3).

The companies' responses varied according to the origin of the companies' capital. Here, differentiation was observed for the following benefits groups: an increase in the number of customers and improved stakeholder relations. Enterprises with foreign capital rated the scale of the listed benefits higher than companies with Polish capital. The export grouping variable (yes/no) also differentiated the responses of enterprises in the case of benefits: increase in the number of customers and benefits: compliance with legal requirements. The scale of these benefits was statistically significantly higher among exporters than non-exporting enterprises. The responses of enterprises did not vary depending on the financial situation of the surveyed enterprises. It means that the scale of the analyzed benefits of implementing, applying, and improving an environmental management system based on the requirements of the ISO 14001 standard was similar for both companies in good and bad financial situations. However, the responses of the enterprises differed according to the spatial scale of the enterprises' activities. This variable differentiated the occurrence of the following benefits: improved product characteristics, improved product quality, and compliance with legal requirements. A higher benefit in terms of improved product characteristics and improved product quality was noted among enterprises operating locally/regionally/nationally than among enterprises operating in international markets. In contrast to businesses operating locally, regionally, and nationally, those engaged in international markets benefited more from adherence to legal requirements.

Table 3. Differentiation of ISO 14001 benefits – Mann-Whitney test results

Grouping variable:	Capital (Polish/foreign)		Export (yes/no)		Financial situation (good/bad)		Spatial range (local, regional, natio-nal/international)	
ISO 14001 benefits	Z adj.	p-value	Z	p-value	Z adj.	p-value	Z adj.	p-value
Improving the properties of products	0.2180	0.8274	-0.79356	0.427453	-0.94075	0.346836	2.88077	0.003967*
Improving product quality	0.2612	0.7939	-0.36739	0.713330	-0.47685	0.633468	3.58968	0.000331*
Improving the image of the company	-0.6091	0.5425	-0.72743	0.466964	-1.13189	0.257680	1.94108	0.052250
Reducing pressure on the environment	-0.4025	0.6873	-1.26382	0.206297	-0.87006	0.384271	0.40655	0.684342
Increasing productivity/ efficiency	-0.6071	0.5438	-1.33288	0.182571	0.67787	0.497855	0.96913	0.332481
Increase in the number of customers/inc rease in market share	-1.9953	0.0460*	-2.16759	0.030191*	0.20550	0.837183	0.92541	0.354754

Table 3 (cont). Differentiation of ISO 14001 benefits – Mann-Whitney test results

Grouping variable:	Capital (Polish/foreign)		Export (yes/no)		Financial situation (good/bad)		Spatial range (local, regional, natio-nal/international)	
ISO 14001 benefits	Z adj.	p-value	Z	p-value	Z adj.	p-value	Z adj.	p-value
Increasing work safety	-1.0492	0.2941	-1.74311	0.081315	-0.05001	0.960115	0.08291	0.933922
Improving relationships with stakeholders	-1.9905	0.0465*	-1.93925	0.052472	-0.73621	0.461606	-0.87746	0.380236
Compliance with legal requirements	-1.2082	0.2270	-2.79016	0.005269*	-1.31155	0.189673	-2.25869	0.023904*

* significant at the level of 0.05.

Source: own studies.

It can be surmised that the foreign-owned enterprises surveyed rated the scale of the listed benefits of a formal EMS higher than Polish-owned enterprises because:

- they often have more financial, technological, and operational resources than local enterprises. It may enable them to invest in more advanced technologies, increase their operational efficiency, and pursue expansion on a larger scale;
- they have access to cutting-edge technologies and know-how that may be more advanced than those available in the local market. It can result in more innovative and competitive products and services;
- thanks to their presence in many markets, they can have easier access to global distribution networks, customers, and business partners (market knowledge);
- they often have an established reputation and recognition in international markets and have culturally specific knowledge, which can help them gain customer trust and increase the attractiveness of their products;
- in some cases, foreign companies may receive support and incentives from the local government to invest in a particular market.

Subsequently, the variation analysis was carried out against the variables: company size, legal form, and the maturity level of the ISO 14001 EMS. The results of this analysis were carried out using the Kruskal-Wallis test (Table 4).

Table 4. Differentiation of ISO 14001 benefits – Kruskal-Wallis test results

Grouping variable:	Size		Legal form		ISO 14001 maturity	
ISO 14001 benefits	Kruskal--Wallis test	p-value	Kruskal--Wallis test	p-value	Kruskal--Wallis test	p-value
Improving the properties of products	H (2, N= 299) =2.180360	0.0183*	H (2, N= 299) =2.064477	0.3562	H (5, N= 291) =3.724233	0.5898
Improving product quality	H (2, N= 299) =2.929388	0.2312	H (2, N= 299) =3.361475	0.1862	H (5, N= 291) =5.753481	0.3310
Improving the image of the company	H (2, N= 299) =2.117230	0.3469	H (2, N= 299) =1,828513	0.4008	H (5, N= 291) =9.495590	0.0909

Table 4 (cont.). Differentiation of ISO 14001 benefits – Kruskal-Wallis test results

Grouping variable:	Size		Legal form		ISO 14001 maturity	
ISO 14001 benefits	Kruskal--Wallis test	p-value	Kruskal--Wallis test	p-value	Kruskal--Wallis test	p-value
Reducing pressure on the environment	H (2, N= 299) =3.871644	0.1443	H (2, N= 299) =.1933012	0.9079	H (5, N= 291) =9,688971	0.0845
Increasing productivity / efficiency	H (2, N= 299) =5.994162	0.0499*	H (2, N= 299) =1.430044	0.4892	H (5, N= 291) =2.310389	0.8047
Increase in the number of customers / increase in market share	H (2, N= 299) =18.66476	0.0001*	H (2, N= 299) =8.052317	0.0178*	H (5, N= 291) =1.299942	0.9349
Increasing work safety	H (2, N= 298) =7.092225	0.0288*	H (2, N= 298) =.8085400	0.6675	H (5, N= 290) =4.702540	0.4533
Improving relationships with stakeholders	H (2, N= 298) =14.20928	0.0008*	H (2, N= 298) =5.184913	0.0748	H (5, N= 290) =4.193407	0.5219
Compliance with legal requirements	H (2, N= 298) =8.006362	0.0183*	H (2, N= 298) =3.863064	0.1449	H (5, N= 290) =7.452152	0.1891

* significant at the level of 0.05.

Source: own studies.

The size of the enterprise is associated with the following benefits: improved product characteristics, increased productivity/efficiency, increased number of customers/market share, increased occupational safety, improved stakeholder relations, and compliance with legal requirements.

The scale of the benefits mentioned was higher in small enterprises than in medium-sized enterprises. The organizational structure and activities in larger companies are more complex, and the accountability process is blurred. Implementing solutions resulting from ISO 14001 can help systematize and standardize activities, resulting in greater flexibility for small enterprises in the decision-making process. It may contribute to increasing the actual control over the impact of entities on the environment, which translates into the implementation of the established goals resulting from the adopted strategy. Small enterprises (especially those operating in industrial processing) most often have to work in supply chains if they want to acquire new customers/conquer new markets/expand the scope of their operations. These entities are subject to additional audits, their documentation is relatively easy to verify, and all this favors the creation of goals relating to pro-environmental issues.

On the other hand, in the case of SMEs, requirements relating to internal audits and managerial reviews are particularly challenging to implement. According to research by other authors, SMEs encountered the most significant challenges in implementing the following objectives: reducing reliance on primary raw materials, working towards achieving climate neutrality and SD, and attaining closed-loop material processes. These problems undoubtedly affect the scope of benefits obtained from the system's functioning (Kafel, Nowicki, 2023).

The variable: legal form differentiated the responses of enterprises only in the case of benefits: increasing the number of customers/increasing market share. The number of

customers increased to the greatest extent in joint-stock companies and was significantly higher than in enterprises organized under another legal form. Joint stock companies, especially those listed on the stock exchange, are subject to strict requirements and regulatory supervision. Their reports are subject to an in-depth analysis by investors, clients, and other actors, e.g., the media. Building a positive image of the company in the conditions described requires a greater degree of transparency, which translates into stakeholder trust. It is particularly significant for the implementation of CSR goals. Joint-stock companies often have access to more substantial financial resources, which promotes the appropriate operation and improvement of the environmental management system compliant with the ISO 14001 standard. Investors, especially those interested in ESG aspects, may be more interested in investing in such companies, which draw additional funding and permit expansion firms. It may translate to retaining existing customers and acquiring new, more ecologically conscious ones.

The importance of a certified EMS based on ISO 14001 for listed companies will continue to grow. The Corporate Sustainability Reporting Directive (CSRD), introduced in December 2022, aims to deepen the connection between financial and non-financial reporting. Companies must disclose information on sustainability risks and their impact on financial results. The first reporting under the new rules is estimated to cover approximately 50,000 companies in the EU and should apply to the financial year starting on or after January 1, 2024 (PWC, 2022). The link between ISO 14001 and ESG reporting stems from organizations implementing the ISO 14001 standard having clearly defined procedures for managing their environmental impacts and properly documenting activities in this area. The international standard ISO 14090, "Adaptation to climate change", does not directly extend the scope of ISO 14001 but can be a complement to this standard, among others, in the context of providing tools and methods for climate risk management (including those relating to changing weather patterns, the risk of floods, droughts, fires, extreme weather conditions, interruptions in energy supplies, staffing problems, disruption of supply chains, *lockdowns, blackouts*, or insufficient availability of raw materials, reduction of greenhouse gas emissions) (Silk Road Certification, 2023).

The last of the grouping variables included, i.e., the maturity level of the ISO 14001 EMS, was not a variable that differentiated the scale of potential benefits from implementing and using the ISO 14001 EMS. It means enterprises with both the system for the shortest and the longest time similarly experienced the scale of benefits. It is a surprising situation that should be subjected to further scientific research.

5. CONCLUSIONS, LIMITS, AND FUTURE RESEARCH

From year to year, activities for environmental protection constitute one of the most critical tasks in the management strategy for the top management in companies. Paradoxically, a lack of understanding of this task in the past or waiting for legislation to force action can put manufacturing firms in a reactive position. This business-as-usual approach of the past misses opportunities to realize internal and external benefits while detrimental impacts on the environment continue to cause problems for the planet and society. More and more often, enterprises strive to achieve visible effects of environmental activities through controlling their products and services. Across various industrial sectors, a company's environmental management undergoes a series of distinct developmental stages. Each stage includes descriptions, involved stakeholders, policies, tools, indicators, organizational structure, and temporal behavior graphs (Ormazabal et al., 2017).

Enterprises with a functioning certified EMS enjoy several internal and external benefits. These benefits may vary over time. This area requires more in-depth analysis by researchers. According to the companies surveyed, the maximum benefit is compliance with legal and other requirements to which the company has committed itself. In this way, companies avoid, among other things, environmental penalties and boycotts from increasingly environmentally conscious consumers. The idea of continuous improvement of the pro-environmental management system seems increasingly significant for Polish manufacturing companies. This fact is recognized by local communities and stakeholders, particularly representatives of the younger generation (Generation Z and Alpha). Greenwashing does not improve stakeholder relations – building a socially and environmentally responsible brand is a new area for building a competitive advantage.

In addition to the image benefits associated with implementing and using an EMS, enterprises also notice economic and image benefits. As a result of using the system, manufacturing companies may experience increased productivity and efficiency. This growth is possible, but at the same time, it depends on determinants that differentiate enterprises, such as size. For economic benefits to materialize, the company's involvement in minimizing the negative environmental impact, improving processes, or rational managing resources leading to genuine savings is needed. Image benefits were more important for large enterprises than small and medium-sized enterprises, entities exporting and operating on international markets than for enterprises operating locally, and entities with foreign capital.

In summary, it can be concluded that the scale of the benefits of ISO 14001 varies. It can be explained by the wide variety of companies operating in the manufacturing sector. There are small entities that are, for example, sub-suppliers of multinational corporations that are required to comply with the rules of large corporations, as are their customers. Being environmentally friendly is the be-all and end-all of small businesses. The largest group of companies, however, are the large operators who cannot afford to operate in non-compliance with legal requirements. Often, such entities take even more restrictive actions towards the natural environment, overtaking their rivals and increasing their competitiveness.

Implementing and continuously improving the EMS can allow all stakeholders to collaborate and cooperate. It creates better and more efficient communication and knowledge management. It also enhances societal well-being. Benefits resulting from ISO 14001 adoption in manufacturing companies in Poland are heterogeneous phenomena, and they should be studied using a multidimensional approach. Future studies should examine other business fields to differentiate benefits resulting from ISO 14001 adoption in various countries.

The raised problem of integrating the circular economy (CE) idea and EMS is significant at the international level (Jabbour et al., 2020). In this situation, both political decision-makers and the management of companies should exert their efforts and be focused on those issues related to sustainable strategic performance measurement on the macro-, mezzo-, and microeconomic levels. The ISO 14000 family can help in it as a component of knowledge management, e.g., in the field of open innovation, environmental innovation concerning environmental organizational and process innovation, and environmental product and marketing innovation, which have positive impacts on the companies' competitive capability (e.g., Skordoulis et al. 2020; Nguyen et al., 2022).

Expanding EMS into a CE requires new business model designs and partnerships (Kristensen et al., 2021). Environmental innovation is the intermediary factor that translates the gains achieved from environmental performance into improved financial performance. (Ong et al., 2019). Gaining measurable profits is impossible without designing and improving the model to develop the competency of internal environmental auditors (Apiworathanakorn et al., 2019).

The connection between EMS and the CE is rarely studied in emerging markets (Jabbour et al., 2020) – it should be changed. There is also a need to explore the organizational factors (the role of top management support, employee commitment, development of human capital) through which the internal culture and atmosphere of the organizations are improved to acknowledge acceptance of advance learning in attaining green innovation in sustainable practices (Zhang et al., 2022).

In terms of the limitations of this study, it is significant to be aware that most enterprises cannot indicate to what extent working with an ISO 14001-based EMS is responsible for obtaining specific groups of internal and external benefits in the economic, environmental, and social spheres. In the case of management system integration, it is difficult to determine whether the functioning of an organizational eco-innovation alone is responsible for a given outcome. Analytical instruments are necessary to quantitatively assess both the benefits and costs resulting from the operation of an EMS. Using metrics relating to green accounting is still insufficient, so isolating, evaluating, and quantitatively comparing benefits over time is very difficult. This aspect is pointed out by several researchers working on systemic (strategic) approaches to environmental management.

Our findings on the differentiation of benefits of ISO 14001 system adoption have important implications for academic research on EMS and policy implications for agencies responsible for compliance with sustainability standards and guidelines. The results of this study should be helpful for decision-makers, both enterprises with the adopted EMS certificate and entities without the ISO 14001 certificate. The management staff can use this knowledge to identify the potential benefits that can be achieved as a result of the implementation and functioning of the system. Engaging employees in these procedures gives them independence, increases morale, and promotes a healthy work environment, reducing downtime and increasing productivity.

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