
The Implementation of ISO 14001 In Developed Countries: Literature Review

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Article History

Recived : 04-07-2025

Accepted : 29-07-2025

Revision : 22-09-2025

ABSTRACT

Background: The implementation of ISO 14001 has become increasingly important in addressing global challenges related to sustainability and environmental management. Developed countries have demonstrated strong commitment to this standard as a means to enhance environmental performance, operational efficiency, and industrial competitiveness. Objective: This article explores the similarities and differences among various studies regarding the impact of ISO 14001 implementation, with a focus on both environmental and economic benefits. Methods: This study employed a qualitative descriptive method through a literature review guided by the PRISMA framework. Articles were sourced from Google Scholar using keywords related to ISO 14001, and were then screened and selected based on predefined inclusion and exclusion criteria. Out of 1,650 articles initially identified, 16 were selected for further analysis. Results: The findings indicate that ISO 14001 generally contributes positively to carbon emission reduction and profitability improvement, particularly in countries with high environmental awareness. These studies also emphasize the importance of contextual factors such as company size, market pressure, and national culture in determining the effectiveness of certification. Although most studies employed quantitative methodologies, there was variation in geographical and industrial focus, as well as in adoption motivations, ranging from export advantages to internal company improvements. Conclusion: The success of ISO 14001 implementation is not universal and depends on the specific conditions of each company and country. Therefore, a more tailored approach and adequate policy support are necessary to encourage broader and more effective adoption of this standard.

Keyword: ISO 14001 Certification, Environmental management, Environmental performance

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INTRODUCTION

The implementation of ISO 14001 in developed countries has gained significant attention as organizations increasingly realize the importance of managing their environmental impact through a structured Environmental Management System (SML). These international standards not only facilitate compliance with stringent environmental regulations but also serve as a strategic tool to improve the

company's reputation and operational efficiency. The implementation of these standards also encourages innovation in environmentally friendly production processes and waste reduction. In addition, ISO 14001 helps companies build public trust and strengthen competitiveness in the global market.¹

In developed countries such as the United States, Germany, and Japan, the implementation of ISO 14001 is largely driven by government policies aimed at environmental protection. Governments in these countries often incentivize organizations to pursue ISO 14001 certification through tax breaks and reduced regulatory burdens, thereby encouraging compliance and promoting sustainable practices in industries that have a substantial environmental footprint, such as manufacturing and energy.^{1 2} Research shows that companies that adopt ISO 14001 not only improve their environmental performance but also experience economic benefits, especially when considering company size and environmental awareness as moderation factors.¹

ISO 14001 certification is considered an important asset for companies looking to improve their market position. In Europe, for example, ISO 14001-certified organizations often find it easier to access markets with strict sustainability regulations, such as those imposed by the European Union. This certification signals to customers and investors about a commitment to environmental stewardship, which is increasingly a prerequisite for doing business in a global market that prioritizes sustainability.² The visibility of ISO 14001 certification can enhance the company's reputation, making it more attractive to consumers who care about the environment.³ Public awareness of environmental issues in developed countries is increasingly encouraging the implementation of ISO 14001.

Consumers are more likely to support businesses that demonstrate a commitment to sustainable practices, and ISO 14001 serves as tangible evidence of that commitment.^{2 4} This consumer behavior is in line with findings that show that organizations with strong EMS tend to enjoy better compliance with government regulations and better public perception.⁴ The link between ISO 14001 certification and improving a company's image is confirmed by research showing that companies often adopt these standards not only for compliance but as a strategic move to align with stakeholder expectations and market demands.⁵

The implementation of ISO 14001 in developed countries has received significant attention as organizations increase awareness of the importance of systematic environmental impact management through Environmental Management Systems (EMS). These international standards not only facilitate compliance with stringent environmental regulations, but also serve as a strategic tool to improve operational efficiency and corporate reputation. In addition to encouraging innovation in environmentally friendly production processes and waste reduction, the implementation of ISO 14001 also strengthens public trust and competitiveness in the global market. In summary, the implementation of ISO 14001 in developed countries is driven by a combination of regulatory pressures, market demands, and increasing public awareness of environmental issues, thereby providing long-term benefits in the sustainability and competitiveness of organizations⁶.

This study aims to examine the similarities and differences in findings from previous studies related to the impact of the implementation of ISO 14001 in developed countries with an emphasis on environmental

and economic benefits. In addition, this study also aims to identify factors that affect the effectiveness of the implementation of ISO 14001 certification.

METHOD

The research method applied in this study is using a qualitative descriptive method using literature review. The data extraction process begins through a search in the Google Scholar database. Articles obtained from the database will go through two stages of selection: screening and eligibility. Article screening uses several inclusion criteria: scientific journal articles, indexed by SINTA or Scopus, published in 2018–2024, full-text and accessible articles and study locations in developed countries. Meanwhile, the eligibility criteria used are: Focus on discussing the implementation of ISO 14001, contain a discussion of strategies, factors, or impacts of implementation and use quantitative, descriptive, or qualitative methods. The article search uses the keywords ISO 14001 Certification, Environmental management, Environmental performance. From the search results using predetermined keywords, a total of 1,650 articles were obtained from Google Scholar. Of these, 1,588 articles did not meet the screening criteria, so only 62 articles were continued to the eligibility stage. Of the 62 articles, 46 articles did not meet the eligibility criteria and the remaining 16 articles were then analyzed further in this study. To ensure that the selection process is carried out systematically and transparently, the PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-analysis*) guide is used.

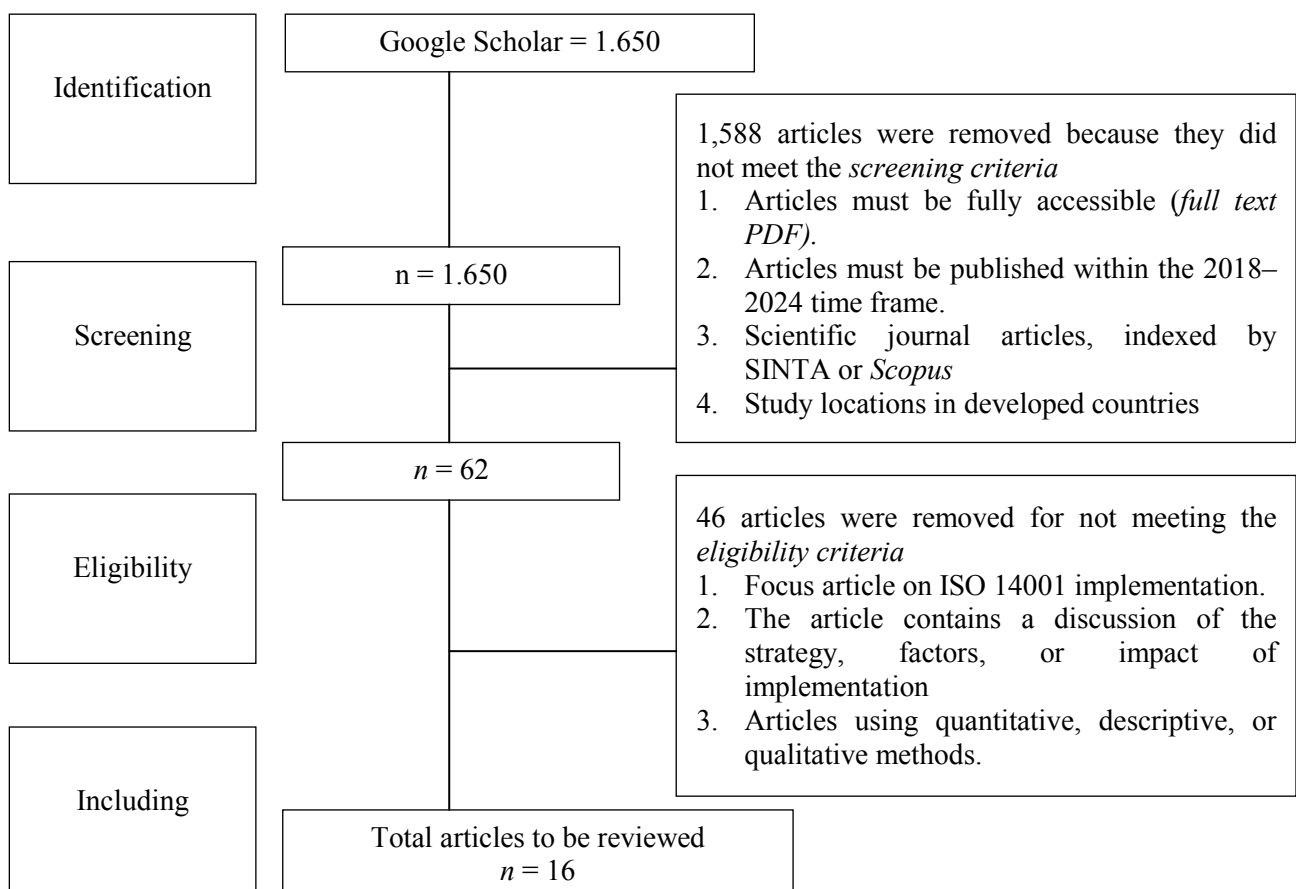


Figure 1. 1 PRISMA Flowchart

RESULTS AND DISCUSSIONS

Table 1. Literature Review Research Matrix

Author (year)	Article Title	Method	Result
Arocena et al. (2020) ¹	The impact of ISO 14001 on firm environmental and economic performance: The moderating role of size and environmental awareness.	Using a strong empirical approach, the study examined an international sample of 583 public companies over a nine-year period, which revealed that ISO 14001 certification significantly reduces carbon emissions and increases profitability, especially in companies from countries with high environmental awareness and larger organizational sizes.	The study underscores the importance of contextual factors, which show that the benefits of ISO 14001 are not uniform but depend on the characteristics of specific companies and countries, thus offering valuable insights for managers and policymakers aiming to optimize environmental management strategies.
Brogi & Menichini (2019) ²	Do the ISO 14001 Environmental Management Systems Influence Eco-innovation Performance? Evidences from the EU Context	This study uses a quantitative analysis of survey data collected from various companies across the European Union. The authors used structural equation modeling to assess the relationship between ISO 14001 certification and the performance of ecological innovation.	The research findings show that ISO 14001 certification positively influences the performance of ecological innovations, reinforcing the importance of environmental management systems in driving sustainable business practices.
Hidayati (2023) ³	Benefit analysis of the implementation of Environmental Management System (EMS) ISO 14001:2015 in a tyres industry	This study uses a qualitative methodology to identify and analyze the advantages of the stages of implementing ISO 14001:2015, which uncover a positive correlation between these benefits and better environmental outcomes.	Discusses the benefits of implementing the ISO 14001:2015 Environmental Management System (SML) in the tire industry, focusing on its impact on environmental performance. The findings underscore the importance of consistent and effective SML practices in improving the performance of the corporate environment, thus providing valuable insights for organizations in developed countries seeking to adopt similar standards.
Chiarini (2019) ⁶	Factors for succeeding in ISO 14001 implementation in Italian construction industry	Using qualitative research methodologies, the study identified key determinants such as top management commitment, employee engagement, and effective communication, ultimately revealing that these factors are important for fostering a culture of sustainability and compliance with ISO standards.	Observing the important factors influencing the successful implementation of ISO 14001 in the Italian construction industry, a sector of great importance in the context of environmental management systems. The findings underscore the importance of a tailored strategy for the adoption of ISO 14001, particularly in developed countries where regulatory frameworks and market

Author (year)	Article Title	Method	Result
			expectations are increasingly tight.
Ahmed et al. (2021) ⁷	An integrated lean and ISO 14001 framework for environmental performance: an assessment of New Zealand meat industry	Presents a comprehensive study of the integration of lean principles with ISO 14001 in the New Zealand meat industry, utilizing semi-structured interviews with industry experts to gather qualitative insights.	The research reveals that this integrated approach not only improves environmental performance but also clarifies the alignment between ISO 14001 operational procedures and lean methodologies, thus offering a robust framework for practitioners and researchers. The study stands out as a pioneering effort in assessing the combined implementation of these two methodologies in a specific industry context, contributing valuable knowledge to the field of environmental management.
Sam & Song (2022) ⁸	Corporate environmentalism and international trade: Evidence from industry-level data.	Leveraging a gravity trade model, the study examined industrial-level data from 1988 to 2015, which revealed that ISO 14001 certification significantly increased exports, particularly to high-income countries, by reducing information barriers related to environmental quality.	The findings underscore the role of certification as a credible market signal, suggesting that further research could explore its implications in developing countries, where environmental regulations may be less stringent.
Fonseca & Domingues (2018) ⁹	Exploratory Research of ISO 14001:2015 Transition among Portuguese Organizations	The study revealed that a significant majority of respondents (97%) aim to complete the transition by the specified deadline, highlighting perceived benefits such as improved integration with other management systems and improved communication.	The findings suggest that the perceived benefits of certification vary by size of the organization, which suggests the need for further investigation into the implications of ISO 14001:2015 in various contexts and levels of maturity of environmental management systems.
Liston & Heyes (2019) ¹⁰	Is There Evidence for Export-Led Adoption of ISO 14001? A Review of the Literature Using Meta-Regression	This literature review uses meta-regression analysis to examine the deployment of ISO 14001 in developed countries, focusing on the influence of export-led strategies on adoption rates.	This research underscores the role of ISO 14001 as an important mechanism for promoting environmental best practices in developed countries, facilitating the transfer of sustainable practices through international trade.
Mansour et al. (2021) ¹¹	Prediction of implementing ISO 14031 guidelines using a multilayer perceptron neural network approach	Using a quantitative methodology, the study analyzed survey responses from 596 environmental managers, using a perceptron multilayer neural network to achieve a	The findings make a significant contribution to the literature on environmental performance evaluation, which demonstrates the synergistic relationship between the two standards and

Author (year)	Article Title	Method	Result
		classification accuracy of 94% for training data and 91% for test data, thus demonstrating a strong correlation between ISO 14031 implementation and ISO 14001 certification status.	advocates their integration into a cohesive framework to improve organizational compliance and environmental management.
Chaikin et al. (2018) ¹²	Environmental Management Certification: Socio-Economic Monitoring	Using a methodology that includes a literature review and statistical data from various countries, the study reveals that economic development has a significant impact on the implementation of environmental management systems.	The findings show that to improve ISO 14001 certification in Ukraine, targeted strategies such as soft loans and improved ecological education are essential, so as to address gaps in existing research on developed countries' practices in environmental management.
Garrido et al. (2019) ¹³	ISO 14001 and CO2 emissions: An analysis of the contingent role of country features	Using a comprehensive analysis of 53 countries from 2007 to 2017, the study uses quantitative methods to reveal that ethical business practices increase the effectiveness of ISO 14001 in reducing emissions, while fierce competition and stakeholder relationships can weaken these effects	The findings contribute to a deeper understanding of how contextual factors affect the environmental outcomes of ISO 14001 implementation, which suggests that the impact of certification varies significantly based on a country's ethical landscape and competitive dynamics.
Salim et al. (2018) ¹⁴	Global trends in environmental management system and ISO14001 research	The authors used a comprehensive literature review methodology to analyze thematic and geographic trends in published research, which revealed significant insights into the adoption of ISO 14001 in both developed and developing countries.	Their findings point to the growing recognition of ISO 14001 as an important framework for improving environmental performance, particularly in the context of global climate challenges.
Orcos & Palomas (2019) ¹⁵	The impact of national culture on the adoption of environmental management standards	Using a comprehensive database covering 52 countries from 1999 to 2016, the authors used a quantitative approach to analyze the relationship between cultural dimensions in particular performance orientation and institutional collectivism and ISO 14001 certification levels.	The findings reveal that while performance orientation tends to hinder the adoption of ISO 14001, institutional collectivism promotes it, with both cultural influences evolving over time, thus providing valuable insights into the dynamics of environmental management standards in various national contexts.
Mansour Alsulamy (2021) ¹⁶	Evaluating Association Between Implementation of ISO 14031 Guidelines and ISO 14001 Certification By Industrial Sector In	Using a descriptive approach, the study surveyed 596 organizations to assess their commitment to environmental performance evaluation, revealing a moderate positive correlation between the	The findings suggest that organizations, particularly those with limited resources, should prioritize monitoring environmental indicators to improve their environmental performance, while highlighting

Author (year)	Article Title	Method	Result
	Saudi Arabia	implementation of ISO 14031 and ISO 14001 certifications.	the need for future research to explore causal relationships and effectively integrate ISO standards.
Chen et al. (2020) ¹⁷	Lean Manufacturing and Environmental Sustainability: The Effects of Employee Involvement, Stakeholder Pressure and ISO 14001	Utilizing quantitative methods, the study collected data from 220 Chinese manufacturing companies and used <i>partial least squares</i> (PLS) regression to examine the relationship between employee engagement, stakeholder pressure, and environmental performance.	The results show that while ISO 14001 does not directly moderate the relationship between LM and green practices, its integration with LM encourages synergies that contribute significantly to improving environmental performance, thus offering valuable insights for manufacturers and policymakers aiming to improve sustainability initiatives.
Treacy et al. (2019) ¹⁸	ISO14001 certification and operating performance: A practice-based view	Utilizing a practice-based view and incident study methodology, the authors assess both certified and non-certified companies, revealing that ISO 14001 certification positively affects manufacturing cost efficiency, employee productivity, and return on assets, although it also shows the potential for diminishing returns in the long run.	Provides a comprehensive analysis of the impact of ISO 14001 certification on operational performance in companies located in developed countries, particularly the UK and Ireland. This study is particularly important because it measures the operational benefits of ISO 14001, going beyond the subjective performance measures commonly used in previous research, thus providing valuable insights into the economic implications of environmental management systems.

Research related to the implementation of ISO 14001 in developed countries shows a diversity of perspectives in understanding the impact of this certification on the environmental and economic performance of companies, both on a national and international scale. Each study offers a different point of view, influenced by differences in methodology, geographic context, and motivation for certification adoption. While there is a general pattern in the benefits of ISO 14001 that are recognized to have a positive impact on reducing carbon emissions as well as increasing profitability, significant differences in research methodology demonstrate how important it is to review the successful implementation of ISO 14001 in more depth and contextually. Overall, these studies outline similarities and differences in observed outcomes that provide valuable insights into the variation in the adoption and effectiveness of environmental certification.

In general, almost all of the studies listed used quantitative methodologies to analyze the impact of the implementation of ISO 14001. Brogi & Menichini's (2019) research, for example, applied a structural

equation model to assess the relationship between ISO 14001 certification and environmental innovation or *eco-innovation* where the results showed that this certification played an important role in encouraging companies to adopt more sustainable practices.² Similarly, Boiral et al. (2018) conducted a systematic review showing that ISO 14001 certification is positively correlated with improved environmental performance and can increase profitability, particularly in countries with high environmental awareness.¹⁹

Meanwhile, a study by Arocena et al. (2021) highlights the use of empirical methods on a sample of public companies in various countries, showing the positive impact of ISO 14001 in reducing carbon emissions while increasing profits, especially in countries with high environmental awareness.¹ This quantitative methodology is the dominant choice because it allows researchers to obtain objectively measurable results about the influence of ISO 14001 certification on company performance. This approach provides empirical evidence that reinforces the claim that the implementation of environmental management systems, such as ISO 14001, not only assists companies in improving environmental performance, but also contributes positively to profitability.

Variations in geographical contexts and industry sectors also bring significant differences in the results achieved. For example, Brogi & Menichini (2019) focused their research on companies in the European Union that generally have strict environmental regulations and market pressures that encourage sustainable practices.² Ahmed et al. (2021) also examined the meat industry in New Zealand where the implementation of ISO 14001 brings different challenges and opportunities compared to the context in the European Union.⁷ Meanwhile, Sam & Song, (2022) examined the impact of ISO 14001 in various industries uncovering the different challenges and opportunities associated with the adoption of ISO 14001 in different contexts.⁸

This variation suggests that while ISO 14001 provides general benefits, such as improved reputation and operational efficiency, the effects are not always uniform across countries or industry sectors. This distinction is important because it shows each industry or country may face different challenges and opportunities in its implementation. This means that the results of research cannot always be generalized. This underscores the importance of policymakers and company managers to consider the specific factors that affect the effectiveness of these standards in their operating environment. A tailored approach allows companies to maximize the benefits of certification, while policymakers can design relevant incentives to drive adoption of these standards in specific industries or regions.

The motivation for adopting ISO 14001 also varies widely among companies providing further insight into its implementation. Some companies pursue ISO 14001 certification to comply with strict export requirements, as noted by Liston-Heyes & Heyes (2019) who argue that certification serves as a compliance signal that increases competitiveness in the global market.¹⁰ In contrast, other motivations include improving efficiency and internal communication as highlighted by Fonseca & Domingues (2018) who found that the transition to ISO 14001:2015 facilitates better integration with existing management systems. These diverse motivations illustrate that ISO 14001 can serve as a flexible strategy tailored to each organization's specific needs and priorities.⁹ These differences in motivation suggest that some companies may be driven by external

pressures, such as the need to comply with international standards in trade, while others see a major benefit in improving internal processes.

Contextual factors, such as national culture, also influence the adoption rate of ISO 14001, which provides additional insight into the importance of considering social and cultural aspects in the implementation of this standard¹⁵. Showing that countries with a culture of institutional collectivism are more likely to adopt ISO 14001 because the collective orientation encourages a commitment to social and environmental responsibility. In contrast, in countries with more individualistic and performance-oriented cultures, companies tend to adopt ISO 14001 pragmatically, only when there are strong market or regulatory pressures. This influence of national culture shows that the application of ISO 14001 cannot be carried out uniformly, but must be adapted to the social values that prevail in each country.

A literature review of ISO 14001 shows that although there is a general pattern of positive benefits to the environment and company profitability, there are many differences influenced by research methodology, geographical context, industry sector, adoption motivation, and cultural values. This diversity of perspectives provides the view that the effectiveness of ISO 14001 is contextual, so the success of its implementation depends heavily on how this standard is tailored to the specific conditions, needs, and challenges of each organization or country.

CONCLUSION

Based on the results of a review of 16 scientific articles, it can be concluded that the implementation of ISO 14001 in general has a positive impact on improving environmental performance, operational efficiency, and company competitiveness. The implementation of these standards assists companies in identifying, managing, and reducing the environmental impact of their operational activities in a systematic and sustainable manner. The successful implementation of ISO 14001 is greatly influenced by internal factors such as the commitment and support of top management, active employee participation, availability of resources, and effective communication and training systems. In addition, external factors such as pressure from government regulations, market demands, pressure from consumers, and national cultural influences also play an important role in driving the sustainability of environmental management systems. The integration of ISO 14001 with other management systems such as ISO 9001 or occupational health and safety management systems has also been proven to be able to improve overall operational effectiveness and efficiency. Therefore, as a suggestion, companies need to build a long-term commitment to implementing ISO 14001 consistently and comprehensively, as well as ensuring that all parties in the organization are actively involved in the continuous improvement process. Further research is also recommended to evaluate the long-term impact of ISO 14001 on business sustainability and corporate adaptability to global environmental challenges.

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