Received: 15 April 2024 | Revised: 31 August 2024 | Accepted: 9 September 2024

DOI: 10.1002/bsd2.70015

RESEARCH ARTICLE

Business Strategy and Development

WILEY

Corporate environmental behavior toward sustainable development: Motivations, benefits, and challenges of ISO 14001 adoption at Japanese subsidiaries in Thailand

Reo Hirata | Dimiter S. Ialnazov

Graduate School of Advanced Integrated Studies in Human Survivability, Kyoto University, Kyoto, Japan

Correspondence
Reo Hirata, Graduate School of Advanced Integrated Studies in Human Survivability, Kyoto University, 1, Nakaadachi-cho, Yoshida, Kyoto Sakyo-ku, Kyoto 606-8306, Japan.
Email: hirata.reo.f52@kyoto-u.jp

Funding information
Sompo Environment Foundation; JSPS KAKENHI, Grant/Award Number: 22K01460; JST SPRING, Grant/Award Number: JPMJSP2110

Abstract

Since the Earth Summit held in Rio de Janeiro in 1992, ISO 14001 has become an internationally recognized environmental management system that has spread all over the world. The existing literature has examined in detail the motivations, benefits, and challenges of ISO 14001 adoption in developed countries. However, there is a relative lack of studies on the adoption of ISO 14001 by the subsidiaries of multinational corporations (MNCs) in developing countries, and in Thailand in particular. This paper investigates the motivations, benefits, and challenges of ISO 14001 adoption at Japanese subsidiaries in Thailand based on the results of a questionnaire survey of 100 subsidiaries and a semi-structured interview survey of 11 subsidiaries. We find that the main motivations are pressures by the national and local governments, as well as by the customers. In addition to the tax incentives, the main benefits are gaining competitiveness, enhancing the corporate image, and maintaining efficient management. We also identify the following challenges: the costs of ISO 14001 adoption, and the training and awareness of the employees. Compared with the existing literature, we find some new motivations, benefits, and challenges related to the local context of ISO 14001 adoption. Although our results are valid only for the Japanese subsidiaries in Thailand, the in-depth understanding of the motivations, benefits, and challenges of ISO 14001 adoption may contribute to the expanding literature about corporate environmental behavior toward sustainable development.

KEYWORDS
environmental management, ISO 14001 adoption, Japanese subsidiaries, sustainable development, Thailand

1 | INTRODUCTION

1.1 | Background

At the Earth Summit held in Rio de Janeiro in 1992 the UN member states adopted the Agenda 21, a comprehensive action plan to achieve sustainable development. It was recognized that the fulfillment of the objectives of Agenda 21 required the participation of non-governmental actors such as multinational corporations (MNCs). Furthermore, Agenda 21 (30.3) mentioned that "Business and industry, including transnational corporations, should recognize environmental management as among the highest corporate priorities and as

a key determinant to sustainable development" (United Nations, 1992). The adoption of the UN sustainable development goals (SDGs) in 2015 has confirmed the important role of environmental management in achieving sustainable development. In particular, environmental management can lead actions to achieve Goal 9 ("Industry, Innovation and Infrastructure"), Goal 12 ("Responsible Consumption and Production"), Goal 13 ("Climate Action"), and Goal 17 ("Partnerships for the Goals"). In addition to its contribution to the society, corporate environmental management can be very important for companies' bottom line. A recent study has indicated a positive correlation between environmental management and firm performance (Kaur & Dharni, 2024).

Due to the higher awareness of environmental protection after the Earth Summit in 1992, the International Standard of Organization (ISO) issued the ISO 14000 family as a standard of an environmental management system (EMS) in 1996. Within the ISO 14000 family, ISO 14001 is one of the fundamental standards for an EMS. According to the ISO's official electronic booklet, "ISO 14001 is as an internationally agreed standard that sets out the requirements for an environmental management system. It helps organizations improve their environmental performance through a more efficient use of resources and through the reduction of waste, gaining a competitive advantage and the trust of stakeholders" (ISO, 2015a, p.2). The annual registered number of ISO 14001 certifications has increased year by year. In total, 529,853 certifications were registered in 2022 all over the world, which is more than 8 times bigger than the number of certifications in 2003 (64,996) and 1.93 times bigger that the number of certifications in 2013 (273,861) (ISO, 2022). Even though there are several other environmental management certifications, ISO 14001 has become the international standard that covers the whole world. ISO 14001 requires companies to establish the PDCA (Plan-Do-Check-Action) cycle which means setting environmental objectives and processes, implementing, monitoring, and measuring the processes and then taking actions to continuously improve (ISO, 2015b). Furthermore, companies are audited by a third party once in every 3 years regarding whether the PDCA cycle is appropriately operated. Thus, ISO 14001 guarantees the implementation of environmental management by companies.

Although ISO 14001 adoption is needed for conducting environmental management properly, the acquisition and renewal of the certificate, as well as the consulting fees can be quite costly for companies depending on their size and some extent to which they adopt ISO 14001. In this paper, we answer the question why companies choose to acquire ISO 14001 voluntarily in spite of the large costs on the case of Japanese subsidiaries in Thailand. The reason why this study focuses on the Japanese subsidiaries in Thailand is the strong trade and investment relationship between Japan and Thailand. Japan External Trade Organization (JETRO) reported that there were more than 5800 Japanese subsidiaries in Thailand in 2020 (JETRO, 2021). The number of Japanese subsidiaries in Thailand was the third largest in 2022, behind China and the United States (MOFA, 2022). With regard to the number of projects and the amount of Foreign Direct Investment (FDI) in Thailand, Japan has been the top foreign direct investor since 2015 when the Board of Investment (BOI), the Thai government agency in charge of foreign investment, started to disclose relevant data (BOI, 2024). Due to these close economic ties, Japanese companies can be seen as key actors in the Thai economy that carry some responsibility for the existing social and environmental issues.

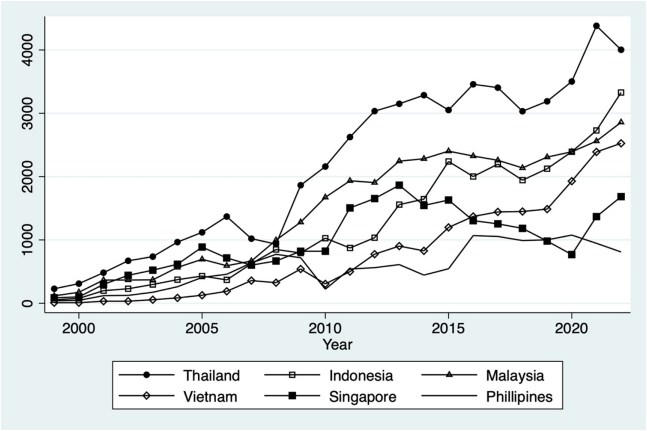

FIGURE 1 ISO 14001 adoption in ASEAN countries from 1999 to 2022. *Source*: Created by the authors based on ISO (2022).

1.2 | Current status of ISO 14001 adoption in Thailand

Figure 1 shows the number of ISO 14001 certifications in the six major ASEAN member countries. According to the Figure 1 based on ISO (2022), except in 2008, Thailand has recorded the largest number of ISO 14001 certifications in 1999–2022. Thus, Thailand is one of the leading countries in ASEAN regarding ISO 14001 adoption.

1.3 | Research gap and research questions

In general, there is an abundant literature about the motivations or reasons for ISO 14001 adoption in developed countries. However, the literature about developing countries is relatively smaller. In the case of Thailand, we found only the following three papers. According to the study by Tambunlertchai et al. (2013) with using the data of 494 Thai companies, FDI from Organization for Economic Co-operation and Development (OECD) member countries plays a key role in ISO 14001 adoption in Thailand. The second paper investigates the case of Japanese subsidiaries in Thailand. With applying ordinary least square (OLS) method, Kimbara et al. (2014) find that top leaderships and the goal of environmental management in the subsidiary, environmental pressures from customers and the transfer of environmental practices from the parent company are positively related with the implementation of environmental management which includes ISO 14001 adoption and the environmental report. However, the paper by Kimbara et al. (2014) uses a limited number

TABLE 1 Summary of literatures regarding motivation, benefits, and challenges of ISO 14001 adoption.

Authors	Country	Method	Data	Type	Main results
Tambunlertchai et al. (2013)	Thailand	Probit model	494 Thai companies	Motivations	- FDI from OECD member countries - Firm size - Experience with ISO9000 - Production of intermediate products
Kimbara et al. (2014)	Thailand	OLS	51 Japanese subsidiaries in Thailand	Motivations	- Environmental management system by parent firm - Green procurement by parent firm - Top leaderships and the goal of environmental management in the subsidiary
Hirata et al. (2023)	Thailand	Logistic regression	117 Japanese subsidiaries in Thailand	Motivations	- Proportion of direct voting right by parent company - Business history of parent company - Proportion of independent directors on the parent companies' boards
Pinto et al. (2017)	Saudi Arabia	Questionnaire survey	27 companies	Benefits Challenges	- Higher competitiveness - Better environmental performance - Improvement of corporate reputation - Negative attitude toward documentation process - Lack of financial support - Cost for accreditation by the third party
Boiral et al. (2018)	10 countries	Systematic review	94 literatures	Benefits	- Positive impacts on environmental management practices, environmental indicators, the image of the company, and its relationship with stakeholders
Ayala-Ponce et al. (2018)	Mexico	Case study: semi-structured interviews and official document	Maquiladora industries	Benefits	- Evolution of competitive advantages
Rasheed et al. (2023)	The Maldives	Questionnaire survey and central tendency measure of weighted average	41 Maldivian construction industry	Benefits Challenges	- Enhancement of corporate image and environmental protection - Lack of legal enforcement - Requirement for company structures and policies to change to accommodate an EMS
Waxin et al. (2019)	The UAE	Semi-structured interviews	11 organizations	Challenges	- Lack of human resources, regulations, support from management - Practical challenges - High cost
Dasanayaka et al. (2022)	23 countries	Critical review	54 literatures	Challenges	- External barriers: cost, lack of supports - Internal barriers: lack of resource and employee engagement

Source: Created by the author.

of questionnaire survey data. In our own previous research, we show that higher direct voting rights of the parent companies have a positive correlation with ISO 14001 adoption at Japanese subsidiaries in Thailand (Hirata et al., 2023). From the above, we may conclude that the motivations of ISO 14001 adoption in Thailand are not well studied, and the factors of ISO 14001 adoption include both internal and external factors. Most of the existing literature applied either quantitative methods or small sample surveys. There is a relative lack of studies that examine the impact of local context factors based on more detailed survey data. The second goal of this paper is to study the benefits of ISO 14001 adoption. There are six expected benefits or advantages of ISO 14001 adoption (ISO, 2015a). Boiral et al. (2018) has reviewed the discussion about the impacts of ISO 14001 adoption. From their paper, we understand that there are positive impacts on environmental management practices, environmental indicators, the image of the company, and its relationship with stakeholders. Some of the existing literature mention the benefits in the case of developing countries. Ayala-Ponce et al. (2018) shows that corporate environmental responsibility leads to a better organizational competitiveness in the case of Mexico. According to Rasheed et al. (2023), the EMS leads to the enhancement of corporate image and environmental protection in the construction industry in the Maldives. In the case of Saudi Arabia, better environmental performance, higher competitiveness, and better company reputation have been confirmed based on the results of a questionnaire survey (Pinto et al., 2017). However, most of these studies have focused on not the subsidiaries, but the home-grown companies in developing countries. Therefore, the topic about the benefits of ISO 14001 adoption for not only Thai companies but also for the subsidiaries of MNCs in Thailand has not been well studied.

Finally, the third goal of this paper is to study the challenges of ISO 14001 adoption. The existing literature offers some discussion on the challenges of, or barriers to ISO 14001 adoption based on the systematic review (Dasanayaka et al., 2022). Dasanayaka et al. (2022) suggests two types of barriers, for example, external (the cost of the certification) and internal ones (the lack of internal resources and employee engagement). In addition to cost problem, another challenge is related to bureaucratic procedures such as the documentation process in the Saudi Arabia (Pinto et al., 2017) and related to lack of human resources in the UAE (Waxin et al., 2019). However, compared with the literature, there is still not much research that focuses on the challenges of ISO 14001 adoption at the subsidiaries of MNCs in Thailand from local context. These existing studies are summarized in Table 1.

As already discussed in the previous section, there is little existing research regarding the motivations, benefits, and challenges of ISO 14001 adoption at the subsidiaries of MNCs in Thailand using detailed survey data. Therefore, in order to fill the contextual research gap, this paper investigates in depth the local context factors that have influenced ISO 14001 adoption at the Japanese subsidiaries in Thailand. Based on the research gap, we establish the following 3 research questions and 13 expectations (which will be explained in Section 2):

1. What are the motivations of ISO 14001 adoption at the Japanese subsidiaries in Thailand?
2. What are the benefits of ISO 14001 adoption at the Japanese subsidiaries in Thailand?
3. What are the challenges of ISO 14001 adoption at the Japanese subsidiaries in Thailand?

1.4 | Research methods, data and paper structure

After this introduction part, Section 2 summarizes the background theories and explains our expectations. This paper uses qualitative research methods, in particular a questionnaire survey and semi-structured interviews. We carried out a questionnaire survey in Thailand about the motivations, benefits, and challenges of ISO 14001 adoption from September to December 2022. We received the filled out questionnaire surveys from 100 Japanese subsidiaries in Thailand. This was followed by the semi-structured interviews of 11 Japanese subsidiaries in Thailand from October 2022 to November 2023. The research methods and the data will be explained in detail in Section 3. Through these unique surveys, we address the contextual research gap and contribute to the better understandings regarding ISO 14001 adoption in Thailand. Section 4 presents our research results based on cross-tabulation analysis and content analysis. Section 5 contains a discussion based on our findings and in Section 6, we summarize the contributions of the paper and explain the limitations of our research.

2 | THEORETICAL FRAMEWORK AND OUR EXPECTATIONS

2.1 | Theoretical background

In this section, we discuss two theoretical frameworks that have been developed to explain corporate environmental behavior, in particular voluntary environmental actions taken by companies. The first such framework is the stakeholder theory. According to this theory (Freeman, 1984), firms are required to consider the interests of not only shareholders, but also stakeholders like regulatory agencies, customers, suppliers, employees, and local residents. The stakeholders ask the managers to have a long-term view and to pursue long-term profits that include better firm reputation and non-financial performance. Taking into consideration stakeholders' interests leads the companies toward the launch and further expansion of environmental actions.

The institutional theory has also been another source of inspiration for this paper. Scott (2014) defined institutions as "regulative, normative and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life (p. 48)." DiMaggio and Powell (1983) introduced the concept of isomorphism that helps explain why different organizations adopt similar behavior. Among the mechanisms of institutional isomorphism, they singled out coercive isomorphism, which arises from both formal and informal pressures by other organizations and by cultural expectations. Institutional pressures arise from government regulations, markets and environmental activism, and have effects on corporate environmental behaviors (Christmann & Taylor, 2001). To connect with the topic of this paper, some scholars have argued that the institutional legitimacy, which means legitimacy stemming from conformance to institutional pressure, is one of the drivers of ISO 14001 adoption (Boiral, 2007; Jiang & Bansal, 2003).

Some of the previous literature explain the behavior of firms based on the shareholder model because company performance has been evaluated by using financial indicators showing how much shareholder value is created. However, non-financial indicators such as the environmental indices have recently become more important, and the environmental behavior of firms is affected by not only shareholders but also stakeholders. We agree with stakeholder-centered and institutional legitimacy approaches because they help to equip us with better tools to understand the voluntary environmental actions taken by companies. Therefore, the discussion in this paper is based on the stakeholder and institutional theoretical frameworks.

2.2 | Motivations of ISO 14001 adoption at the Japanese subsidiaries in Thailand

2.2.1 | Compliance with environmental regulations

Compliance with environmental regulations is one of the important motivations for ISO 14001 adoption. Quazi et al. (2001) analyzes the

case of the electronic and chemical industries in Singapore and finds that companies have acquired ISO 14001 to meet the environmental standards set by the government. The same result is confirmed by the case studies in the Gulf Arab countries (Waxin et al., 2019). In the U.S., regulatory pressures are likely to mandate ISO 14001 because companies desire to keep good relationships with regulators to ensure reliability and long-term business (Darnall, 2006). Johnstone and Hallberg (2020) show that government regulations and legitimation have led to ISO 14001 adoption by small and medium enterprises (SMEs) in the UK, Ireland and Sweden. However, there is a relative lack of studies about the compliance with environmental regulations by the subsidiaries of MNCs in developing countries. In addition, the existing literature focuses on government regulations at the national level. It is quite possible that government regulations at the local level can also play an important role. Therefore, based on the existing literature the following expectations were developed:

Expectation 1a. Compliance with the environmental regulations by Thai national government impacts ISO 14001 adoption at the Japanese subsidiaries in Thailand.

Expectation 1b. Compliance with the environmental regulations by Thai local municipalities impacts ISO 14001 adoption at the Japanese subsidiaries in Thailand.

2.2.2 | Pressure by foreign customers

Foreign customer pressure is another potential motivation of ISO 14001 adoption. In our paper, foreign customers are both foreign companies within Thailand (for instance, other Japanese companies operating in Thailand) and outside Thailand (for instance, the parent company in Japan). Some previous studies view ISO 14001 adoption as a response to the requirements of foreign customers in the cases of Japan (Nakamura et al., 2001; Nishitani, 2009), China (Christmann & Taylor, 2001; Qi et al., 2011), Malaysia (Arimura et al., 2014), Thailand (Tambunlertchai et al., 2013) and based on cross-country data (Liu et al., 2019; Prakash & Potoski, 2006, 2007). However, there are only a few previous studies about the pressure by foreign customers on the subsidiaries of MNCs in developing countries. Hence, the following expectation was developed:

Expectation 1c. Pressure by non-Thai companies both within and outside Thailand impacts ISO 14001 adoption at the Japanese subsidiaries in Thailand.

2.2.3 | Pressure by local customers

Kimbara et al. (2014) confirmed that environmental pressure by local customers is also positively correlated with ISO 14001 adoption at Japanese companies in Thailand. In addition, Bansal and Bogner (2002) mentioned that local customers from downstream industries required suppliers to adopt ISO 14001. However, Psomas et al. (2011) found that local customer pressure was relatively unimportant for ISO 14001 adoption in Greek companies. In spite of the lack of consensus about the importance of local customer pressure for ISO 14001 adoption, the following expectation was developed:

Expectation 1d. Pressure by local customers (including individual Thai consumers and Thai companies) impacts ISO 14001 adoption at the Japanese subsidiaries in Thailand.

2.2.4 | Other local factors

According to Hoffman (2001), company decision makers also respond to pressures by suppliers and social activists such as environmental NGOs. The stakeholder theory includes suppliers and NGOs in the list of company stakeholders. Regarding the empirical evidence, Testa et al. (2018) find that organizations that receive pressures from suppliers internalize EMS implementation in order to gain competitiveness. Furthermore, Berrone et al. (2013) points out that environmental NGOs play a great role for environmental innovations at firms. Therefore, we added the following expectations.

Expectation 1e. Pressure by local suppliers impacts ISO 14001 adoption at the Japanese subsidiaries in Thailand.

Expectation 1f. Pressure by environmental NGOs impacts ISO 14001 adoption at the Japanese subsidiaries in Thailand.

2.3 | Benefits of ISO 14001 adoption

2.3.1 | Gaining competitiveness

One of the benefits of ISO 14001 adoption is the expected gain in competitiveness (ISO, 2015a). As mentioned above, ISO 14001 adopters can sell to customers that demand from their suppliers to have that certification (Bansal & Bogner, 2002). Thus, suppliers can gain economic benefits thanks to ISO 14001 adoption. Furthermore, in the case of Saudi companies, Pinto et al. (2017) found three benefits from ISO 14001 adoption; increased competitive and financial advantages, improved company reputation, and enhanced environmental performance. In the case of agriculture and food sector, ISO 14001 adoption brought economic and financial benefits again due to stronger competitive advantages (Carrillo-Labella et al., 2020). Johnstone and Hallberg (2020) also found that ISO 14001 adoption improved financial performance in

the SMEs of three European countries. Therefore, the following expectation was developed:

> **Expectation 2a.** Gaining competitiveness in the local market is one of the benefits of ISO 14001 adoption at the Japanese subsidiaries in Thailand.

2.3.2 | Improving corporate reputation

Improving corporate reputation is another benefit of ISO 14001 adoption (ISO, 2015a). The existing literature also points out to benefits related to better corporate reputation. Bansal and Bogner (2002) argue that the legitimacy stemming from conformance to institutional pressures leads to the building of trust and long-term relationship with stakeholders because the ISO standard signals conformance to a wide range of stakeholders. The main benefits of EMS adoption is the improved corporate image in the case of the Maldivian construction industry (Rasheed et al., 2023). In the case of Greek companies, Psomas et al. (2011) found the following benefits related to corporate reputation: improved relationship with society due to a better environmental performance, and enhanced company position in the market. Based on their research on the agriculture and food sector in Spain, Carrillo-Labella et al. (2020) argue that ISO 14001 adoption enables the organizations to improve their reputation. Camilleri (2022) and Johnstone and Hallberg (2020) also report that ISO 14001 adoption has a good effect on corporate reputation. Therefore, the following expectation was developed:

> **Expectation 2b.** Improving corporate reputation is another benefit of ISO 14001 adoption at the Japanese subsidiaries in Thailand.

2.3.3 | Maintaining efficient management

ISO (2015a) points out other benefits of ISO 14001 adoption such as efficient management within the organization. Having ISO 14001 can help to monitor and streamline the management process. Camilleri (2022) argues that ISO 14001 adoption leads to a better planning, organization, leadership, and control of EMS and a higher awareness about compliance with the relevant regulations. Johnstone and Hallberg (2020) also mention that ISO 14001 adoption helped to improve the internal process and procedures. Therefore, the following expectation was developed:

> **Expectation 2c.** Maintaining efficient management is another benefit of ISO 14001 adoption at the Japanese subsidiaries in Thailand.

2.3.4 | Tax incentives

Other possible benefits are tax incentives for companies that adopt ISO 14001. The goal of BOI is to promote investments in Thailand from abroad. The promotion policies of the BOI mainly consist of investment incentives (tax and non-tax incentives) depending on the industry type. For example, according to BOI "projects that have investment capital of 10 million baht or more (excluding cost of land and working capital) must obtain ISO 9000 or ISO 14000 certification or similar international standard certification within 2 years from the full operation startup date, otherwise corporate income tax exemption shall be reduced by one year (BOI, 2023, p. 9)." Depending on the industry type, foreign companies investing in Thailand can receive a corporate tax exemption up to 13 years and exemptions of import duties (BOI, 2023). Although the role of tax incentives has not been discussed much in the previous studies, we wish to explore their importance in more depth in this paper. Therefore, the following expectation was developed:

> **Expectation 2d.** Tax incentives represent some other benefits of ISO 14001 adoption at the Japanese subsidiaries in Thailand.

2.4 | Challenges of ISO 14001 adoption

2.4.1 | Cost in terms of time and money

There is some existing literature about the challenges of ISO 14001 adoption. Dasanayaka et al. (2022) categorized the barriers to environmental management practices, including ISO 14001 adoption, into eight internal and four external barriers. They found that the lack of resources and employee engagement were the top two barriers in the internal barriers category (with respective share of 40.7% and 27.7%), while high cost was the most important barrier (with a share of 12.9%) in the external barriers category. Camilleri (2022) conducted a systematic review and a cost–benefit analysis about the rationale for ISO 14001 adoption. Camilleri's study found that companies had to consider the costs before ISO 14001 implementation. Similar results were obtained by studies about 11 public and private companies in the Gulf Arab countries (Waxin et al., 2019), in Saudi Arabia (Pinto et al., 2017) and in Malaysia (Sorooshian & Yee, 2019). However, the literature about the challenges of ISO 14001 adoption at subsidiaries of MNCs in developing countries is not sufficient. Hence, the following expectation was established.

> **Expectation 3a.** Cost is one of the barriers of ISO 14001 adoption at the Japanese subsidiaries in Thailand.

2.4.2 | Practical implementation problems and the internal situation within the companies

The large documentation required for ISO 14001 adoption and renewal was criticized by the interviewed companies (Boiral, 2007, 2011). Other previous studies reported practical implementation

problems (including the complexity of the process) in the Gulf Arab countries (Waxin et al., 2019) and in the Spanish agri-food sector (Carrillo-Labella et al., 2020).

Another challenge was the internal situation within the companies. The study cited above by Dasanayaka et al. (2022) reported that negative attitudes and the lack of knowledge by managers are additional barriers to ISO 14001 adoption. Camilleri (2022) argued that ISO 14001 adoption and renewal need a continuous commitment by the management and employees. The Malaysian industry also faced the inadequate commitment and involvement of employees and top managers, as well as the lack of training (Sorooshian & Yee, 2019). However, the literature about the challenges of ISO 14001 adoption at the subsidiaries of MNCs in developing countries is not sufficient. Hence, the following expectations were established.

Expectation 3b. The complexity of documentation process is another barrier of ISO 14001 adoption at the Japanese subsidiaries in Thailand.

Expectation 3c. The internal situation within the companies is also a barrier of ISO 14001 adoption at the Japanese subsidiaries in Thailand.

3 | DESCRIPTION OF OUR QUESTIONNAIRE AND INTERVIEW SURVEYS

3.1 | Questionnaire survey

In this paper we use qualitative research methods (e.g., questionnaire and semi-structured interview surveys) to investigate the motivations, benefits, and challenges for ISO 14001 adoption. The sample selection process was as follows: (1) We selected the listed Japanese companies in seven different industries: chemical, rubber, steel, metal, machinery, electronics, and precise machinery from Toyo Keizai Shinpou Sha (2020), which is a very famous Japanese company dataset, (2) among them, we selected the subsidiaries in Thailand whose purpose of establishment includes product manufacturing because the manufacturing sectors are more likely to emit pollutants and take actions such as environmental protection, and (3) the number of the selected subsidiaries in (2) was 398 subsidiaries. Therefore, our population size for the questionnaire survey was 398 Japanese subsidiaries in Thailand. Each location address of these subsidiaries was collected from Toyo Keizai Shinpou Sha (2020).

The questionnaire survey was conducted from September 2022 to December 2022. Our research team groups (1) the cover letters from the respective Japanese and Thai universities, (2) the questionnaire survey sheets in three languages (Japanese, English, and Thai) based on the theories and expectations explained above, and (3) a return envelope. Based on the list of the target companies and their contact information which we had prepared at the sample selection process, by post we sent the 398 target subsidiaries the envelop which the above documents were enclosed. After sending the envelope, we managed to increase the response rate thanks to the assistance by Thai university students who made repeated phone calls to the targeted companies in Thai and requested their cooperation. In addition, we gave the companies three selective return options: (1) return by post (with using the enclosed return envelope), (2) return by email, and (3) scan the QR code which attached the survey sheet and answer via google form.

The questionnaire survey consisted of 21 questions organized in four parts: (1) nine questions for "General Information," (2) nine questions for "Opinions on ISO 14001," (3) two questions for "Relationship with the parent company," and (4) one question for "General questions about environmental management." In five questions out of nine in the second part of this survey, we asked about the motivations, benefits, and challenges of ISO 14001 adoption, important things when implementing ISO 14001, and reasons why companies did not acquire ISO 14001 (see Table 2). All expectations in Section 2 had to be confirmed in the questionnaire survey based on cross-tabulation analysis. In addition, we collected data which are the excluding expectations.

The respondents could select the multiple answers that they felt the proper factors. For example, each respondent could select the possible choices from 1.1.1 to 1.8 regarding the motivations of ISO 14001 adoption. The contents of this survey were constructed based on the existing literature, which focused on other countries. Through this survey, we wanted to understand whether our expectations based on the existing literature would be confirmed in the context of Thailand. The required sample size is calculated in Equation (1). As the population size is finite, we conduct the finite correction in the Equation (2).

$$n = \lambda^2 \frac{p(1-p)}{d^2}, \tag{1}$$

where n indicates the required sample size, λ is confidence level (z-score), p is the ratio of responses, and d is acceptable error.

$$n' = \frac{nN}{N+n-1}, \tag{2}$$

where n' indicates the corrected required sample size and N is the population size.

On the assumption that confidence level is 95% ($z = 1.96$), p is 50% and d is 10%, the corrected required sample size (n') is 78. As the results of our questionnaire survey will be described in Section 4, we received responses by 100 subsidiaries.

3.2 | Semi-structured interviews

We conducted semi-structured interviews at 11 Japanese subsidiaries from October 2022 to November 2023 in order to understand the motivations, benefits, and challenges for ISO 14001 adoption in more depth. We contacted all companies that

TABLE 2 Summary of questionnaire survey contents.

1. Motivations

High Financial Indicators

1.1.1 ROA was high/improving in the year prior to ISO 14001 adoption

1.1.2 ROE was high/improving in the year prior to ISO 14001 adoption

1.1.3 ROS was high/improving in the year prior to ISO 14001 adoption

1.1.4 Debt ratio was high/improving in the year prior to ISO 14001 adoption

1.1.5 Other financial Indicators were high/improving in the year prior to ISO 14001 adoption

Low Financial Indicators

1.2.1 ROA was low/worsening in the year prior to ISO 14001 adoption

1.2.2 ROE was low/worsening in the year prior to ISO 14001 adoption

1.2.3 ROS was low/worsening in the year prior to ISO 14001 adoption

1.2.4 Debt ratio was low/worsening in the year prior to ISO 14001 adoption

1.2.5 Other financial Indicators were low/worsening in the year prior to ISO 14001 adoption

Global Initiatives

1.3 To answer global initiatives such as SDGs or ESG Investments, or else

To answer requests from shareholders

1.4.1 Requests from parent company

1.4.2 Impact in the stock price

1.4.3 Requests from other shareholders

To answer requests from stakeholders

1.5.1 Individual Consumers

1.5.2 Corporate consumers (Thai companies)

1.5.3 Corporate consumers (Other multinational companies in Thailand)

1.5.4 Employees

1.5.5 Local residents

1.5.6 National Government

1.5.7 Local Government

1.5.8 Suppliers (Thai companies)

1.5.9 Suppliers (Other multinational companies)

1.5.10 Environmental NGOs founded in Thailand

1.5.11 Environmental NGOs founded in Japan

1.5.12 Environmental NGOs founded in other countries

1.5.13 Other stakeholders

Parent company

1.6 Instructions from the parent company (President, or board member, or manager) in Japan

2. Benefits

Competitiveness

2.1 Gain a competitive advantage in the local market

Reputation

2.2 Gain a good reputation from national government

2.3 Gain a good reputation from local consumers

2.4 Gain a good reputation from suppliers

Incentives

2.5 Gain subsidies or tax reductions/exemptions, or other benefits from the national or the local government

Control management

2.6 Positive changes within our company such as improving business efficiency, innovation or clarifying where responsibility lies, or else

Others

2.7 No clear advantages or merits but it's still indispensable to acquire ISO 14001

2.8 Other advantages or merits

3. Challenges

3.1 Costs to acquire and introduce ISO 14001

3.2 Difficult to match ISO 14001 with the local society, the legal system and the culture

3.3 Difficult to reach consensus and smooth communication with the parent company regarding ISO 14001 acquisition and implementation

3.4 Not improve their productivity and profits

3.5 There are no challenges or barriers

3.6 Other challenges and barriers

4. Important Things when implementing ISO 14001

4.1 Same level of quality and environmental management cycle as in the parent company in Japan

4.2 Training and education for local employees

4.3 Disclosure to local stakeholders

4.4 Other important things

5. Reasons why companies did not acquire ISO 14001

5.1 Costs to acquire and introduce ISO 14001

5.2 Having other environmental certification (or a similar internal system) and that is enough

TABLE 2 (Continued)

Local factors			
1.7.1	To comply with Environmental Regulations	5.3	Acquiring ISO 14001 is of lower priority for us compared to the parent company or other subsidiaries
1.7.2	Mandatory to acquire ISO 14001 to do business at industrial estate or industrial park	5.4	Our corporate group does not encourage us to acquire ISO 14001
1.7.3	Environmental Actions by local competitors	5.5	The size of company is too large to acquire and implement ISO 14001
1.7.4	Government incentives such as subsidies, tax benefits, or others	5.6	As the size of our company is too small, we decided not to acquire or renew ISO 14001
1.7.5	Other local factors		
Others		5.7	No advantages and we don't feel the necessity to acquire ISO 14001
1.8	Other motivations	5.8	Other reasons

Note: There are parent company factors in (1.4.1) and (1.6). The former (1.4.1) emphasizes the parent company as the main shareholder, while the latter (1.6) tries to understand how the parent company requests are relayed to the subsidiary.
Source: Created by the authors.

TABLE 3 A summary of interviews.

Company	Industry type	In-person or online	Positions of main interviewees	Language
A1	Transportation	In-person	Vice President	English
A2	Transportation	Online	Vice President Advisor	Japanese
B1	Electronics	In-person	General Manager	Japanese
C1	Machinery	In-person	Chief of the Safety Health & Environment Department	Thai
D1	Chemical	Online	Safety / Environment Manager	Thai
B2	Electronics	In-person	General Manager Senior Sales Engineer	English
D2	Chemical	In-person	General Manager	English
C2	Machinery	In-person	Manager, Environment Group	English and Thai
B3	Electronics	In-person	General Affairs Department Manager	Thai
B4	Electronics	In-person	Managing Director Senior Manager	English
D3	Chemical	Online	Head of Corporate Strategy ESG Promotion Senior Manager	English

Source: Created by the authors.

responded to our questionnaire survey by email and asked them whether they would agree to participate in our semi-structured interview survey. Besides, we also requested the Japanese transportation subsidiaries in Thailand because the industry expanded their business in Thailand and plays an important role in Thailand. Through the process, we found 11 interviewees. The interviewee companies belong to four industries: transportation, electronics, machinery, and chemical.

Each interview was conducted for about an hour either in person or online video meeting (Microsoft Teams or Zoom) depending on the company request. Three interviews were held online, and the others were held in person. A summary of the interviews is shown below (see Table 3). We prepared the questions for the interview survey and sent them to the interviewees in advance. In the case when the interviewees requested to use Thai language, we asked Thai university students to assist us with the Thai-English interpretation. When we conduct the semi-structured interview survey, we presented the letter of consent for the interviewees and explained the process and data protection policies for them before starting survey. Only when they agreed with our explanation in advance, we conducted this survey.

Although the structure of our questions followed the contents of the questionnaire survey based on the literature review, which focused on other countries, through the semi-structured interview survey and content analysis, we gained a deeper understanding of the motivations, benefits, and challenges of ISO 14001 adoption compared with questionnaire survey and extracted more detailed information regarding ISO 14001 adoption and other environmental management actions.

TABLE 4 Distribution of responses to our questionnaire survey by industry type.

Industry	Population size	Number of responses	Response rate (%)
Chemical	123	35	28.5%
Rubber	26	3	11.5%
Steel	24	6	25.0%
Metal	34	6	17.6%
Machinery	82	27	32.9%
Electronics	98	23	23.5%
Precise machinery	11	0	0.0%
Total	398	100	25.1%

Source: Created by the authors based on the results of questionnaire survey.

TABLE 5 Distribution of ISO 14001 adoption by industry type.

Industry	Population size	Number of ISO 14001 adopters	ISO 14001 adoption rate (%)
Chemical	35	29	82.9%
Rubber	3	3	100.0%
Steel	6	4	66.7%
Metal	6	4	66.7%
Machinery	27	16	59.3%
Electronics	23	19	82.6%
Precise machinery	0	0	0.0%
Total	100	75	75.0%

Source: Created by the authors based on the results of questionnaire survey.

4 | RESULTS

4.1 | Results from the questionnaire survey

4.1.1 | Overview

We received replies from 100 out of 398 Japanese subsidiaries in Thailand, which means that the response rate is 25.1%. Table 4 summarizes the distributions of responses to our questionnaire survey by industry type. Except for the precise machinery industry, the response rate from other industries is from 11.5% to 32.9%. Table 5 shows the distribution of ISO 14001 adoption by industry type. Seventy-five out of the 100 subsidiaries replied that they had acquired ISO 14001.

ISO 14001 was first issued in 1996 and revised in 2004 and in 2015. Table 6 indicates the initial year of ISO 14001 adoption by industry type. More than 20 subsidiaries have adopted and continued to renew ISO 14001 since 1996, while 24 subsidiaries have adopted the certification after 2015. All ISO 14001 adopters have been keeping the certification from the time of adoption until the time of the survey implementation.

4.1.2 | Motivations

Figure 2 and Table 7 show the motivations for ISO 14001 adoption by industry type. Each item at the vertical axis was explained in Table 2. The cells in Table 7 where the proportion of responses in the choice is more than the proportion of ISO 14001 adopters in the industry colors in blue.[1] The numbers on the top of the bars indicate the number of companies that supported a particular motivation. According to Figure 2, the higher motivations are global trends or initiatives such as SDGs or ESG Investment, or else, (1.3), pressure by the parent company (1.4.1 and 1.6), and compliance with environmental regulations (1.7.1). The results show that requests by both national and local governments (1.5.6 and 1.5.7), and rules established by industrial estates/parks (1.7.2) are also among the important motivations of ISO 14001 adoption. Therefore, Expectation 1a and 1b are supported by the results from the questionnaire survey. In addition, more than 25 companies replied that pressure by foreign customers operating in Thailand (1.5.3) and local customers (1.5.1 and 1.5.2) were also important motivations. Thus, Expectation 1c and 1d are supported too. On the other hand, Expectation 1e about the pressure by local suppliers does not seem convincing (1.5.8). Similarly, Expectation 1f about the pressure by environmental NGOs is unsupported as well (1.5.9, 1.5.10, and 1.5.11). However, 19 companies answered that pressure by employees (1.5.4) and environmental actions by local competitors (1.7.3) were important too. Moreover, for the respondents from the chemical industry local government regulations and rules established by industrial estates/parks seemed to matter the most.

According to Table 7, chemical, steel, metal, and electronics industry selected the motivations of ISO 14001 adoption in not only the higher ranked motivations in total (for example the global initiatives (1.3), parent company factors (11.6 and 1.4.1), customers (1.5.1, 1.5.2 and 1.5.3), regulations by industrial estate and park and national and local government (1.7.2, 1.5.6 and 1.5.7)), but also low ranked motivations (for example, ROS and other financial indicators (1.1.3, 1.1.5, 1.2.3 and 1.2.5) and other local factors (1.7.5)). On the other hand, the machinery industry tends to select the higher ranked motivations, and rubber industry selected few motivations of ISO 14001 adoption. Therefore, almost all sectors have higher ranked motivations. However, the lower ranked ones depend on the industrial sectors.

4.1.3 | Benefits

Figure 3 and Table 8 show the benefits of ISO 14001 adoption by industry type. Each item at the vertical axis was explained in Table 2. Similar to Table 7, the cells in Table 8 where the proportion of responses in the choice is more than the proportion of ISO 14001 adopters in the industry colors in blue. The numbers on the top of the bars indicate the number of companies that supported a particular benefit. The top benefit is competitive advantage in the local market (2.1). Improved corporate reputation and efficient management are

TABLE 6 ISO 14001 adoption by industry type over time (1997–2022).

	Chemical	Rubber	Steel	Metal	Machinery	Electronics	Precise machinery	Total
1996								
1997						2		2
1998					1	1		2
1999								
2000					2	2		4
2001	3				1	1		5
2002	4				1			5
2003	2				1			3
2004	1	1			1			3
2005						1		1
2006		1	1	1		1		4
2007	2							2
2008						1		1
2009	1							1
2010	1	1				2		4
2011	1					1		2
2012	3				1	1		5
2013					1			1
2014					1	2		3
2015	2		1	1				4
2016								
2017	2							2
2018					1			1
2019	1				1			2
2020	2				2	1		5
2021	2		1		2	1		6
2022	2		1	1				4
N.A.				1		2		3
Total	29	3	4	4	16	19		75

Note: N.A. means that the initial year of ISO 14001 adoption is unidentified by the respondent. The blank cell means there is no applicable company.
Source: Created by the authors based on the results of questionnaire survey.

ranked next (2.3, 2.4, 2.6, and 2.2). Among the three types of corporate reputation, improved reputation among the local consumers is the most expected benefit. Therefore, Expectation 2a, 2b, and 2c are supported. On the contrary, tax incentives are not regarded as significantly important benefits of ISO 14001 adoption (2.5). Thus, Expectation 2d is not validated. Five chemical companies out of seven respondents answered that ISO 14001 is indispensable for their business (2.7). Therefore, the results depend on the industry type.

According to Table 8, chemical industry chose not only the higher ranked benefits, but also lower ranked ones. For example, 71.4% of the respondents in chemical industry answered that ISO 14001 adoption is indispensable. On the other hand, steel, metal, machinery, and electronics industry selected the higher ranked benefits of ISO 14001 adoption. Rubber industry does not seem to feel the benefits of ISO 14001 adoption too much.

4.1.4 | Challenges

We asked about the challenges of ISO 14001 adoption for ISO 14001 certified companies (Figure 4; Table 9) and the reasons for not acquiring ISO 14001 for not certified companies (Figure 5; Table 10). Similar to Table 7, the cells in Tables 9 and 10 where the proportion of responses in the choice is more than the proportion of ISO 14001 adopters or non-adopters in the industry colors in blue. We find that the major challenge of ISO 14001 adoption is the high cost (3.1 for ISO 14001 adopters and 5.1 for not certified companies). Therefore, Expectation 3a is supported. The second challenge is the internal situation within the companies. Ten companies did not acquire ISO 14001 because of their small size (5.6 on Figure 5). In addition, 14 companies faced the difficulty to match ISO 14001 with local society, legal system, and culture (3.2), and five ISO 14001 adopters felt

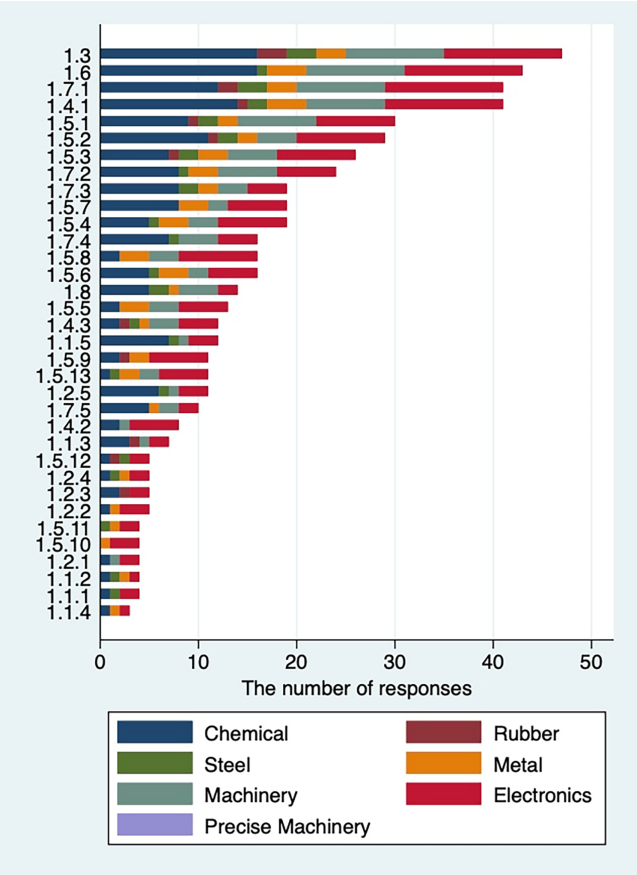

FIGURE 2 Motivations for ISO 14001 adoption by industry type. *Source*: Created by the authors based on the results of questionnaire survey.

difficulties in communicating with the parent company (3.3) as can be seen from Figure 4.

According to Table 9, chemical industry chose not only the higher ranked challenges, but also lower ranked ones. For example, all respondents and 66.7% of respondents in chemical industry chose the challenges with parent company and the lack of improvement of productivity and profits, respectively. The proportion of cost problem (7.1% and 32.1%, respectively) in the metal and machinery industry are quite higher compared with the proportion of respondents.

On the other hand, the lack of improvement of productivity and profits was not much of a barrier (3.4 on Figure 4), and 10 other barriers have yet to be revealed in detail (3.6 on Figure 4). The same results apply to the reasons why companies did not acquire ISO 14001. Except for the above two reasons (5.1 and 5.6 on Figure 5), all others were inconclusive (5.2, 5.3, 5.4, 5.5, 5.7, and 5.8 on Figure 5). Thus, Expectation 3c is supported while there is no conclusive evidence regarding Expectation 3b. Furthermore, 24 companies told us that they did not experience any challenges (3.5 on Figure 4), or that they overcame the difficulties by operating the ISO 14001.

According to Table 10, although the sample size is relatively small, non-ISO 14001 adopters in chemical industry tend not to acquire ISO 14001 for several reasons such as company size, lower priority, and other reasons. According to the results of machinery sector, they do not feel the necessity to acquire ISO 14001 and are not encouraged to acquire the certification by the parent company. Some machinery companies have other environmental certifications.

4.1.5 | Responses to the questions about other necessary actions

We asked about other actions that are necessary when implementing ISO 14001 (Figure 6; Table 11). Similar to Table 7, the cells in Table 11 where the proportion of responses in the choice is more than the proportion of ISO 14001 adopters in the industry colors in blue. More than 60 companies out of the 75 companies that have acquired ISO 14001 mentioned the importance of training and education of local employees (4.2). Another necessary action (ranked second) was to maintain the same level of quality and environmental management cycle as in the parent company in Japan (4.1). Disclosure to local stakeholders was ranked in third place (4.3), but the number of responses was less than half of the most responded choice. Only seven companies chose other important things.

According to Table 11, each industrial sector tries to manage ISO 14001 with actions such as training and educations for local employees. We cannot reach the conclusion about which action is indispensable for ISO 14001 implementation, but it seems that several follow-up actions are necessary when implementing ISO 14001.

4.2 | Results from the interview survey

4.2.1 | Overview

As mentioned in Section 3.2, we conducted semi-structured interviews at 11 Japanese subsidiaries in Thailand both in person and online. We used the interviews to investigate in depth the motivations, benefits, and barriers of ISO 14001 adoption. The results are summarized in Table 12.

4.2.2 | Motivations

We found seven motivations of ISO 14001 adoption from the interview survey. Four motivations out of the seven were in line with the results of the questionnaire survey. One motivation was to comply with government regulations. Another one was to respond to pressures by customers where the customers were Thai companies, foreign companies outside Thailand, and other Japanese subsidiaries in Thailand. Similar to the results of the questionnaire survey, pressure by the parent company and global trends or initiatives were also key motivations for ISO 14001 adoption. Therefore, Expectation 1a, 1b, 1c, and 1d are fully supported.

Next, pressure by local residents and employees was an unsignificant motivation in the questionnaire survey, but one company

TABLE 7 Cross tabulation by industry type regarding the motivations of ISO 14001 adoption.

Sector	Chemical	Rubber	Steel	Metal	Machinery	Electronics	Precise machinery
Total	29 (38.66%)	3 (4.00%)	4 (5.33%)	4 (5.33%)	16 (21.33%)	19 (25.33%)	0 (0.00%)
1.3	16 (34.04%)	3 (6.38%)	3 (6.38%)	3 (6.38%)	10 (21.28%)	12 (25.53%)	0 (0.00%)
1.6	16 (37.21%)	0 (0.00%)	1 (2.33%)	4 (9.30%)	10 (23.26%)	12 (27.91%)	0 (0.00%)
1.4.1	14 (34.15%)	1 (2.44%)	2 (4.88%)	4 (9.76%)	8 (19.51%)	12 (29.27%)	0 (0.00%)
1.7.1	12 (29.27%)	2 (4.88%)	3 (7.32%)	3 (7.32%)	9 (21.95%)	12 (29.27%)	0 (0.00%)
1.5.1	9 (30.00%)	1 (3.33%)	2 (6.67%)	2 (6.67%)	8 (26.67%)	8 (26.67%)	0 (0.00%)
1.5.2	11 (37.93%)	1 (3.45%)	2 (6.90%)	2 (6.90%)	4 (13.79%)	9 (31.03%)	0 (0.00%)
1.5.3	7 (26.92%)	1 (3.85%)	2 (7.69%)	3 (11.54%)	5 (19.23%)	8 (30.77%)	0 (0.00%)
1.7.2	8 (33.33%)	0 (0.00%)	1 (4.17%)	3 (12.50%)	6 (25.00%)	6 (25.00%)	0 (0.00%)
1.5.4	5 (26.32%)	0 (0.00%)	1 (5.26%)	3 (15.79%)	3 (15.79%)	7 (36.84%)	0 (0.00%)
1.5.7	8 (42.11%)	0 (0.00%)	0 (0.00%)	3 (15.79%)	2 (10.53%)	6 (31.58%)	0 (0.00%)
1.7.3	8 (42.11%)	0 (0.00%)	2 (10.53%)	2 (10.53%)	3 (15.79%)	4 (21.05%)	0 (0.00%)
1.5.6	5 (31.25%)	0 (0.00%)	1 (6.25%)	3 (18.75%)	2 (12.50%)	5 (31.25%)	0 (0.00%)
1.5.8	2 (12.50%)	0 (0.00%)	0 (0.00%)	3 (18.75%)	3 (18.75%)	8 (50.00%)	0 (0.00%)
1.7.4	7 (43.75%)	0 (0.00%)	1 (6.25%)	0 (0.00%)	4 (25.00%)	4 (25.00%)	0 (0.00%)
1.8	5 (35.71%)	0 (0.00%)	2 (14.29%)	1 (7.14%)	4 (28.57%)	2 (14.29%)	0 (0.00%)
1.5.5	2 (15.38%)	0 (0.00%)	0 (0.00%)	3 (23.08%)	3 (23.08%)	5 (38.46%)	0 (0.00%)
1.1.5	7 (58.33%)	0 (0.00%)	1 (8.33%)	0 (0.00%)	1 (8.33%)	3 (25.00%)	0 (0.00%)
1.4.3	2 (16.67%)	1 (8.33%)	1 (8.33%)	1 (8.33%)	3 (25.00%)	4 (33.33%)	0 (0.00%)
1.2.5	6 (54.55%)	0 (0.00%)	1 (9.09%)	0 (0.00%)	1 (9.09%)	3 (27.27%)	0 (0.00%)
1.5.9	2 (18.18%)	1 (9.09%)	0 (0.00%)	2 (18.18%)	0 (0.00%)	6 (54.55%)	0 (0.00%)
1.5.13	1 (9.09%)	0 (0.00%)	1 (9.09%)	2 (18.18%)	2 (18.18%)	5 (45.45%)	0 (0.00%)
1.7.5	5 (50.00%)	0 (0.00%)	0 (0.00%)	1 (10.00%)	2 (20.00%)	2 (20.00%)	0 (0.00%)
1.4.2	2 (25.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (12.50%)	5 (62.50%)	0 (0.00%)
1.1.3	3 (42.86%)	1 (14.29%)	0 (0.00%)	0 (0.00%)	1 (14.29%)	2 (28.57%)	0 (0.00%)
1.2.2	1 (20.00%)	0 (0.00%)	0 (0.00%)	1 (20.00%)	0 (0.00%)	3 (60.00%)	0 (0.00%)
1.2.3	2 (40.00%)	1 (20.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	2 (40.00%)	0 (0.00%)
1.2.4	1 (20.00%)	0 (0.00%)	1 (20.00%)	1 (20.00%)	0 (0.00%)	2 (40.00%)	0 (0.00%)
1.5.12	1 (20.00%)	1 (20.00%)	1 (20.00%)	0 (0.00%)	0 (0.00%)	2 (40.00%)	0 (0.00%)
1.1.1	1 (25.00%)	0 (0.00%)	1 (25.00%)	0 (0.00%)	0 (0.00%)	2 (50.00%)	0 (0.00%)
1.1.2	1 (25.00%)	0 (0.00%)	1 (25.00%)	1 (25.00%)	0 (0.00%)	1 (25.00%)	0 (0.00%)
1.2.1	1 (25.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (25.00%)	2 (50.00%)	0 (0.00%)
1.5.10	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (25.00%)	0 (0.00%)	3 (75.00%)	0 (0.00%)
1.5.11	0 (0.00%)	0 (0.00%)	1 (25.00%)	1 (25.00%)	0 (0.00%)	2 (50.00%)	0 (0.00%)
1.1.4	1 (33.33%)	0 (0.00%)	0 (0.00%)	1 (33.33%)	0 (0.00%)	1 (33.33%)	0 (0.00%)

Note: Each cell indicates the number of responses in real number and proportion of responses in the choice in parentheses.
Source: Created by the authors based on the results of questionnaire survey.

mentioned that as one of the motivations of ISO 14001 adoption in the interview survey. One possible explanation is the relative geographical proximity between of its factories to residential areas because the company is located near Bangkok. Compared to the other companies in our sample, it is possible that the company has to give the local residents and employees a signal of environmental care and meet their demand via ISO 14001 adoption.

Furthermore, another new finding from the interview survey was about the pressure by business associations ("they require safety, safety for environment, safety for labor, etc. … it is similar to ISO.") and the internal control and management ("The main motivation is to maintain the system. If we don't have ISO, it is difficult to maintain the corporate internal system"). Depending on the industry type, as some business associations are eager to show that they care for the environment, they may give an eco-friendly pressure to their member companies. These movements have the potential to become a new motivation leading to the adoption of ISO 14001 across the whole supply chain. On the other hand, pressures by local suppliers and environmental NGOs were not significant. Thus, Expectation 1e and 1f are not supported.

4.2.3 | Benefits

From the interview survey, we found nine benefits of ISO 14001 adoption. Four benefits out of the nine were the same as the results of questionnaire survey. First of all, ISO 14001 adoption improves the corporate reputation among the local and foreign consumers and leads to a higher competitiveness in the local market. Another major benefit was efficient management including visualization of management and operational control. Related to this, one company answered that ISO 14001 adoption is indispensable for business operation. Therefore, Expectation 2a, 2b, and 2c are fully supported. Some companies replied that they get benefits from tax incentives ("reductions of property taxes," "reductions of factory license fees," and "import tax exemptions"). Considering the results of two surveys together, Expectation 2d is supported by the interview survey. Other confirmed benefits from the interview survey were compliance with the environmental regulations and improvement of environmental performance. Thanks to the PDCA cycle, companies make sure to comply with the relevant regulations and take actions to achieve their environmental goals. Another benefit of ISO 14001 adoption found from the interviews is the implementation of the 5S[2]. Finally, interviewees mentioned that ISO 14001 adoption is one of the criteria based on which companies can receive business awards ("Green Industry Award") which is promoted by Ministry of Industry, Thailand, and ranks the companies into five categories depending on the degree of their environmental performance. We can conclude that ISO 14001 adoption is very important as it leads to various benefits for the companies.

4.2.4 | Challenges

The results of the interview survey point to two major challenges of ISO 14001 adoption: the first one is cost, and the second one is training and awareness of the employees. These challenges were also confirmed in the questionnaire survey. The first challenge is the cost of ISO 14001 adoption. In addition to the adoption fee, the companies

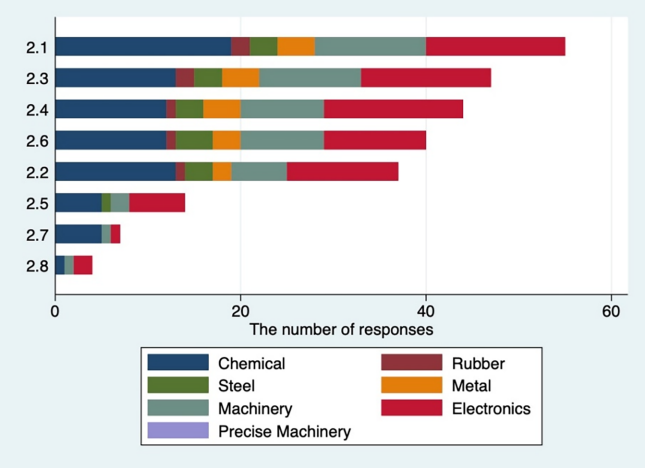

FIGURE 3 Benefits for ISO 14001 adoption by industry type.
Source: created by the authors based on the results of questionnaire survey.

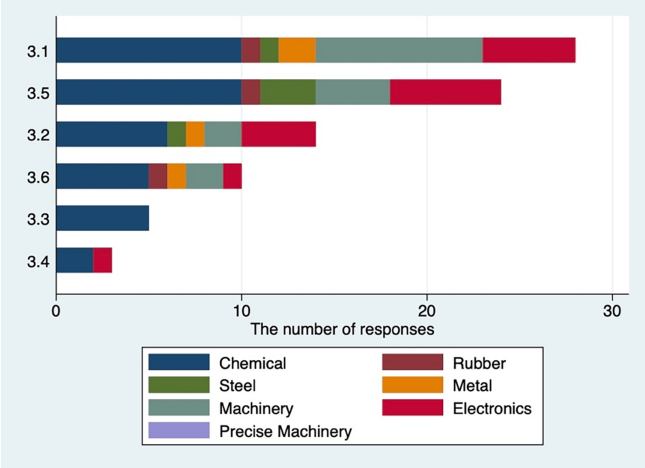

FIGURE 4 Challenges of ISO 14001 adoption by industry type.
Source: Created by the authors based on the results of questionnaire survey.

TABLE 8 Cross tabulation by industry type regarding benefits of ISO 14001 adoption.

Sector	Chemical	Rubber	Steel	Metal	Machinery	Electronics	Precise machinery
Total	29 (38.66%)	3 (4.00%)	4 (5.33%)	4 (5.33%)	16 (21.33%)	19 (25.33%)	0 (0.00%)
2.1	19 (34.55%)	2 (3.64%)	3 (5.45%)	4 (7.27%)	12 (21.82%)	15 (27.27%)	0 (0.00%)
2.3	13 (27.66%)	2 (4.26%)	3 (6.38%)	4 (8.51%)	11 (23.4%)	14 (29.79%)	0 (0.00%)
2.4	12 (27.27%)	1 (2.27%)	3 (6.82%)	4 (9.09%)	9 (20.45%)	15 (34.09%)	0 (0.00%)
2.6	12 (30.00%)	1 (2.50%)	4 (10.00%)	3 (7.50%)	9 (22.50%)	11 (27.50%)	0 (0.00%)
2.2	13 (35.14%)	1 (2.70%)	3 (8.11%)	2 (5.41%)	6 (16.22%)	12 (32.43%)	0 (0.00%)
2.5	5 (35.71%)	0 (0.00%)	1 (7.14%)	0 (0.00%)	2 (14.29%)	6 (42.86%)	0 (0.00%)
2.7	5 (71.43%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (14.29%)	1 (14.29%)	0 (0.00%)
2.8	1 (25.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (25.00%)	2 (50.00%)	0 (0.00%)

Note: Each cell indicates the number of responses in real number and proportion of responses in the choice in parentheses.
Source: created by the authors based on the results of questionnaire survey.

TABLE 9 Cross tabulation by industry type regarding challenges of ISO 14001 adoption.

Sector	Chemical	Rubber	Steel	Metal	Machinery	Electronics	Precise machinery
Total	29 (38.66%)	3 (4.00%)	4 (5.33%)	4 (5.33%)	16 (21.33%)	19 (25.33%)	0 (0.00%)
3.1	10 (35.71%)	1 (3.57%)	1 (3.57%)	2 (7.14%)	9 (32.14%)	5 (17.86%)	0 (0.00%)
3.5	10 (41.67%)	1 (4.17%)	3 (12.50%)	0 (0.00%)	4 (16.67%)	6 (25.00%)	0 (0.00%)
3.2	6 (42.86%)	0 (0.00%)	1 (7.14%)	1 (7.14%)	2 (14.29%)	4 (28.57%)	0 (0.00%)
3.6	5 (50.00%)	1 (10.00%)	0 (0.00%)	1 (10.00%)	2 (20.00%)	1 (10.00%)	0 (0.00%)
3.3	5 (100.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
3.4	2 (66.67%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (33.33%)	0 (0.00%)

Note: Each cell indicates the number of responses in real number and proportion of responses in the choice in parentheses.
Source: created by the authors based on the results of questionnaire survey.

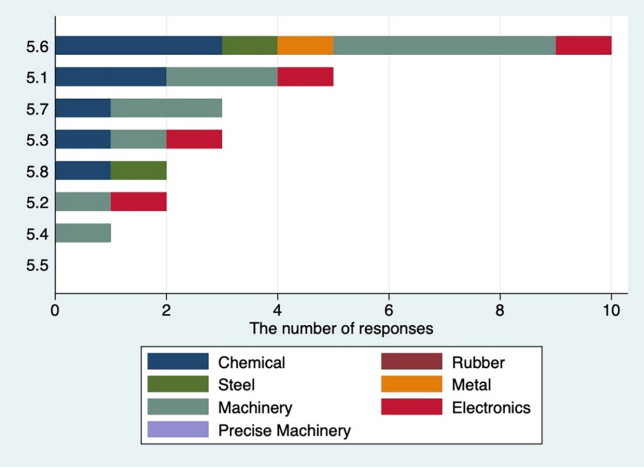

FIGURE 5 Reasons why companies did not acquire ISO 14001 by industry type. *Source*: Created by the authors based on the results of questionnaire survey.

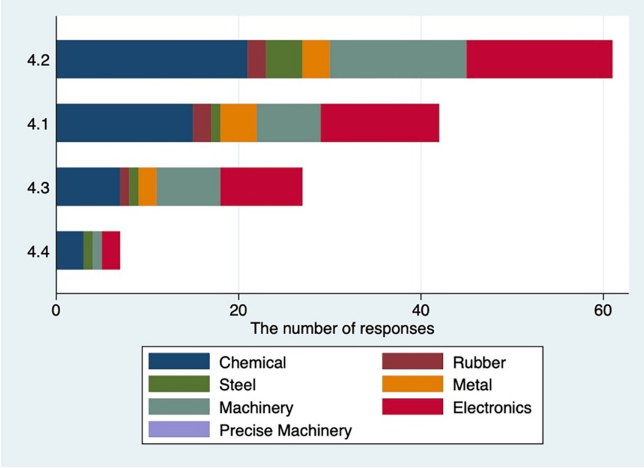

FIGURE 6 Other actions that are necessary when implementing ISO 14001. *Source*: Created by the authors based on the results of questionnaire survey.

TABLE 10 Cross tabulation by industry type regarding reasons why companies did not acquire ISO 14001.

Sector	Chemical	Rubber	Steel	Metal	Machinery	Electronics	Precise machinery
Total	6 (24.00%)	0 (0.00%)	2 (8.00%)	2 (8.00%)	11 (44.00%)	4 (16.00%)	0 (0.00%)
5.6	3 (30.00%)	0 (0.00%)	1 (10.00%)	1 (10.00%)	4 (40.00%)	1 (10.00%)	0 (0.00%)
5.1	2 (40.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	2 (40.00%)	1 (20.00%)	0 (0.00%)
5.3	1 (33.33%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (33.33%)	1 (33.33%)	0 (0.00%)
5.7	1 (33.33%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	2 (66.67%)	0 (0.00%)	0 (0.00%)
5.2	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (50.00%)	1 (50.00%)	0 (0.00%)
5.8	1 (50.00%)	0 (0.00%)	1 (50.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
5.4	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (100.00%)	0 (0.00%)	0 (0.00%)
5.5	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)

Note: Each cell indicates the number of responses in real number and proportion of responses in the choice in parentheses.
Source: Created by the authors based on the results of questionnaire survey.

should pay the renewal fee every 3 years as they continue to keep the certification. In some cases, the companies have to pay the additional cost of an annual check to maintain the quality of their ISO 14001 certification. According to our interviewees, the subsidiaries bear all these costs by themselves and do not receive any subsidies from the parent company. Some subsidiaries may compensate for the ISO 14001 related costs by raising the price of their products or services. The second challenge is training and awareness of the employees. The managers carry out environmental training for new employees, thereby trying to improve their environmental awareness.

TABLE 11 Cross tabulation by industry type regarding reasons why companies did not acquire ISO 14001.

Sector	Chemical	Rubber	Steel	Metal	Machinery	Electronics	Precise machinery
Total	29 (38.66%)	3 (4.00%)	4 (5.33%)	4 (5.33%)	16 (21.33%)	19 (25.33%)	0 (0.00%)
4.2	21 (34.43%)	2 (3.28%)	4 (6.56%)	3 (4.92%)	15 (24.59%)	16 (26.23%)	0 (0.00%)
4.1	15 (35.71%)	2 (4.76%)	1 (2.38%)	4 (9.52%)	7 (16.67%)	13 (30.95%)	0 (0.00%)
4.3	7 (25.93%)	1 (3.7%)	1 (3.70%)	2 (7.41%)	7 (25.93%)	9 (33.33%)	0 (0.00%)
4.4	3 (42.86%)	0 (0.00%)	1 (14.29%)	0 (0.00%)	1 (14.29%)	2 (28.57%)	0 (0.00%)

Note: Each cell indicates the number of responses in real number and proportion of responses in the choice in parentheses.
Source: Created by the authors based on the results of questionnaire survey.

In addition, the managers encourage actions by employees such as separating the waste by type and reducing the waste. Therefore, Expectation 3a and 3c are fully supported. In addition, three additional barriers to ISO 14001 adoption were revealed from the interview survey. One barrier is the complex documentation process. The complexity requires a great deal of time and cost for the companies, in particular at the initial stage of ISO 14001 adoption. Consequently, Expectation 3b is also partially confirmed by the results of the interview survey. The other new finding was about the unclear connection between ISO 14001 adoption and the improvement of productivity and profits. Some companies reported the achievement of efficient management and environmental goals thanks to ISO 14001 adoption. Therefore, though ISO 14001 adoption by itself cannot lead to higher profit, companies can improve and achieve their goals via ISO 14001 adoption. Another finding from the interview survey was that in addition to ISO 14001, companies have to consider obtaining and implementing other certifications (such as "ISO 45001" and "carbon footprint standard")[3].

5 | DISCUSSION

In this paper, we examined the motivations, benefits, and challenges of ISO 14001 adoption at the Japanese subsidiaries in Thailand by using a unique and detailed dataset which we gathered by using questionnaire (100 respondents) and interview surveys (11 respondents). Regarding the motivation of ISO 14001 adoption, our results support the findings of previous studies about the role of governmental regulations (Darnall, 2006; Johnstone & Hallberg, 2020; Quazi et al., 2001; Waxin et al., 2019), and about the customers (Arimura et al., 2014; Bansal & Bogner, 2002; Christmann & Taylor, 2001; Díaz de Junguitu & Allur, 2019; Kimbara et al., 2014; Liu et al., 2019; Nakamura et al., 2001; Nishitani, 2009; Prakash & Potoski, 2006, 2007; Qi et al., 2011; Tambunlertchai et al., 2013). As a theoretical contribution, our findings also confirm the importance of the stakeholder and institutional theories in explaining the factors of ISO 14001 adoption. However, our findings reveal the supplier pressure is not convincing, and the pressure from environmental NGOs is not supported. These stakeholders are obviously important for businesses, but the environmental awareness of Thai suppliers might be not as high as that in advanced countries. In addition, the empowerment of environmental NGOs in Thailand is relatively lower than other countries. An internet search about "Environment" in an online NGO directory leads to finding only seven environmental NGOs in Thailand (WANGO, 2023).

Next, the results of our study confirmed most of the expected benefits of ISO 14001 adoption and supported the stakeholder theory. ISO 14001 adoption seems to give a signal about environmental behavior to stakeholders and to improve corporate reputation. In addition, ISO 14001 adoption could help expand both domestic and external markets, increase competitiveness, and maintain efficient management. These results are consistent with the previous literature, which was mentioned in Section 2.3. Our research about the role of tax incentives did not produce consistent results. However, we believe that our results lead to a better understanding of the findings from the existing studies. Moreover, our paper adds empirical evidence based on the Thai context to the existing literature about the benefits of ISO 14001 adoption.

Thirdly, our results about the challenges of ISO 14001 adoption provide support to the findings of some previous studies, in particular, about the cost (Camilleri, 2022; Dasanayaka et al., 2022; Pinto et al., 2017; Sorooshian & Yee, 2019; Waxin et al., 2019) and about the internal situation within the companies (Camilleri, 2022; Dasanayaka et al., 2022; Sorooshian & Yee, 2019). However, it is unclear whether the excessive documentation is a barrier of ISO 14001 adoption.

In addition, we obtained some new findings and characteristics among industries that have not been mentioned in the existing literature from our interview survey. We show that depending on the industry type pressure by business association and the internal control and management can also be motivations of ISO 14001 adoption. In our paper, we discuss for the first time some benefits of ISO 14001 adoption such as implementation of 5S or winning the Green Industry award. In addition, while confirming the cost problems, we show that the subsidiaries do not receive any subsidies from parent companies, and how they are trying to cope with the cost of ISO 14001 adoption and renewal. Moreover, chemical industry feels a broad types of motivations, benefits, and challenges compared with other industries. The results will be insightful for how much the industry impacts on the environment and what stakeholders surround for the industry is the points to be considered. Consequently, our paper contributes to

TABLE 12 Summary of the interview survey results.

Company	Motivations for ISO 14001 adoption	Benefits of ISO 14001 adoption	Challenges of ISO 14001 adoption	Actions related to ISO 14001 adoption as well as other actions and comments
A1	No ISO 14001 adoption	No ISO 14001 adoption	No ISO 14001 adoption	[Other comments] 1. Other group subsidiaries have adopted ISO 14001. The motivation for ISO 14001 adoption is customer demands. 2. Environmental awareness and enforcement are challenges.
A2	1. Parent company requests 2. Pressure by EU Customers	1. Better corporate reputation 2. Many things are visualized because of using objective indicators.	1. No specific challenges, but the first steps of ISO 14001 adoption are difficult.	[Actions related to ISO 14001] 1. Keep the high quality of the management 2. Thai people are diligent, so they can learn ISO 14001 well. [Other actions and comments] 1. One-year training for managers at the headquarters in Japan. 2. The cost of ISO 14001 is a necessary expense.
B1	1. Parent company request 2. No specific local factors, but pressures from customers are an important motivation.	1. Improve the corporate image 2. Indispensable for business operation	1. The training for new employees because many employees quit their job after working for a short time	[Actions related to ISO 14001] 1. Teach employees how to separate the waste by type. Make an overview of ISO 14001 at the orientation session 2. Training and education for the 5S [Other actions] 1. Consider the implementation of other international standards like ISO 45001 (occupational health and safety management systems) 2. Consider installing solar panels on the rooftops of company buildings 3. Waste management
C1	1. Parent company request 2. To comply with environmental regulations. 3. Pressure by customers such as other Japanese subsidiaries.	1. Reduction of taxes such as property tax	1. Training for employees 2. High cost waste management according to standards	[Actions related to ISO 14001] 1. Audit by the environmental manager and environmental training once every 3 years 2. ISO 14001 is not of same level as in Japan because of the differences in environmental regulations 3. No NGO pressures 4. ISO 14001 adoption is correlated with improving environmental performance [Other actions] 1. Maximum 50% of energy consumption can be reduced after installing solar panels
D1	1. Parent company request 2. Government regulations 3. Pressure by customers	1. Reduction of the factory license fee	1. Many difficulties when implemented ISO 14001 more than 20 years ago, but now not too difficult because there are many regulations now.	[Actions related to ISO 14001] 1. Sometimes, we have to pay higher cost to achieve environmental goals (such as waste management) that we set through ISO 14001 adoption. [Other actions] 1. The parent company sets the direction such as CO2 emission cuts and the subsidiary launches concrete actions depending on the local context.
B2	No ISO 14001 adoption	No ISO 14001 adoption	No ISO 14001 adoption	[Other actions] 1. Comply with the relevant regulations 2. Contribute to society through our business 3. Implement emissions control by waste management, energy savings, and reduction of paper use
D2	1. Parent company request 2. Internal control 3. Maintain the system 4. Business association	1. Tax exemptions 2. Efficient management	No specific challenges	[Actions related to ISO 14001] 1. Training and education of local employees [Other actions] 1. 3R (recycling the milk boxes and the aluminum cans) 2. Boost the awareness of employees through various environmental actions 3. Reduce electricity consumption
C2	1. Requests by Thai consumers	1. Gain a competitive	1. Make a documentation manual	[Actions related to ISO 14001] 1. Training and education of local employees

(Continues)

TABLE 12 (Continued)

Company	Motivations for ISO 14001 adoption	Benefits of ISO 14001 adoption	Challenges of ISO 14001 adoption	Actions related to ISO 14001 adoption as well as other actions and comments
	and foreign consumers in Thailand 2. Thai manager commitments	advantage in the local market 2. Better reputation among the local consumers 3. Operational Control 4. Comply with environmental regulations		[Other actions] 1. Reduce CO2 emissions and energy consumption. Improve waste management 2. Carbon footprint standard (ISO 14067) 3. Introduce solar power and hydrogen
B3	1. Parent company request 2. Customer demands 3. Comply with environmental regulations	1. Improve environmental performance 2. Reduce energy consumption 3. Maintain a safe environment for employees	1. Raise the awareness of garbage separation	[Actions related to ISO 14001] 1. Internal audit operation [Other actions] 1. Reduce energy consumption 2. Keep working places clean 3. The Green Factory award
B4	1. Parent company request 2. Pressure by other group companies 3. Pressure by customers 4. Local government regulations 5. Demands by local residents and employees	1. Gain a competitive advantage in the local market 2. Better reputation among consumers 3. Improve business efficiency 4. Improve environmental performance	1. ISO 14001 adoption cannot improve directly the productivity and the profit.	[Actions related to ISO 14001] 1. Yearly training and study of the corporate philosophy 2. Internal environmental policies. Our internal rules are stricter than ISO 14001 requirements [Other actions] 1. Install solar panels on the rooftops of company buildings 2. Reduce and recycle the waste 3. The Green Industry award
D3	1. Global initiatives 2. Parent company request 3. Pressure by consumers (Thai and foreign companies in Thailand)	1. Gain competitiveness 2. Tax exemptions 3. Higher profits (indirect effect)	1. The employees should understand the requirements and practice the PDCA cycle	[Actions related to ISO 14001] 1. Training and education of new employees (monthly and yearly) 2. Monitoring the business operations 3. Regular meeting with the managers [Other actions] 1. The Eco-factory awards 2. Responsible care activities 3. Reduce energy consumption

Source: Created by the authors based on the results of interview survey.

the existing literature as we provide some new insights based on the Thai local context of ISO 14001 adoption.

6 | CONCLUSION

This paper examines the motivations, benefits, and challenges of ISO 14001 adoption at the Japanese subsidiaries in Thailand. We conducted a questionnaire survey and received responses from 100 Thai subsidiaries. In addition, we did semi-structured interviews at 11 subsidiaries. Our major findings from the two surveys are summarized below.

The major motivations of ISO 14001 adoption at Japanese subsidiaries in Thailand are compliance with environmental regulations by Thai national government and local municipalities, responding to pressures by foreign and local customers, as well as by the parent company, and conforming with global trends such as SDGs. Our results are line with the existing literature. In addition, from the interview

survey, we found some additional motivations such as pressure by business association and control of the internal management. We also found that the main benefits of ISO 14001 adoption are gaining competitiveness in the local market, improving corporate reputation, and maintaining efficient management at the subsidiaries. Based on the results from the interview survey, we discussed other benefits such as tax incentives, compliance with environmental regulations by Thai national and local municipalities, and improvement of environmental performance, as well as two benefits which were not mentioned in the previous literature: implementation of 5S and winning the Green Industry award. Lastly, the major challenges of ISO 14001 adoption are the cost problem and the internal situation within companies including the training and awareness of the employees. We found from the interview survey that there is no subsidy from the parent company to cover the costs of ISO 14001 adoption, but this does not become a barrier.

Another contribution of the paper is that it helps to gain a better and in-depth understanding of the motivations, benefits, and challenges of ISO 14001 adoption based on the Thai local context. The new evidence in this study address the research gap regarding ISO 14001 adoption in Thailand, and support for the stakeholder theory and institutional theory. Moreover, better, in-depth understanding may help to develop a higher awareness of the benefits, and to provide suggestions on how to overcome the barriers of ISO 14001 adoption. Although we focus on only Thailand case in this study, these contributions may be conducive to a wider spread of ISO 14001 in the other developing countries. Ultimately, the promotion of corporate environmental behavior should help the countries to achieve the SDGs mentioned earlier.

Although this paper contributes to the literature about the motivations, benefits, and barriers of ISO 14001 adoption, it also has some limitations that have to be overcome in our future research. First of all, while some expectations were supported by one of the surveys, they were not confirmed by the other. Further in-depth investigations as well as better understanding of the cultural background should be pursued to address these issues. Secondly, while 100 responses to the questionnaire survey and 11 semi-structured interviews might be enough for the reliability of this study, in the future the size of the sample and the number of industry types must be expanded.

ACKNOWLEDGMENTS

The authors would like to thank the anonymous reviewers for their valuable comments, which have helped to improve this paper considerably. This work was supported by Sompo Environment Foundation, JST SPRING, Grant Number JPMJSP2110 and JSPS KAKENHI, Grant Number 22K01460.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

ORCID

Reo Hirata https://orcid.org/0000-0003-1576-1884

ENDNOTES

[1] For example, the proportion of ISO 14001 adopters in the chemical sector is 38.66%. When the proportion to choose the option at the industrial sector is more than 38.66%, the cell is shown in green. In Table 7, the proportion to choose the "local government (1.5.7)" is 42.11%. In comparison with the proportion of ISO 14001 adopters in chemical industry (38.66%), the option to "local government" seems to be more important factor in this sector. Therefore, the cell of "local government" in Table 7 is in blue.

[2] 5S stands for the first letters of five managerial concepts: Sorting (*Seiri*), Setting-in-order (*Seiton*), Shining (*Seisou*), Standarizing (*Seiketsu*), and Sustaining (*Shitsuke*).

[3] ISO 45001 indicates occupational health and safety management systems, and the standard of carbon footprint of products is ISO 14067.

REFERENCES

Arimura, T., Iguchi, H., & Michida, E. (2014). Product-related environmental regulation and voluntary environmental actions: Impacts of RoHS and REACH in Malaysia. *IDE Discussion Paper*, *454*, 1–29. https://doi.org/10.20561/00037716

Ayala-Ponce, N., Vilchis-Vidal, A., & Picard-Ami, M. L. (2018). Corporate environmental responsibility and competitiveness: The maquiladora industry of the Mexican northern borderlands. *Business Strategy & Development*, *1*(3), 169–179. https://doi.org/10.1002/bsd2.20

Bansal, P., & Bogner, W. C. (2002). Deciding on ISO 14001: Economics, institutions, and context. *Long Range Planning*, *35*(3), 269–290. https://doi.org/10.1016/S0024-6301(02)00046-8

Berrone, P., Fosfuri, A., Gelabert, L., & Gomez-Mejia, L. R. (2013). Necessity as the mother of 'green' inventions: Institutional pressures and environmental innovations. *Strategic Management Journal*, *34*(8), 891–909. https://doi.org/10.1002/smj.2041

BOI. (2023). *Investment Promotion Guide* 2023. https://www.boi.go.th/upload/content/BOI_A_Guide_EN.pdf

BOI. (2024). *Foreign Direct Investment Statistics and Summary*. https://www.boi.go.th/index.php?page=statistics_oversea_report_st

Boiral, O. (2007). Corporate greening through ISO 14001: A rational myth? *Organization Science*, *18*(1), 127–146. https://doi.org/10.1287/orsc.1060.0224

Boiral, O. (2011). Managing with ISO systems: Lessons from practice. *Long Range Planning*, *44*(3), 197–220. https://doi.org/10.1016/j.lrp.2010.12.003

Boiral, O., Guillaumie, L., Heras-Saizarbitoria, I., & Tayo Tene, C. V. (2018). Adoption and outcomes of ISO 14001: A systematic review. *International Journal of Management Reviews*, *20*(2), 411–432. https://doi.org/10.1111/ijmr.12139

Camilleri, M. A. (2022). The rationale for ISO 14001 certification: A systematic review and a cost–benefit analysis. *Corporate Social Responsibility and Environmental Management*, *29*(4), 1067–1083. https://doi.org/10.1002/csr.2254

Carrillo-Labella, R., Fort, F., & Parras-Rosa, M. (2020). Motives, barriers, and expected benefits of ISO 14001 in the agri-food sector. *Sustainability*, *12*(5), 1724. https://doi.org/10.3390/su12051724

Christmann, P., & Taylor, G. (2001). Globalization and the environment: Determinants of firm self-regulation in China. *Journal of International Business Studies*, *32*(3), 439–458. https://www.jstor.org/stable/3069490

Darnall, N. (2006). Why firms mandate ISO 14001 certification. *Business & Society*, *45*(3), 354–381. https://doi.org/10.1177/0007650306289387

Dasanayaka, C. H., Gunarathne, N., Murphy, D. F., & Nagirikandalage, P. (2022). Triggers for and barriers to the adoption of environmental management practices by small and medium-sized enterprises: A

critical review. *Corporate Social Responsibility and Environmental Management*, *29*(4), 749–764. https://doi.org/10.1002/csr.2244

Díaz de Junguitu, A., & Allur, E. (2019). The adoption of environmental management systems based on ISO 14001, EMAS, and alternative models for SMEs: A qualitative empirical study. *Sustainability*, *11*(24), 7015. https://doi.org/10.3390/su11247015

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, *48*(2), 147–160. https://doi.org/10.2307/2095101

Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman.

Hirata, R., Ialnazov, D. S., & Mieno, F. (2023). Corporate governance characteristics of Japanese manufacturing companies and ISO 14001 adoption by their subsidiaries in Thailand. *Current Research in Environmental Sustainability*, *6*, 100236. https://doi.org/10.1016/j.crsust.2023.100236

Hoffman, A. J. (2001). Linking organizational and field-level analyses: The diffusion of corporate environmental practice. *Organization & Environment*, *14*(2), 133–156. https://doi.org/10.1177/1086026601142001

ISO. (2015a). *ISO 14001—Introduction to ISO 14001:2015* (*1st ed.*). https://www.iso.org/files/live/sites/isoorg/files/store/en/PUB100371.pdf

ISO. (2015b). *Environmental management systems—Requirements with guidance for use*. Retrieved January 31, 2024, from https://www.iso.org/obp/ui/en/#iso:std:iso:14001:ed-3:v1:en

ISO. (2022). *The ISO Survey*. https://www.iso.org/the-iso-survey.html

JETRO. (2021). *Thai Nikkeikigyou Shinshutdoukouchousa 2020 Nen Chousakekka* (*in Japanese*). https://www.jetro.go.jp/ext_images/_Reports/01/047f1d797cf3c47e/20210002.pdf

Jiang, R. J., & Bansal, P. (2003). Seeing the need for ISO 14001. *Journal of Management Studies*, *40*(4), 1047–1067. https://doi.org/10.1111/1467-6486.00370

Johnstone, L., & Hallberg, P. (2020). ISO 14001 adoption and environmental performance in small to medium sized enterprises. *Journal of Environmental Management*, *266*, 110592. https://doi.org/10.1016/j.jenvman.2020.110592

Kaur, C., & Dharni, K. (2024). Influence of performance measures and sample characteristics on the relationship between corporate environmental management and firm performance: A meta-analytic review. *Business Strategy & Development*, *7*(2), e367. https://doi.org/10.1002/bsd2.367

Kimbara, T., Murakami, K., & Tapachai, N. (2014). Environmental management transfer and environmental performance by Japanese firms in Thailand. *Applied Environmental Research*, *36*(4), 81–90. https://doi.org/10.35762/AER.2014.36.4.8

Liu, J., Yuan, C., Hafeez, M., & Li, X. (2019). ISO 14001 certification in developing countries: Motivations from trade and environment. *Journal of Environmental Planning and Management*, *63*(7), 1241–1265. https://doi.org/10.1080/09640568.2019.1649642

MOFA. (2022). *Kaigai Shinshutsu Nikkei Kigyo Kyotensuu Chosa* (*in Japanese*). https://www.mofa.go.jp/mofaj/ecm/ec/page22_003410.html

Nakamura, M., Takahashi, T., & Vertinsky, I. (2001). Why Japanese firms choose to certify: A study of managerial responses to environmental issues. *Journal of Environmental Economics and Management*, *42*(1), 23–52. https://doi.org/10.1006/jeem.2000.1148

Nishitani, K. (2009). An empirical study of the initial adoption of ISO 14001 in Japanese manufacturing firms. *Ecological Economics*, *68*(3), 669–679. https://doi.org/10.1016/j.ecolecon.2008.05.023

Pinto, L., Allui, A., & Mariotti, F. (2017). Motivations, barriers and benefits in the adoption of ISO 14001 in Saudi organizations. *International Journal of Applied Business and Economic Research*, *15*(24), 389–413. https://serialsjournals.com/abstract/65921_28.pdf

Prakash, A., & Potoski, M. (2006). Racing to the bottom? Trade, environmental governance, and ISO 14001. *American Journal of Political Science*, *50*(2), 350–364. http://www.jstor.org/stable/3694277

Prakash, A., & Potoski, M. (2007). Investing up: FDI and the cross-country diffusion of ISO 14001 management systems. *International Studies Quarterly*, *51*(3), 723–744. http://www.jstor.org/stable/4621735

Psomas, E. L., Fotopoulos, C. V., & Kafetzopoulos, D. P. (2011). Motives, difficulties and benefits in implementing the ISO 14001 environmental management system. *Management of Environmental Quality: An International Journal*, *22*(4), 502–521. https://doi.org/10.1108/14777831111136090

Qi, G., Zeng, S., Tam, C., Yin, H. T., Wu, J. F., & Dai, Z. H. (2011). Diffusion of ISO 14001 environmental management systems in China: Rethinking on stakeholders' roles. *Journal of Cleaner Production*, *19*(11), 1250–1256. https://doi.org/10.1016/j.jclepro.2011.03.006

Quazi, H. A., Khoo, Y.-K., Tan, C.-M., & Wong, P.-S. (2001). Motivation for ISO 14000 certication: Development of a predictive model. *Omega*, *29*(6), 525–542. https://doi.org/10.1016/S0305-0483(01)00042-1

Rasheed, A. S., Booth, C. A., & Horry, R. E. (2023). Stakeholder perceptions of the benefits and barriers of implementing environmental management systems in the Maldivian construction industry. *Journal of Housing and the Built Environment*, *38*(4), 2821–2850. https://doi.org/10.1007/s10901-023-10067-5

Scott, W. R. (2014). *Institutions and organizations: Ideas, interests and identities*. Sage Publications, Inc.

Sorooshian, S., & Yee, L. S. (2019). Demotivating factors affecting the implementation of ISO 14001:2015 in Malaysia. *Environmental Quality Management*, *29*(2), 85–95. https://doi.org/10.1002/tqem.21664

Tambunlertchai, K., Kontoleon, A., & Khanna, M. (2013). Assessing participation in voluntary environmental programmes in the developing world: The role of FDI and export orientation on ISO14001 adoption in Thailand. *Applied Economics*, *45*(15), 2039–2048. https://doi.org/10.1080/00036846.2011.648320

Testa, F., Boiral, O., & Iraldo, F. (2018). Internalization of environmental practices and institutional complexity: Can stakeholders pressures encourage greenwashing? *Journal of Business Ethics*, *147*, 287–307. https://doi.org/10.1007/s10551-015-2960-2

Toyo Keizai Shinpou Sha. (2020). *Kaigaishinshutsu Kigyousouran 2020* [*Kaishabetsu hen*] (*in Japanese*).

United Nations. (1992). *Agenda 21*. https://sustainabledevelopment.un.org/content/documents/Agenda21.pdf

WANGO. (2023). *Worldwide NGO Directory*. https://www.wango.org/resources.aspx?section=ngodir#tab2

Waxin, M. F., Knuteson, S. L., & Bartholomew, A. (2019). Drivers and challenges for implementing ISO 14001 environmental management systems in an emerging Gulf Arab country. *Environmental Management*, *63*(4), 495–506. https://doi.org/10.1007/s00267-017-0958-5

How to cite this article: Hirata, R., & Ialnazov, D. S. (2024). Corporate environmental behavior toward sustainable development: Motivations, benefits, and challenges of ISO 14001 adoption at Japanese subsidiaries in Thailand. *Business Strategy & Development*, *7*(3), e70015. https://doi.org/10.1002/bsd2.70015