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Environmental performance of foreign firms: Chinese and Japanese firms in Myanmar

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ABSTRACT

Little is known about how the environmental approaches of foreign investors in developing countries are formed. The objective of this study is to conceptualize and investigate the drivers of the environmental performance of foreign firms. This is done through a comparative analysis of the environmental profiles of Chinese and Japanese firms in Myanmar. Applying institutional and resource-based theories, the study investigates the complex and multifaceted roles that domestic regulations and internal resources of firms play in their environmental performance. The study contributes to the literature on corporate environmental behaviour by constructing a novel set of environmental variables connected with FDI. The research is based on survey data covering 296 Chinese and 125 Japanese companies operating in Myanmar. The data are analysed using a hierarchical multiple linear regression. It is found that Japanese companies tend to adopt all-inclusive and comprehensive strategies driven by both regulatory pressure and firm capacity when addressing environmental issues, while the environmental choices of Chinese companies tend to be driven by intra-firm resources. For Chinese companies, neither ownership type nor operating in a polluting industrial sector necessarily influence the environmental profile, whereas both of these variables had significant effects on the environmental performance of Japanese firms. The findings indicate that both resource-based and institutional theories are useful when assessing the influence of environmental regulations on FDI in developing countries.

1. Introduction

Growing foreign direct investment (FDI) has been one of the main drivers of the globalisation of the world economy from the 1980s onwards. In 2019, both FDI inflows and outflows exhibited significant growth globally, with the former rising by 30% and the latter by 33%. In 2019, China was the world's largest FDI recipient, receiving 38% of global FDI, while Japan was the largest source of FDI outflows, being the source of 42% of regional outward FDI.

Along with political economy risks such as growing trade tensions, the Covid-19 pandemic has disrupted global and Asia-Pacific FDI flows to, from and within the Asia-Pacific region (OECD, 2020). Although FDI is not expected to fully rebound before 2021, the investment liberalization in 2019–2020 in Myanmar, the Philippines, Thailand and Vietnam created a more attractive investment environment. Post-pandemic economic recovery in these countries will require substantial financial resources, and FDI is an important source for this. While restoring and attracting FDI is critical to recovery in the Asia-Pacific region, the recovery path must also be sustainable. The pandemic may represent a unique opportunity for the governments of these countries to revisit their approaches to FDI and realise the potential of FDI to contribute to sustainable development. It is therefore imperative to examine the environmental profile of existing FDI, introduce mechanisms to attract green investment and encourage environmentally friendly corporate behaviour (Khan et al., 2019).

One of the most important and most frequently raised issues related to FDI is its impact on the natural environment (Antoci et al., 2015; Cole et al., 2017). The environmental impacts associated with FDI could easily be overshadowed by the economic benefits of investment (Hakimi and Hamdi, 2016). Realizing the potential negative consequences of FDI on the environment, most governments have become more selective in the source and type of FDI flowing into their country (Demena and Afesorgbor, 2020). Many FDI recipient countries are now promoting so-called 'green FDI' to focus on the adverse environmental externalities and economic growth. As a result, enterprises often encounter challenges stemming from the protection of the environment and society

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that require the adoption of new sustainable strategies and technologies (Borowski, 2020). According to the existing research, the interaction between these pressures may determine how sustainably foreign investors behave (Antonietti and Marzucchi, 2014). Although large-scale FDI can potentially accelerate environmental degradation in host countries, it can potentially also contribute to environmental protection, especially if the FDI is accompanied by cleaner technologies and sustainable management practices (Demena and Afesorgbor, 2020).

Previous research concerned with the FDI–environment relationship has mostly focused on the impacts of domestic regulation on aggregate FDI flows and the effects of FDI on the local environment, mainly relating it to the environmental Kuznets curve and the pollution haven hypothesis (Aung et al., 2017; Bruvoll and Fæhn, 2006; Rezza, 2013). While a growing number of studies discuss FDI as a double-edged-sword that can positively or negatively impact the host country's environment, there has been a lack of empirical research on the environmental performance of FDI at the firm-level (Cole et al., 2017). Some studies examine the environmental performance of domestic firms (Liu and Ye, 2012). Given the global acceleration of FDI in recent years and the heterogeneity of firms in terms of resource capacity, managerial practices and environmental regulations, there is a need to better understand the drivers of the environmental behaviour of individual firms in foreign settings. Research into the determinants of enterprise environmental performance has examined the incentives for companies to embrace ecologically responsive initiatives (Nikolaou et al., 2018). The creation of new opportunities and maximisation of profit margins through government economic incentives are often highlighted as drivers for enterprises to go green (Lasrado and Zakaria, 2020). This body of literature is primarily based on the institutional theory of enterprise sustainable development (Greenwood et al., 2015). Institutional theory argues that corporate commitment to environmental sustainability is motivated by firms seeking legitimacy and acceptance (Bansal, 2005a).

A second body of literature has instead taken a resource-based view (RBV), according to which firms seek to gain competitive advantage – such as corporate sustainability – through their internal characteristics and resources (tangible or intangible) (Yu et al., 2017b). This view suggests that a firm's ability to attain environmental sustainability depends on internal organizational resources such as assets, capabilities, processes, information and knowledge. Thus, while the institutionalist approach emphasises the influence of external pressure on the environmental profiles of companies, RBV emphasises the internal resources of companies. Despite the importance of environmental sustainability of FDI, little research has been carried out comparing the application of these two logics to FDI environmental performance. A systematic application of these models can improve our understanding of the dynamics underlying the environmental performance of foreign firms.

To fill this gap, we develop a conceptual framework for identifying the key determinants that influence the environmental profiles of foreign companies in a developing country and compare RBV and institutional theory. We test our conceptual model in the context of Chinese and Japanese firms investing in Myanmar, a lower-middle income economy. Myanmar is a suitable unit of analysis because of its rapidly growing economy, geopolitical significance, transitional political regime with quickly evolving economic and environmental policies and environmental vulnerability.

Myanmar is one of the fastest growing economies in the world. The annual GDP growth rate for 2018–2019 was 6.7% (The World Bank, 2019). However, the Covid-19 pandemic and political unrest are dealing severe blows to the country's economy. In a baseline scenario, the growth was projected to drop to just 0.5% in 2019–2020 (The World Bank, 2020). From 2011 onwards, Myanmar was on a path of political and economic transition from a 50-year dictatorship and state-controlled economy to democracy and a market-based economy (Aung, 2019; Stokke et al., 2018). Parallel to this process, the government established several policies to facilitate investments (Vakulchuk et al., 2017). These new regulations have facilitated significant growth of FDI, especially in the power, oil and gas, transportation and communication and manufacturing sectors (ADB, 2017). Despite the economy relying heavily on the extraction of natural resources, manufacturing is becoming increasingly important to the national economy, causing a rise in pollution from industrial activities. Environmental regulations in Myanmar, as in many developing countries, suffer from insufficient capacity, in terms of both human and financial resources, to adequately address industrial pollution (Minsitry of Economy, 2019). In particular, the lack of reliable enterprise data and monitoring often prevents the assessment of firm-specific environmental impacts (DICA, 2017). This poses a significant obstacle to reviewing the environmental performance of the firms and enforcement of national pollution control regulations. In these circumstances, modelling the environmental performance of foreign firms can help compensate for the absence of data and resource constraints.

Chinese and Japanese firms were chosen for several reasons, including the high degree of competition between Chinese and Japanese investors in Myanmar, the similar sectoral patterns of investment, the same region of origin and the similar controversial environmental reputations and data availability of companies from these two countries (Reilly, 2013; Shaikh, 2020). These similarities provide a particularly interesting context for an investigation into the environmental performance of the two countries' foreign investments in a developing country and the determinants of their environmental performance.

Sharing a 2000-km border, China has been Myanmar's most significant economic partner and foreign investor since 1988–89 (Reilly, 2013). Total Chinese investment reached USD 20.68 billion in the first quarter of 2019, making up 25% of total foreign investment in Myanmar. Nevertheless, Myanmar's changing socio-political landscape has brought significant challenges to China's investment in the country. Where it once had uniquely dominant position in Myanmar, China now must compete with other foreign actors, including its regional rival Japan, and handle a more active civil society. Although Japanese investment in Myanmar was curtailed between 1988 and 2011 due to the sanctions against the Myanmar military regime (Kudo, 2016; Seekins, 2015), the two countries have signed several economic cooperation agreements after Myanmar transitioned from military to civilian rule (Bonnitcha, 2014). Japanese investment in Myanmar reached an all-time high of USD 1.48 billion in the fiscal year 2017, making it the fourth-largest foreign investor in the country (Asano, 2015). Myanmar's civil society holds a favourable impression of Japan compared to China, seeing the business conduct of Japanese firms as more responsible with greater emphasis on environmental protection and benefit sharing with Myanmar society (Asano, 2015).

Although the empirical material in this paper is on Chinese and Japanese enterprises in Myanmar, this research showcases how foreign firms may behave in countries undergoing political and economic transition. Facing data and resource constraints in regulating foreign investment is not unique to Myanmar. It is generally recognised that environmental regulators in developing countries often lack vital information on enterprises' environmental practice and what factors are necessary in setting strategies and actions plans. The results of this research could inform and support improvements in the environmental performance of foreign enterprises. The paper also highlights the urgency of collecting detailed enterprise-level environmental data in Myanmar and other developing countries with high levels of economic growth and FDI.

This study bridges the gap in the existing FDI and environment research by providing new perspectives and findings related to disaggregated firm-level factors. The study also contributes to the literature on corporate environmental behaviour by constructing a novel set of environmental variables connected with FDI. More specifically, we conceptualize the FDI-environment relationship using the determinants of corporate-green behaviour and performance. The conceptual framework, survey instrument and methodology developed in this study can be applied to many parts of the world with FDI inflows.

The remainder of the article is organized as follows: Section 2 details

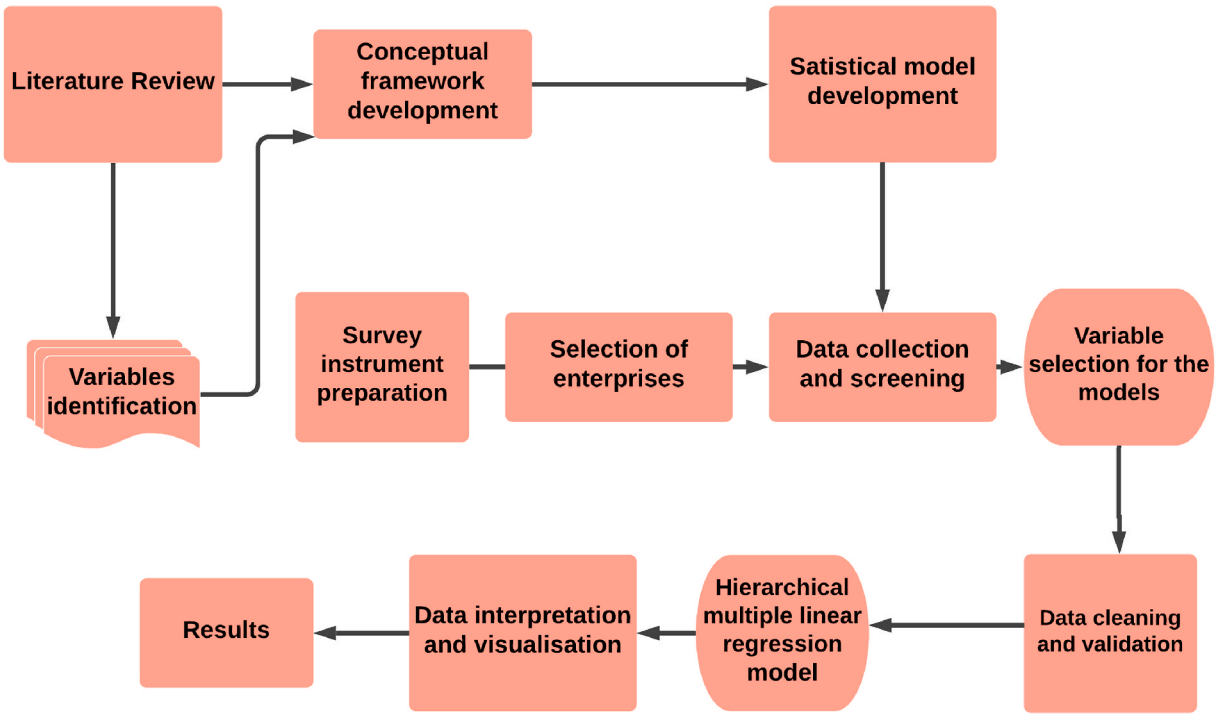

Fig. 1. Workflow of research.

the methodology including the conceptual framework, variable selection and data description; Section 3 presents the results and findings; Section 4 discusses the results and Section 5 concludes the paper.

2. Methods

Fig. 1 depicts the study's workflow.

This paper is theoretically anchored in RBV and institutional theory. Fig. 2 summarises the paper's conceptual model depicting the dependent, moderating and independent variables. Methodologically, this study applies the disaggregated approach in an effort to deepen the understanding of how foreign firms' environmental performance is associated with intra-firm resources and capabilities (Corbett and Claridge, 2002), their perception of the host country's environmental regulations and the likelihood of adverse environmental impacts from their production facilities (Bansal, 2005b). It also examines the moderating effects of the firms' sector and ownership type. Thus, the following empirical model is estimated:

$$EP_{it} = \alpha_i + \beta_1 EI_{it} + \beta_2 EK_{it}^2 + \beta_3 EC_{it} + \beta_4 Comp_{it}^2 + \beta_5 Asset_{it} + \beta_6 Age_{it} + \beta_7 Size_{it} + \beta_8 RnD_{it} + \beta_9 Scope_{it} + \beta_{10} TP_{it} + \beta_{11} EP_{it} + \beta_{12} ER_{it} + \beta_{13} ES_{it} + \varepsilon_i \quad (1)$$

where the dependent variable EP is environmental performance, EI is environmental impact, EK is environmental knowledge, EC is environmental capacity, Comp is a firm's ability to compete, TP is third party influence, EP is environmental policy, ER is encouraging regulations and ES is environmental stringency.

How enterprises respond to sustainable development has become a key issue in the modern business world (Costanigro et al., 2009; Glover et al., 2014; Nikolaou et al., 2018). The topic of enterprise environmental performance is receiving growing attention in the academic literature as the role that environmental stewardship plays in business grows (Babiak, 2010). Enterprises may become environmentally active due to a variety of internal and external driving forces (Bansal, 2005), and firms' environmental strategies can be either reactive or proactive (Kim, 2018). Enterprises' sustainability efforts are driven by two basic motivational factors (Currin, 2012). The first motive, legal compliance/institutional pressure, is explained by institutional theory and social approval theory. Institutional theory argues that organisations promote survival and legitimacy through factors such as government regulations and social and cultural expectations (Zhu et al., 2012). This type of environmental strategy is known as a reactive corporate environmental practice (Lee et al., 2018).

Institutional theory argues that organisations secure their legitimacy through the adoption of the sustainable practices expected by stakeholders and compliance with regulatory standards and laws (Scott, 2008). Studies have confirmed that stringent environmental regulation is the most significant institutional factor influencing a firm's environmental performance (Ghisetti and Pontoni, 2015; Hojnik and Ruzzier, 2016; Pereira Santos and Vence, 2015; Antoci et al., 2015). Liao et al. (2018) find that institutional drivers are the main motives for enterprises' environmental behaviour. Scott (2008) identifies three pillars of institutional theory: cognitive, normative and regulative. Although all three are equally important as institutional drivers, Buysse and Verbeke (2003) show that regulatory and normative factors are most significant in environmentally sensitive industries. Regulatory pressure is a particularly strong driver of environmental practice because the government has the power to penalise firms if it finds evidence of non-compliance (Carr and Pearson, 1999b). The mass media and non-governmental social actors generate normative pressure and drive firms to compare their environmental activities with their peers and copy environmental practices to gain legitimacy (Antoci et al., 2015; Darnall et al., 2009; Lee et al., 2018; Rivera et al., 2006).

While the quest for legitimacy is a powerful motivator for firms to engage in environmental practices, scholars have considered other significant drivers, such as resource-based factors (Aragón-Correa and Rubio-López, 2007; Barney, 1991; Hart and Dowell, 2011). RBV posits that firms acquire competitive advantages through tangible and intangible resource endowments, such as human capital, total assets and dynamic capabilities (Darcy et al., 2014; Inoue et al., 2013). This theory argues that firms' internal factors are rare, valuable and inimitable resources and significant drivers of environmental practices and that firms consider environmental protection to be a strategic intangible asset that

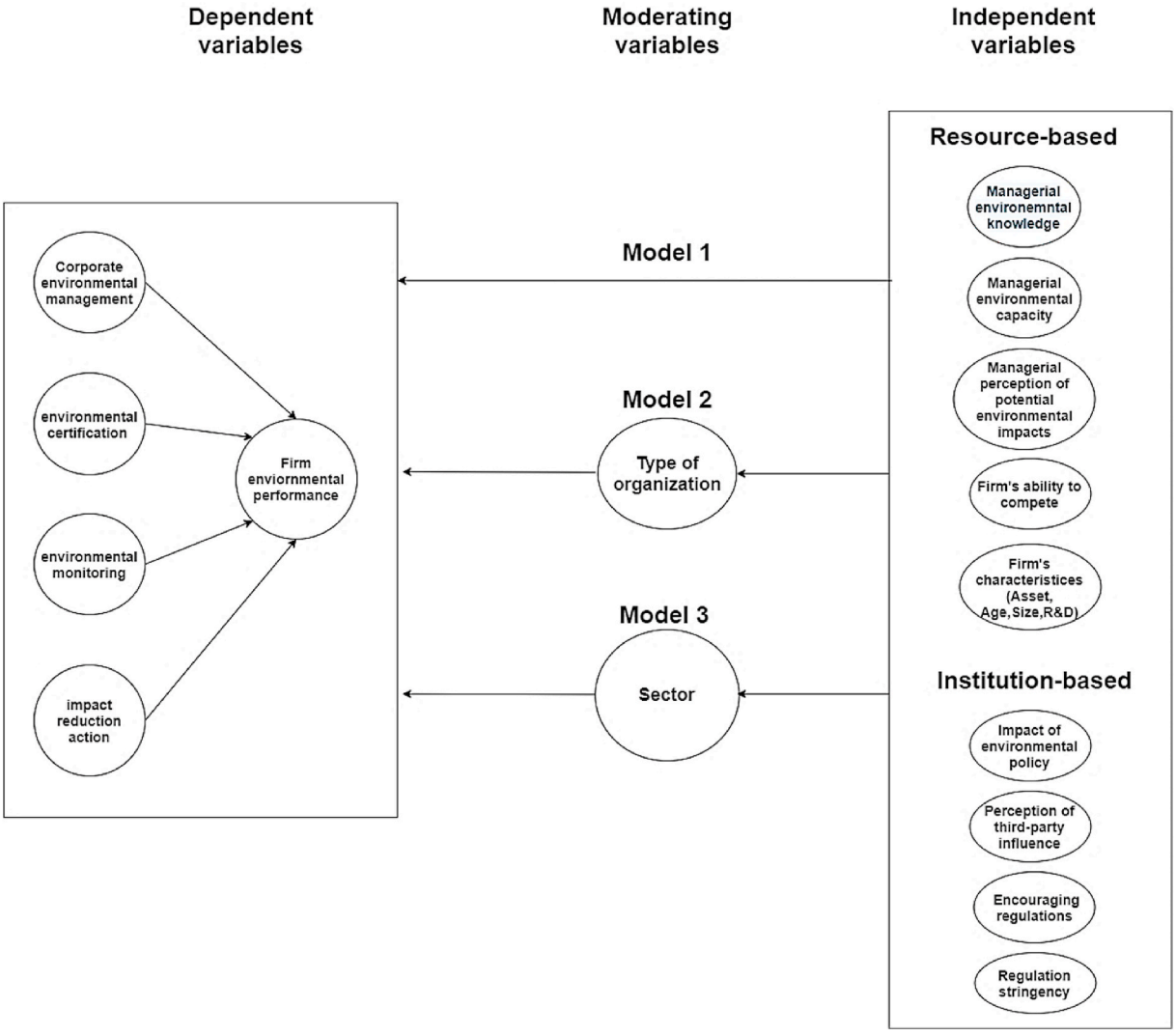

Fig. 2. Conceptual model.

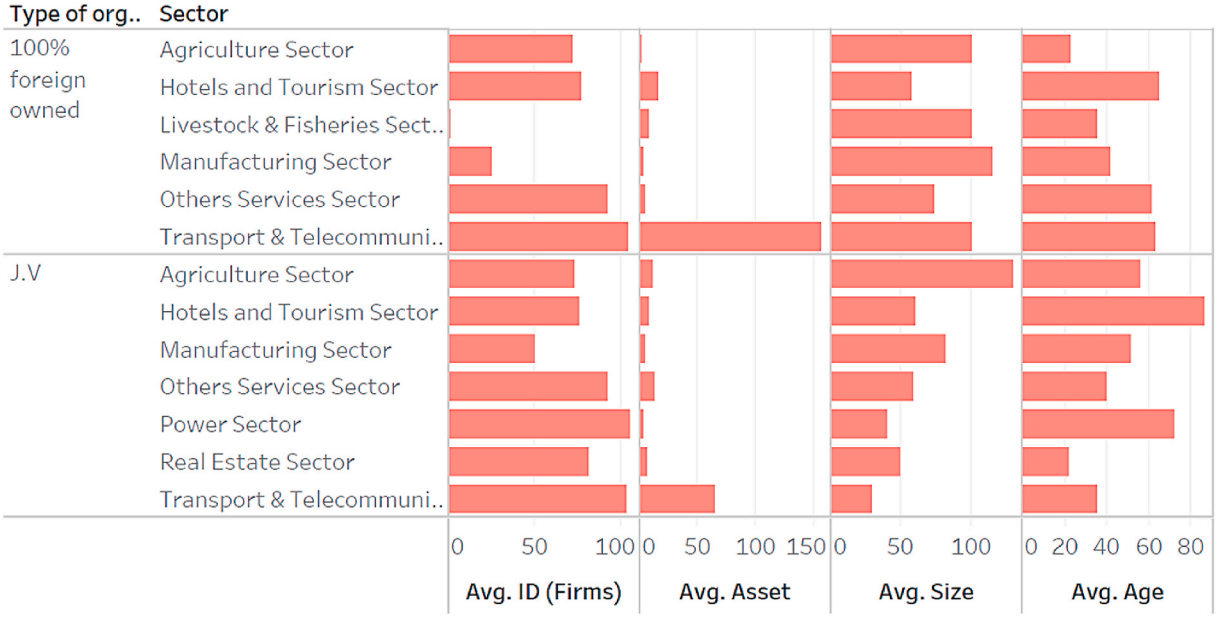

Fig. 3. Demographic characteristics of respondents representing Chinese and Japanese firms.

Table 1
Characteristics of Chinese firms surveyed.

	N	Minimum	Maximum	Mean	SD
Asset	277	0.0050	7978.5200	62.7493	549.5168
Age	277	8	370	25.28	29.791
Size	277	20	400	198.89	86.610
Ability to compete	277	0.6000	38.0000	7.6083	5.2408
Research and development	277	0.0240	1.5200	0.3043	0.2096
Environmental performance	277	1.88	4.14	2.6526	0.4593
Potential impacts	277	1.25	4.25	2.8669	0.5344
Knowledge law	277	2.50	5.00	3.9242	0.7258
Third-party influence	277	1.15	5.00	3.2921	0.9127
Environmental capacity	277	1.00	4.14	2.0335	0.5376
Policy impact	277	1.00	5.00	2.8800	0.7536
Regulation	277	1.00	4.18	2.3249	1.1534
Stringency	277	1.00	4.50	3.1805	0.8512
Valid *N* (listwise)	277				

Table 2
Characteristics of Japanese firms surveyed.

	N	Minimum	Maximum	Mean	Std. Deviation
Investment	106	0.1880	157.4400	8.529261	19.4445879
Age	106	20	500	25.50	21.35
Size	106	20	300	88.66	62.177
Ability to compete	106	0.9000	30.0000	6.8778	5.6507
R&D	106	0.0051	4.500	1.0147	0.8500
Environmental performance	106	1.67	4.44	3.5174	0.6387
Potential impact	106	1.53	4.07	3.0478	0.6692
Knowledge law	106	2.00	5.00	3.8821	0.7385
Third-party influence	106	2.08	4.62	3.5181	0.6124
Environmental capacity	106	2.57	4.71	3.5512	0.4419
Policy impact	106	1.00	4.00	2.9253	0.9477
Regulation	106	1.00	3.73	1.8877	0.6847
Stringency	106	1.00	5.00	2.8255	0.9513
Valid *N* (listwise)	106				

can help generate competencies (Bansal, 2005b). More robust environmental practices have also been considered to help firms harmonise their business activities. Firms' resource-based motivations mostly stem from internationalisation, their position in the value chain, the environmental attitudes of upper management and the strategies of firms. In resource-based enterprises, environmental strategies are shaped by two factors: leadership capital (i.e., organisational environmental knowledge and attitude) and higher-order learning processes (i.e., the management capacity to assimilate environmental practices) (Hart and Dowell, 2011).

Hart and Dowell (2011) argue that resource-based pressure can encourage firms to adopt proactive sustainability strategies. Proactive corporate environmental behaviour goes beyond compliance with regulations by developing organisational capacities and resources. Firms perceive that proactive environmental behaviour could improve organisational performance (Yu et al., 2017). This perception stems from the argument that a firm with a better environmental strategy is more likely to develop valuable organisational competitive advantages in an environmentally oriented competitive landscape (Hart and Dowell, 2011).

2.1. Description of variables

An extensive literature review was conducted to identify valid measures for our constructs. The dependent variable for the purposes of our study is the *environmental performance of enterprises*. The level of environmental protection or performance can be measured based on a firm's operation (consumption materials and energy, emissions of pollutants) (Nazir, 2019) or management practices (pollution prevention initiatives or funds assigned to environmental protection). Given the scarcity of data in Myanmar, there is no quantifiable information for industry operational measures such as the amount of material and energy consumed, or the pollutants released by each firm (ADB, 2017). Therefore, we used a survey of Chinese and Japanese enterprises. The four dimensions of a firm's environmental performance considered were 1) corporate environmental management, 2) environmental management certification, 3) environmental monitoring and 4) impact reduction action. Although indirect, environmental performance can reflect a firm's environmental protection efforts as this measure is reflected in the firms' actions and external recognition. Hibiki and Arimura (2004) used a similar approach to measure the environmental performance and management practices of Japanese firms.

In Myanmar, the manufacturing, mining, energy, electric power and construction industries are identified as having particularly salient environmental impacts (DICA, 2020b). Myanmar's Environmental Conservation Law prescribes the environmental standards for emissions, effluents, solid waste, production processes and products. Only the businesses located in Yangon are required to have a pollution control plan and there are no requirements for specific equipment. There are also no requirements for minimum expenditure on pollution control which could be an alternative data to measure firm's environmental performance (Minsitry of Economy, 2019). Hence, the four-dimensional measurement system is considered the most appropriate indicator of firms' environmental performance.

The first dimension, corporate environmental management, is measured by three items: the presence of environmental management personnel, environmental practices in purchasing/marketing and an established environmental management facility (e.g., a written environmental policy). The detailed measurement of each dimension and variable can be found in the questionnaire provided in the supplementary material. Next, environmental monitoring is proxied by monitoring adverse environmental impacts such as the use of natural resources, solid waste generation and wastewater effluents. Finally, we used actions taken to reduce environmental impacts, such as changes in production processes or production technologies and environmental expenditure, to measure impact reduction action.

Based on data availability, a total of 12 independent variables were selected for inclusion in this study. The first eight variables are based on a firm's RBV (Yu et al., 2017a). The first RBV variable is *managerial perception of the enterprise's potential environmental impact*, that is to say, the perception of potential adverse environmental impacts generated by the products or production procedures of enterprises that participated in the survey. While aggregate measures of the impacts on environmental quality such as natural resource depletion and energy depletion are available at the country level for Myanmar, there are no firm-level data to measure direct environmental impacts. There is also no voluntary disclosure of such information by firms operating in Myanmar. We further validated the survey data using the list of industries with potential environmental impacts as identified by the Ministry of Environmental Conservation and Forestry (United Nations Environment Programme, 2015). As the data reflect both the environmental ministry's identification and the perception of the enterprise itself, the variable is a good fit for the concept of firm-level environmental impacts and environmental performance. Given the absence of an effective impact assessment system and data on firms' environmental performance in Myanmar, a firm's perception of its negative impact was the most suitable measure. At a theoretical level a firm's recognition of the environmental impacts of its activities should motivate it to implement environmental practices; it can therefore be expected that our dependent variable will increase if firms perceive that their activities are environmentally sensitive (Kim, 2018).

The second and third independent variables in our study are the

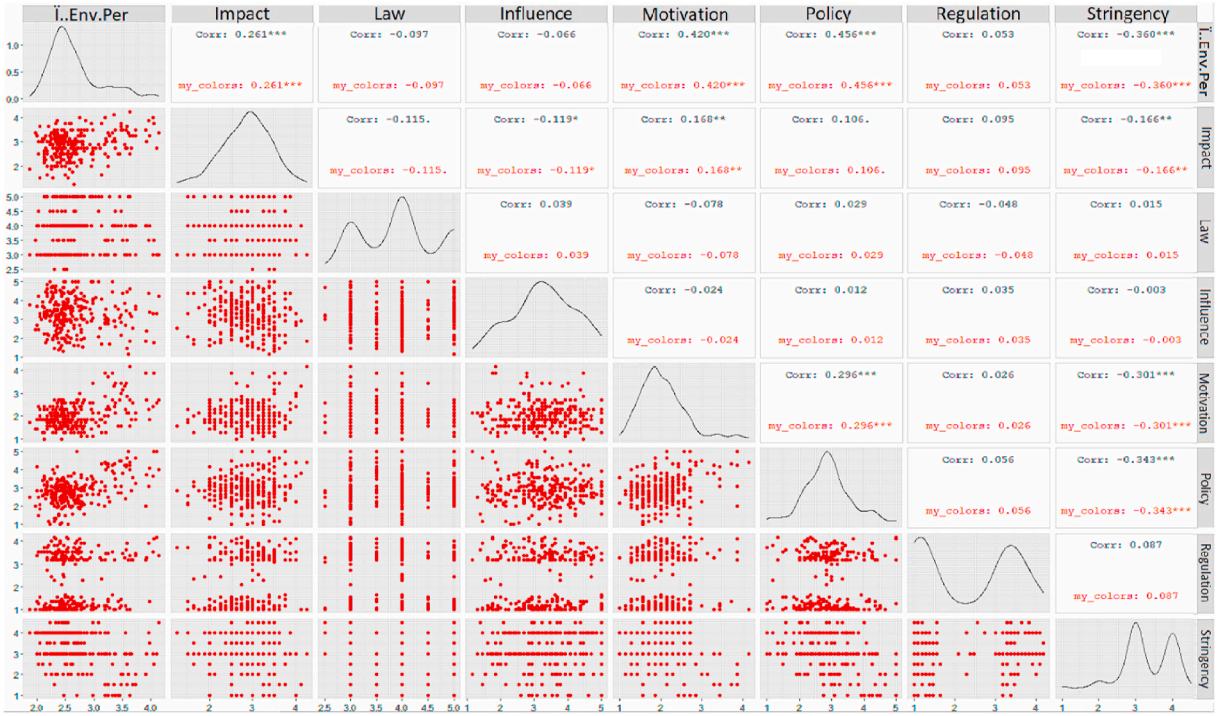

Fig. 4. Correlation matrix of Chinese firms.

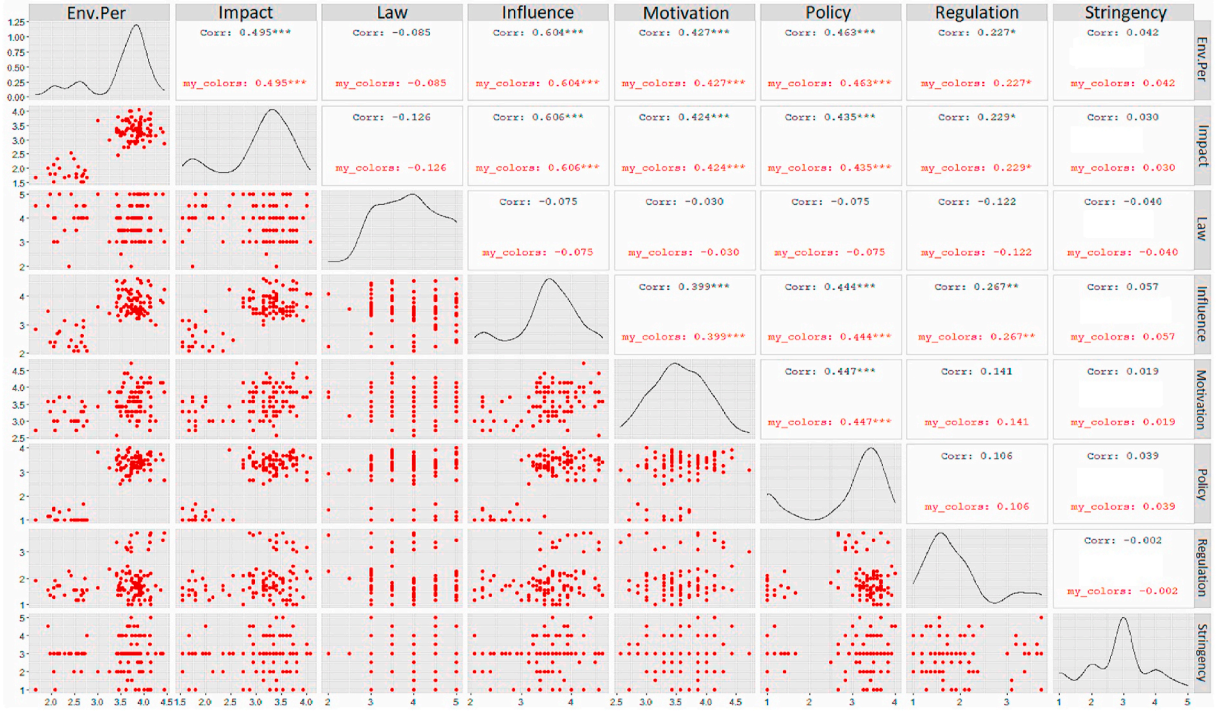

Fig. 5. Correlation matrix of Japanese firms.

managerial environmental knowledge and the*capacity* of firms. The fourth variable is their *ability to compete in their market*. Competitive ability has been recognised as a major motivating factor for organisational responsiveness concerning environmental issues (Wijethilake and Ekanayake, 2018). Finally, we included in the analysis *market scope*, *asset size*, *age* and the *amount of investment in research and development (R&D)*. These firm characteristic variables were provided by the Ministry of National Planning and Economic Development of Myanmar. The market scope is classified by whether the firm's primary customers are in a global, regional or national market. Asset is the log transformation of total assets of the local subsidiary firms in Myanmar and indicates the firm's financial capacity. A firm's financial capacity may influence its ability to invest in environmental protection. Firm size is proxied by the number of employees in the firm. Larger enterprises are more capable of investing in environmentally appropriate production technologies and energy-saving technologies than smaller enterprises (Cole et al., 2017).

Fig. 6. Comparison of the environmental performance of Chinese and Japanese firms.

Wang et al. (2018) note that large firms are more likely to act to improve resource efficiency, enact waste management and produce green products than small firms. As suggested by (Carr and Pearson, 1999a), a firm's size and assets are critical variables for assessing the relationship between its environmental performance and government regulations. Also the age of a firm is an important factor influencing its profitability, and it indirectly affects environmental expenditure (Dhaou and Renard, 2017). Older firms tend to have more experience with environmental regulations and to adopt more environmentally friendly production technologies than their younger counterparts. For the purposes of our analysis, age is the age of the Myanmar subsidiaries of the Chinese and Japanese firms.

The remaining four variables related to institutional theory-based hypotheses. The first variable is the *impact of environmental policy on the firm's production activities*. Next, the variable *third-party influence* measures the perceptions of firms in terms of the influence of third-party groups or organisations. The third and fourth variables, encouraging regulation and stringency of regulation, directly measure *the impact of environmental regulations on the firm*. We measure these variables using managerial perception and the frequency of inspection by public environmental authorities. These variables are used to determine the impact of the perceived stringency of environmental regulations and the influence of the host country's environmental governance on firms' environmental performance. While country-level data measuring environmental regulations – such as the Environmental Performance Index and World Economic Forum (WEF) Sustainability Index – are available for Myanmar, these do not directly represent firm-level regulatory pressure. Instead, they provide background information for state enforcement and compliance activities to measure the quality of the state's environmental law and are useful for assessing FDI–environmental regulation relationships at aggregate level.

In this study, we use firm-level data obtained from a survey to represent the individual firm's perception of the state's environmental regulation stringency. Based on Myanmar's environmental policies for FDI, the indicator for the stringency of environmental policy is the occurrence of on-site regulatory inspections of environmental compliance by the authorities over the past two years. Government inspections have been recognised as one of the most powerful drivers of firms' environmental protection efforts, as regulatory bodies may impose penalties or even terminate a firm's operating license if an environmental regulation is found to be breached (Wijethilake and Ekanayake, 2018). Rivera et al. (2006) also used government monitoring to indicate the intensity of mandatory environmental regulations. Ge et al. (2016) used the frequency of government visits to an enterprise to measure the political legitimacy of the firm through a survey method. Lin and Sheu (2012) utilised green certification to measure institutional environmental pressures. However, it was not possible to use such measures in our study because of the frontier nature of the Myanmar economy – only 18 out of 279 participating firms had a green certificate or ISO 140001 certification.

There are two moderating variables: the *firm's sector* and *ownership type*. The first variable is used to explore the moderating role played by the level of pollution produced by a firm in the relationship among the main variables. The second moderating variable, ownership type, represents the form of organisation, such as 100% foreign owned or a joint venture. These data were obtained from a database sourced from the Directorate of Investment and Company Administration (DICA) in Myanmar. Previous studies have shown that a firm's ownership structure has a direct effect on environmental performance (Earnhart and Lizal, 2016).

Table 3
Hierarchical multiple linear regression results for Chinese firms.

Model	Coefficients	Estimate	Std. Error	*t* value	*p* value
1	(Intercept)	1.7879***	0.27166	6.582	<.001
	Potential environmental impact	0.6123	0.04390	2.833	.153
	Managerial environmental knowledge	−0.4116	0.03140	−1.311	.191
	Managerial environmental capacity	0.2122	0.04546	4.670	.231
	Firm's ability to compete	0.2871**	0.0755	1.704	.009
	Asset	0.6079**	0.0400	1.520	.001
	Age	0.0284*	0.0725	1.356	.074
	Size	0.0887*	0.0349	5.938	.035
	Investment in R&D	0.3558**	0.0582	5.776	.006
	Market cope	0.2871*	0.0755	1.704	.089
	Environmental policy impact	0.8359***	0.02934	2.849	.000
	Third-party influence	−0.0227	0.02492	−0.912	.619
	Encouraging regulations	0.8121	0.03278	5.861	.914
	Regulations stringency	−0.0109***	0.01985	−0.551	<.00
	R^2	68.71			
2	(Intercept)	1.8411***	0.2626	6.888	<.001
	Potential environmental impact	0.7779	0.0427	15.347	.154
	Managerial environmental knowledge	−0.4150*	0.0308	−0.885	.017
	Managerial environmental capacity	0.1659	0.0681	0.540	.231
	Firm's ability to compete	0.2469**	0.0724	1.722	.007
	Asset	0.6140**	0.0405	1.519	.001
	Age	0.0792*	0.0736	1.330	.085
	Size	0.0333*	0.0356	5.869	.046
	Investment in R&D	0.3552**	0.0912	5.896	.007
	Market scope	0.2511*	0.07818	1.600	.011
	Third-party influence	−0.0251	−1.0440	−1.058	.627
	Environmental policy impact	0.8554***	0.0453	0.261	.000
	Encouraging regulations	0.8981	0.0193	0.466	.857
	Regulations stringency	−0.1003***	0.0327	−0.796	<.001
	Type of organisation: 100% foreign-owned	0.4332	0.0354	1.223	.222
	Type of organisation: J. V.	0.4316	0.3549	1.216	.2250
	R^2	69.22			
3	(Intercept)	1.8155***	0.2889	6.771	<.001
	Potential environmental impact	0.7022	0.0418	19.919	.162
	Managerial environmental knowledge	−0.4150*	0.0955	−0.832	.017
	Managerial environmental capacity	0.1590	0.0401	0.631	.243
	Firm's ability to compete	0.2469**	0.0724	1.722	.007
	Asset	0.6140**	0.0405	1.519	.001
	Age	0.0792*	0.0736	1.330	.085
	Size	0.0333*	0.0356	5.869	.036
	Investment in R&D	0.3552**	0.0912	5.896	.002
	Market scope	0.2511*	0.07818	1.600	.011
	Third-party influence	−0.0421	−1.0358	−1.063	.547
	Environmental policy impact	0.9051***	0.0466	0.601	<.001
	Encouraging regulations	0.8730	0.0187	0.180	.857
	Regulations stringency	−0.0095***	0.0773	−0.741	.0000
	Sector: polluting	0.4501	0.385	1.156	.249
	Sector: Non-polluting	0.450	0.3530	1.213	.219
	R^2	63.37			

Note. Dependent variable: environmental performance. *$p < .05$; **$p < .01$; ***$p < .001$. Model 1: $F = 17.33$, $p < .001$. Model 2: $F = 14.11$, $p < .001$. Model 3: $F = 15.09$, $p < .001$.

2.2. Data specification

The key data used in this paper come from a survey of Chinese and Japanese enterprises in Myanmar conducted from October 2019 to March 2020 and a comprehensive firm-level dataset provided by DICA. The survey was undertaken to analyse the relationship between environmental protection and firm-level management of Chinese and Japanese enterprises, and in particular the impacts of intra-firm resources and environmental policy on firm-level environmental decision making. The survey instrument was adapted from the survey of the Organisation for Economic Co-operation and Development (OECD) in Japan developed by Hibiki and Arimura (2004). The survey considered the entire list of existing Chinese and Japanese FDI enterprises in Myanmar recorded in the government database (DICA, 2020a). With the help of DICA, online questionnaires were sent to 331 Chinese firms and 154 Japanese firms. Permitted enterprises which have not invested in the country were excluded from the survey. The questionnaire consisted of 30 questions covering the variables under investigation (see Appendix A). It was developed in English, as the managers of foreign firms in Myanmar are expected to use English as an official language.

We received responses from 296 Chinese firms and 125 Japanese firms, representing 89.42% and 81.16% response rates, respectively. We excluded a few firms due to incomplete data. This resulted in data from a total of 279 Chinese firms and 107 Japanese firms, which were comprised of both 100% foreign owned (state-owned and private enterprises) and joint ventures. Our respondents typically had titles such as general manager, director, supply chain manager, operations manager or sales and marketing manager. Most of the respondents were corporate managers with more than five years of work experience in the same company, potentially offering deep insight into the firm's environmental practices and having knowledge about Myanmar regulations. As the survey covers the entire population and the response rate was high, sampling is not a concern. Fig. 3 summarises the demographic characteristics of the Chinese and Japanese firms' respondents.

The data were analysed using a hierarchical multiple linear regression analysis in R Project for Statistical Computing. Multiple linear regression can explain or predict a criterion (dependent variable) based on a set of predictors (independent variables) of interest. Hierarchical regression is typically suitable for examining specific theoretically based hypotheses (Cohen, 2008). This technique was employed to test the theoretical model and the relative importance of predictor variables.

3. Results

Tables 1 and 2 present descriptive statistics of the variables for Chinese firms and Japanese firms, respectively.

Figs. 4 and 5 display the correlation matrixes of the firms. Scatterplots of each pair of numeric variables are shown in the left part of the figure. The Pearson correlation is displayed on the right. Variable distribution is available along the diagonal. The correlations between each pair of variables were acceptable, as most were below 0.6. Values below 0.7 indicate that there are no significant multicollinearity effects (Senaviratna & A. Cooray, 2019).

Fig. 6 compares the environmental performance of Chinese and

Table 4
Hierarchical multiple linear regression results for Japanese firms.

Model	Coefficients	Estimate	Std. Error	*t* value	*p* value
1	(Intercept)	1.8173***	0.3536	3.358	<.001
	Potential environmental impact	0.9082***	0.0868	2.081	.000
	Managerial environmental knowledge	0.2653	0.0402	0.087	.542
	Managerial environmental capacity	0.9427***	0.0783	0.445	<.001
	Firm's ability to compete	0.1084*	0.0647	1.674	.098
	Asset	0.0018	0.0813	1.000	.320
	Age	0.9011*	0.0589	0.713	.048
	Size	0.0067	0.0087	0.763	.446
	Investment in R&D	0.7182**	0.1937	0.792	.009
	Market scope	0.8312**	0.0765	1.714	.008
	Third-party influence	0.8878**	0.0785	0.621	.005
	Environmental policy impact	0.7370***	0.06849	6.381	<.001
	Environmental regulations	0.0594	0.0483	0.910	.336
	Regulations stringency	0.5889**	0.03223	0.005	.008
	R^2	0.7628			
2	(Intercept)	1.9372***	0.4549	3.159	<.001
	Potential environmental impact	0.9165***	0.0874	2.307	.000
	Managerial environmental knowledge	0.3640	0.0438	0.083	.408
	Managerial environmental capacity	0.9636***	0.0818	0.447	<.001
	Firm's ability to compete	0.1111*	0.0645	1.719	.089
	Asset	0.0020	0.0813	1.114	.268
	Age	0.9010*	0.0583	0.689	.092
	Size	0.0064	0.0087	0.765	.464
	Investment in R&D	0.7152**	0.1940	0.725	.009
	Market scope	0.8312**	0.0762	1.705	.009
	Third-party influence	0.8923**	0.0825	0.998	.003
	Environmental policy impact	0.7766***	0.0743	5.066	<.001
	Environmental regulations	0.0639	0.0610	1.047	.298
	Regulations stringency	0.5951**	0.0338	0.028	.009
	Type of organisation: 100% foreign owned	0.0903*	0.6595	1.298	.098
	Type of organisation: J.V.	0.0621*	0.6488	1.301	.097
	R^2	0.7645			
3	(Intercept)	1.8206***	0.4529	3.137	<.001
	Potential environmental impact	0.9085***	0.0879	2.103	<.001
	Managerial environmental knowledge	−0.2850	0.0427	0.0814	.404
	Managerial environmental capacity	0.9483***	0.0826	0.442	<.001
	Firm's ability to compete	0.0926*	0.0657	1.410	.084
	Asset	0.0015	0.0814	0.842	.402
	Age	0.9005*	0.0164	0.335	.098
	Size	0.0079	0.0087	0.905	.368
	Investment in R&D	0.7287**	0.1932	0.749	.009
	Market scope	0.8159**	0.0772	1.501	.007
	Third-party influence	0.8619**	0.0866	0.995	.003
	Environmental policy impact	0.7458***	0.0846	4.087	<.001
	Environmental regulations	0.0691	0.0652	1.366	.175
	Regulations stringency	0.5636**	0.0339	0.107	.009
	Sector: polluting	0.2291*	0.1783	1.285	.022
	Sector: Non-polluting	0.0293*	0.1785	1.286	.021
	R^2	0.7645			

Note. Dependent variable: environmental performance. *$p < .05$; **$p < .01$; ***$p < .001$. Model 1: $F = 25.11$, $p < .001$. Model 2: $F = 23.73$, $p < .001$. Model 3: $F = 23.72$, $p < .001$.

Japanese firms. Japanese firms generally performed better in terms of supplier/customer relationships, certification and management practices. By contrast, Chinese firms were more committed to reducing their environmental impacts, such as the risk of severe accidents, use of natural resources, local/regional air pollution, soil contaminants and wastewater effluents.

Tables 3 and 4 report the results of the regression model with environmental performance as the dependent variable. We tested three different models to determine the effect of predictor and moderating variables on the observed variable at different levels. In Model 1, we tested the model without the influence of other factors, such as ownership type or the firm's sector. For Chinese firms, the results showed that the coefficient of all the main independent variables to explain environmental performance was statistically significant ($R^2 = 68.7\%$). The most statistically significant variables were environmental policy impact and regulations stringency ($p < .001$). Environmental policy impact had a positive and robust effect on the environmental performance of Chinese firms. Environmental policy instruments, such as input bans/taxes and technology/performance-based standards, can greatly increase the environmental performance of firms. This relationship has been proven in the previous research on the environmental behaviour of firms (Rivera, 2004; Winter & May 2001). However, although statistically significant, stringent environmental regulations seemed to reduce the environmental performance of firms. This can be explained partly by the lack of financial, technical and human capacity among small firms to comply with more stringent environmental policy regimes. An increase in regulatory stringency could also lead to higher corruption and make it seem hopeless for small firms to comply with regulations. This result was also reflected in regulatory policies to encourage environmental behaviour, as the predictor variable of encouraging regulation did not have a significant effect on the observed variable. Mandatory environmental regulations have been shown to be an effective mechanism only when they are combined with penalties and incentives (Meegeren, 2001). It is also reported that the host government's support for environmental practices beyond compliance is a significant incentive for firms to improve their environmental behaviour (Cashore and Vertinsky, 2000). Among the variables measuring institutional-based theory, only one out of four variables has a positive and statistically significant effect on enterprise environmental behaviour.

Moreover, a firm's tangible resources were statistically significant ($p \leq .05$). None of the statistically significant variables measuring the intra-firm capacity had a negative impact on environmental performance. This result is inconsistent with RBV theory and previous research findings (Kim, 2018). Intangible resources, managerial perceptions about environmental impacts, their knowledge and capacity did not have a significant effect on firms' environmental performance. Endrikat et al. (2014) acknowledged that the firm's reactive environmental practices are not influenced by managerial skill or expertise. Overall, a firm's financial and resource capacity tended to have a more positive effect on its environmental performance than institutional pressure, and thus, the environmental performance of Chinese firms in Myanmar is more resource-based than institution-based.

In Model 2, the significance and direction of the variables remained unchanged. Although the coefficient of all the main independent variables was statistically significant ($R^2 = 69.2\%$), the organisation's ownership type, whether 100% foreign owned or joint venture, showed no statistically significant effect on environmental performance (Table 3; Fig. 6). Cole et al. (2008) reported that foreign ownership does not influence the environmental performance of firms in terms of fuel consumption. Similarly, the coefficient of all our main independent variables was statistically significant ($R^2 = 63.3\%$) for Model 3. The sector variable (whether the firm is in a polluting or non-polluting sector) had no statistically significant effect on environmental

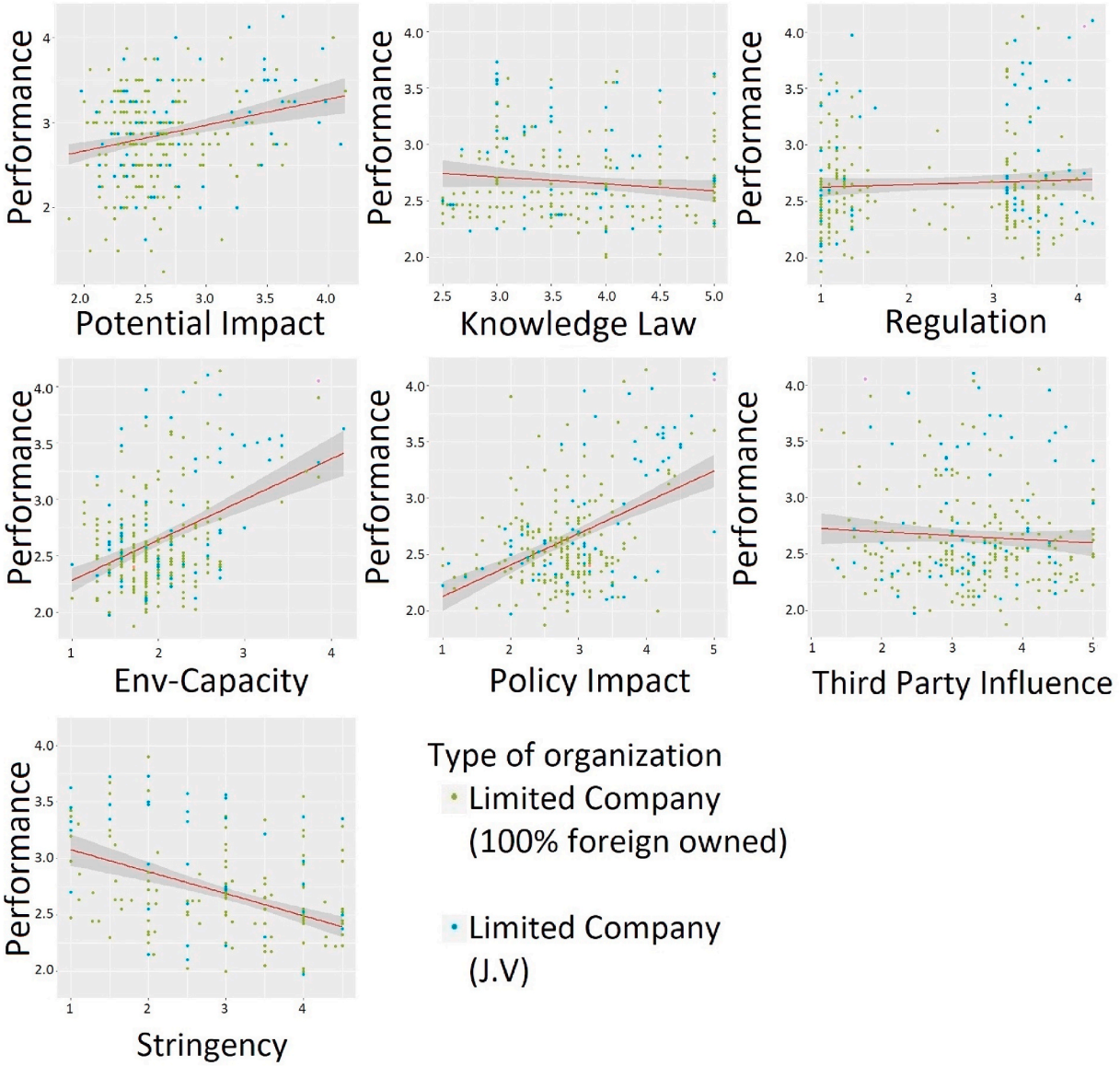

Fig. 7. The moderating effect of ownership on observed and predictor variables in Chinese firms.

performance (Table 3; Fig. 7). These results indicate that the environmental performance of Chinese firms is not influenced by their ownership type or level of pollution, as their behaviour is mainly driven by its resource capacity.

In all the tested models for Japanese firms, nine of the 13 variables were statistically significant ($p \leq .05$, $R^2 = 76.2\%$) and had a positive effect on the dependent variable (environmental performance). The most significant variables were managerial perception of potential environmental impact, environmental managerial capacity and managerial perception of the impact of environmental policy on the firm (Table 3). In terms of the tangible characteristics of firms, investment in R&D and market scope were the most significant. The age of a firm and its ability to compete also influenced its environmental performance. Similarly to those of the Chinese firms, the results from the Japanese firms conform to the RBV theory. Fujii et al. (2013) also found that a Japanese firm's internal resources had a positive effect on its environmental performance. Nakamura (2011) reported similar results. Unlike Chinese firms, Japanese firms' environmental performance was also driven by third-party influences and regulatory stringency, supporting the institutional theory. Encouraging environmental regulations did not have any effect on the environmental decision making of Japanese firms. This could be due to Myanmar's lack of a systematic environmental taxation or subsidies system for foreign enterprises investing in the country (Gelb et al., 2017). It seems that both environmental regulatory pressure and intra-firm resource capacity influence Japanese firms' environmental performance in Myanmar. Park (1998) stated that the environmental performance of Japanese companies addresses both internal resources and external pressure.

Fig. 8 shows the results of Model 2. The coefficient of all the independent and control variables was statistically significant ($R^2 = 76.4\%$). Hence, the organisation's ownership type had a statistically significant effect on environmental performance. However, this impact was more significant for potential impact, environmental capacity, policy impact, third party influence and stringency. The results suggest that 100% foreign-owned firms performed environmentally better than joint venture-type companies.

Likewise, the coefficient of all the main independent variables was statistically significant ($R^2 = 76.4\%$) for Model 3. For Japanese firms, the sector variable had a statistically significant effect on environmental performance (Table 4; Fig. 9). A similar pattern of significance was observed for all the variables except for managerial knowledge about environmental law, which was more significantly affected by sector type

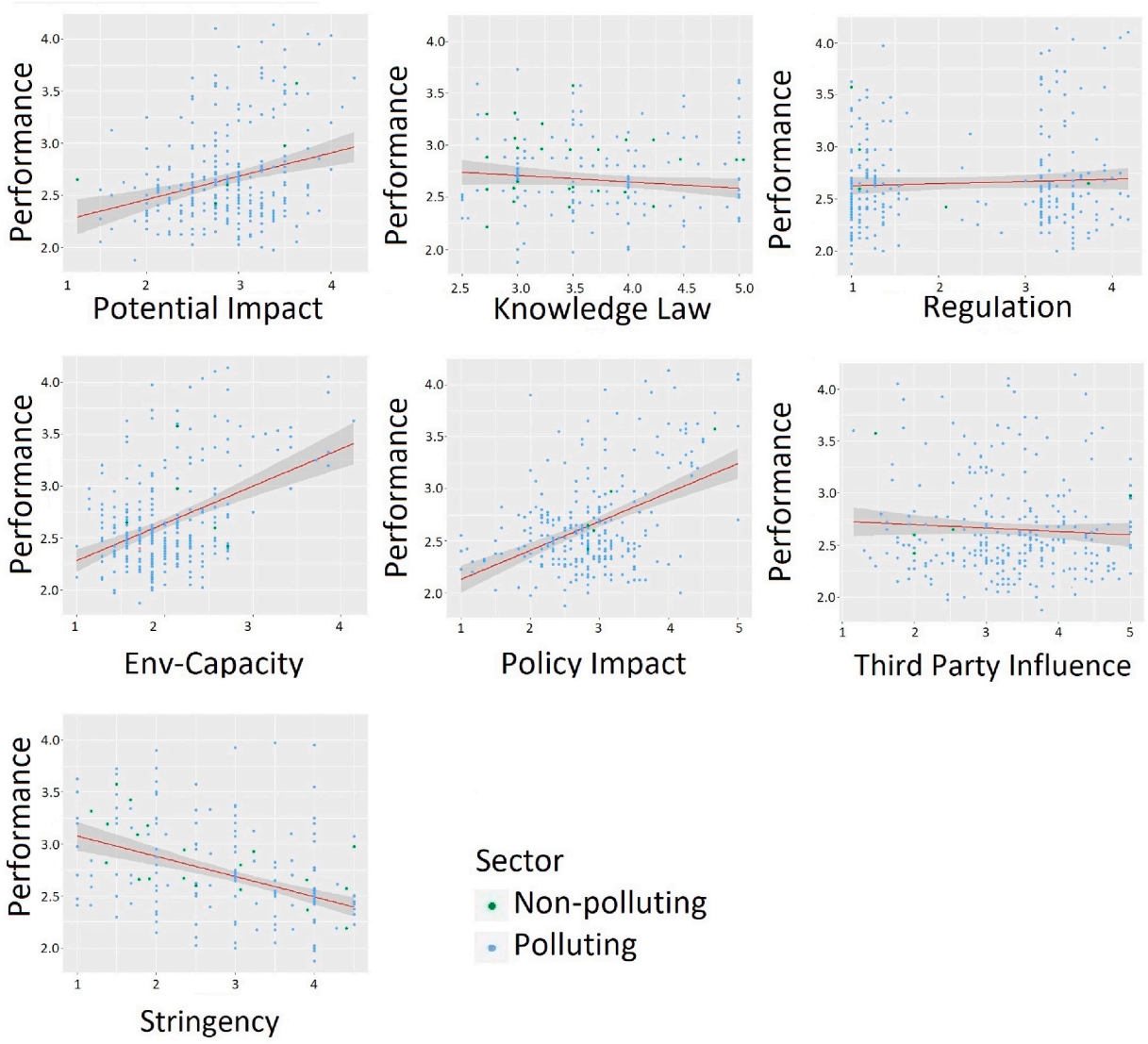

Fig. 8. The moderating effect of sector on observed and predictor variables in Chinese firms.

than ownership. In general, firms in the polluting sector tended to perform better than those in the non-polluting sector (see Fig. 10).

4. Discussion

This study has investigated the determinants of the environmental performance of FDI in a developing country with lax environmental standards. The study explored the relationships among environmental performance, internal resources and regulation stringency, and related them to institution and resource-based theories. It also explored the moderating roles of ownership type and the sector the firms are operating in. In doing so, the study comparatively analysed the motives and pressures behind environmental management practices of Chinese and Japanese firms investing in Myanmar.

First, the study confirms that both institutional drivers and resource capabilities have a positive influence on a firm's environmental management practices. Similar observations have been made in previous studies (Butler and Daly, 2009; Lee et al., 2018; Tontiset, 2015). However, interestingly, the influence of institutional pressure was smaller on Chinese than Japanese firms in Myanmar. In the case of Chinese firms, regulatory factors only partly influenced sustainability strategies and corporate environmental performance, even if the firms were operating in a polluting industry. The significance of intra-firm competitive advantages for environmental performance indicates that Chinese firms' environmental awareness and capacity have a more significant role in their environmental implementation than the regulatory pressure from the host country. This finding is mainly explained by the fact that large Chinese firms with better resource capacity, especially state-owned enterprises, are often induced by the home country institutions to comply with specific environmental protection laws governing incoming FDI (Aung et al., 2020). (Zhu et al., 2012) also found that domestic institution pressures did not have an effect on the environmental behaviour of Chinese firms.

Second, Japanese firms seemed to adopt all-inclusive and comprehensive strategies encompassing both regulatory pressure and firm capacity when addressing environmental issues in Myanmar, whilst Chinese firms tended to make their environmental decisions based on intra-firm resources. These findings are also reflected in the empirical results of the moderating variables. For Chinese firms, neither ownership type nor being in a polluting industry necessarily determined their environmental decisions, whereas both of these variables had significant effects on Japanese firms' environmental performance. This can be attributed to the superiority of the Japanese firms in terms of environmental considerations in their overseas investments. To some extent, these conclusions make up for the lack of research on enterprise ownership type and environmental performance of FDI in developing

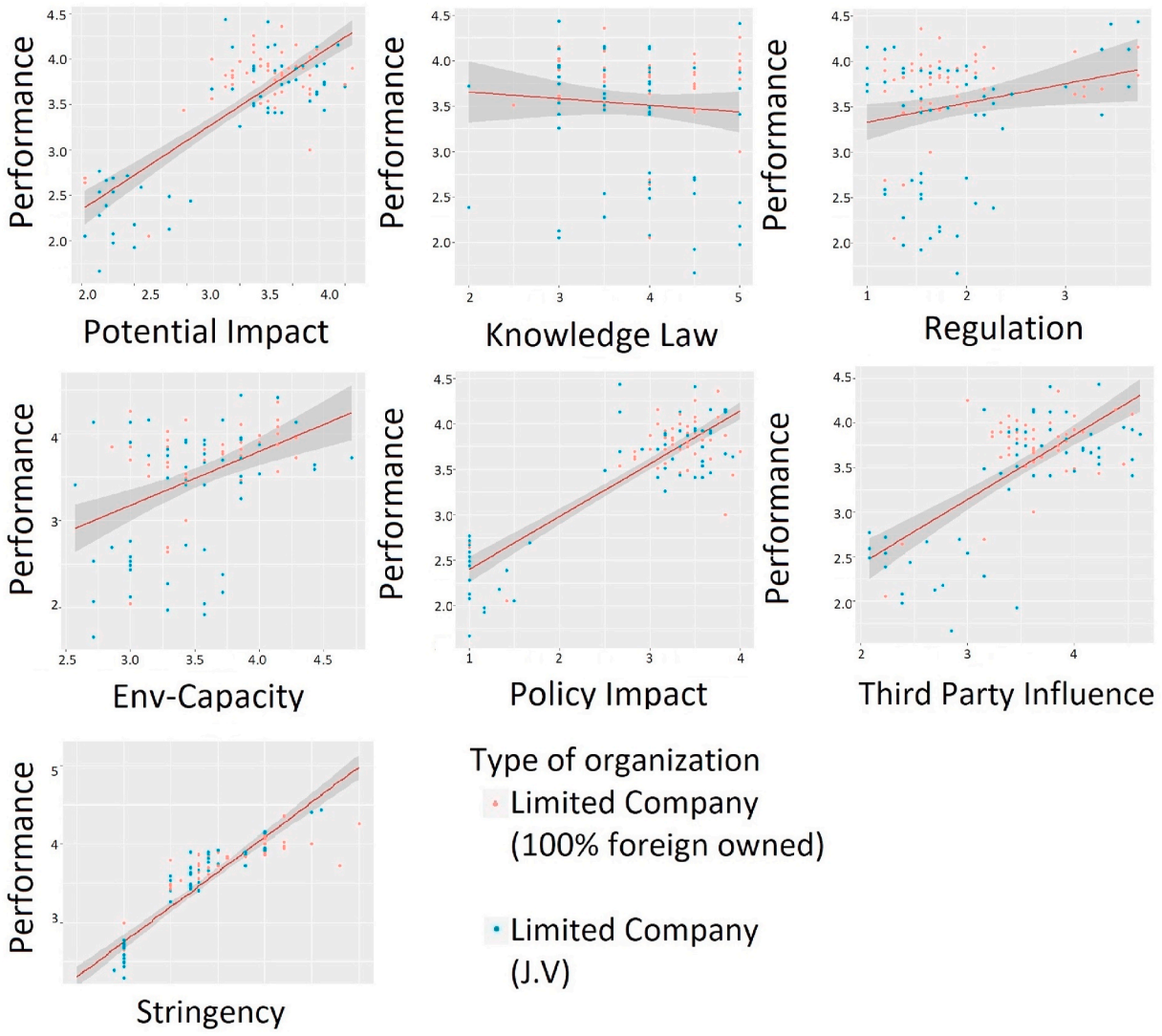

Fig. 9. The moderating effect of ownership on observed and predictor variables in Japanese firms.

countries. Our results may also indicate that the decisive factor in the foreign firm's adaptation of environmental practices is both institutional pressure and intra-firm resources rather than one or the other. Theoretically, these findings support the idea that high levels of legitimacy together with the firm's competitive advantage enhance the environmental performance of foreign firms, providing a better understanding of the role of institutions in the environmental profile of FDI.

This study shows that these relationships are non-linear and significantly influenced by the firm's own characterises in addition to the host country's situation. The original parent firm's attitude towards environmental issues might also affect the motivation of foreign firms to perform better environmentally. This finding is unsupportive of the theory that host country institutional pressure alone determines the performance of foreign firms in developing countries.

5. Conclusion

There is growing recognition that the social and environmental challenges facing Myanmar are exacerbated by the growing FDI (US Department of State, 2019). Good environmental governance and performance of FDI are crucial for Myanmar to develop without sacrificing its natural ecosystem. While China remains the largest source of FDI inflows, Chinese FDI has proven the most controversial and has faced the greatest opposition and hostility from local citizens and international actors (Yao and Zhang, 2018).

Consequently, Chinese investors have faced stricter scrutiny from local communities and civil society than other foreign investors, especially after a partially civilian government took office in Myanmar in 2016. Under those circumstances, Myanmar's regulatory environment and public opinion were having a substantial impact on FDI. According to a recent survey, there was an explicit bias against Chinese investments, and Japanese firms were regarded more positively than their Chinese counterparts (Yao and Zhang, 2018).

In this study, we carried out a comparative investigation into the complex and multifaceted roles that these regulations play in encouraging the environmental performance of Chinese and Japanese firms by examining their intra-firm resources. The results of this investigation have several implications. First, as expected, there is a clear distinction between the environmental motivations of Chinese and Japanese firms. Interestingly, the corporate environmental practices of Chinese firms are not necessarily determined by host country regulation stringency and is somewhat affected by intra-firm resources and capacity. Therefore, besides institutional pressure, it is imperative to monitor foreign firms' environmental awareness and capacity when permitting environmentally sensitive projects. This study also highlights the need for international pressure on Chinese FDI in Myanmar as domestic regulatory pressure might be insufficient to spur Chinese firms' adaptation of environmental practices.

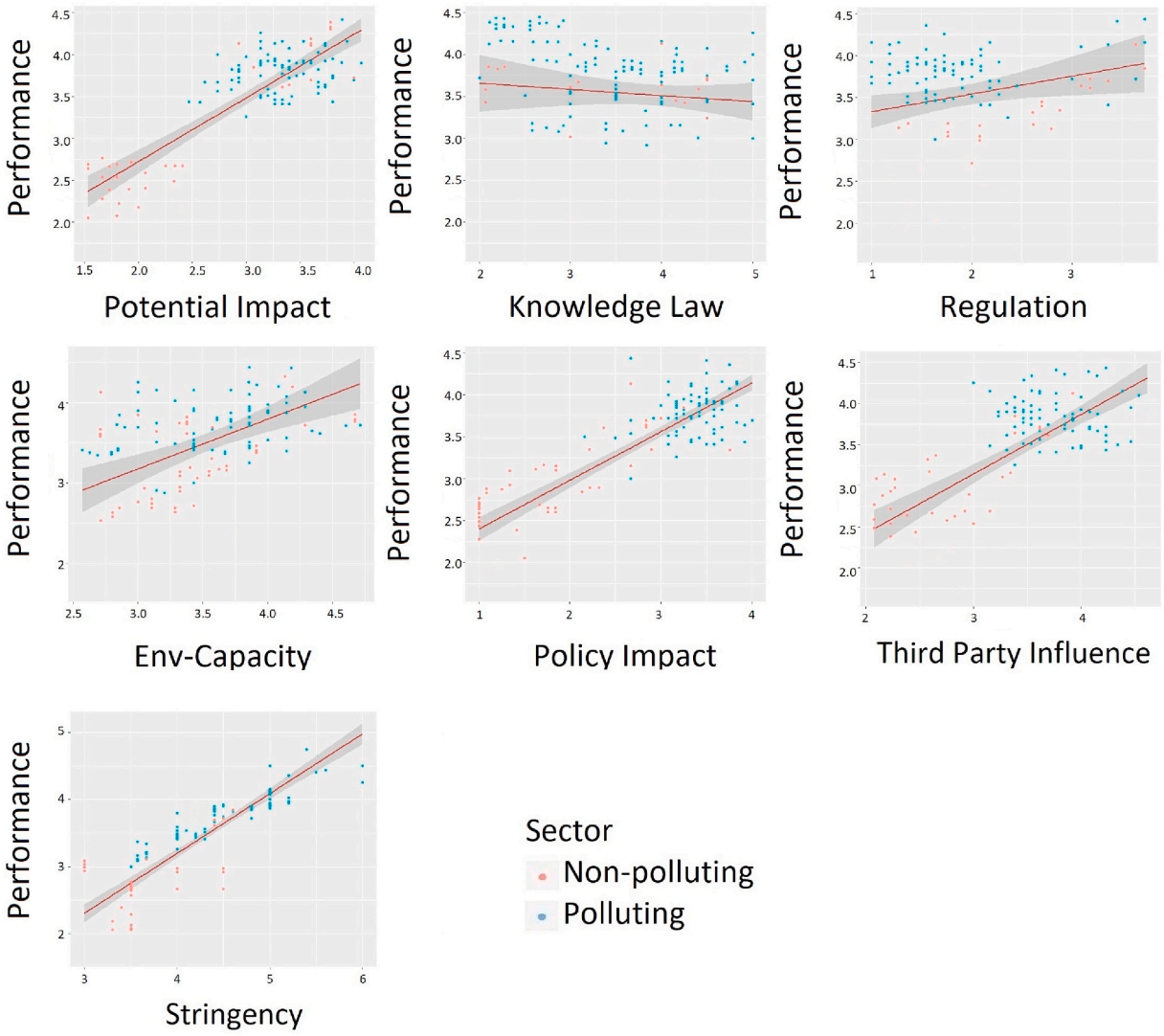

Fig. 10. The moderating effect of sector on observed and predictor variables in Japanese firms.

Moreover, Yao & Zhang (2018) found that the public perception of FDI is contingent on the investing firm's ownership or partnership type. By contrast, the findings from the present study suggest that there is no significant interaction between a Chinese firm's ownership type and its environmental performance. More importantly, the operating industry (polluting or non-polluting) of Chinese firms did not have any significant impacts on their environmental decision making. This finding is worrisome as the majority of Chinese FDI around the world is in resource-intensive and polluting industries (Cai and J, 2017). However, both ownership type and sector were positively associated with Japanese firms' environmental decisions. Hence, it is crucial to consider the internal resources and capabilities of the firm and not fixate only on external institutional factors when assessing the environmental performance of foreign companies.

While countries try to recover from Covid-19 and attract FDI, it is essential to create an enduring inclusive, green and resilient path to recovery (Dokić et al., 2020). Improving the environmental performance of FDI will significantly contribute to this agenda. To leverage this opportunity, governments should identify, retain and attract high quality investors in priority sectors. This agenda should focus on higher quality FDI with internal competitiveness such as good infrastructure, a skilled workforce, technology and financial capacity and those in support of green growth.

Our findings indicate that resource-based and institutional theories should be considered together when assessing the role of environmental regulations in FDI–environment linkages in transition economies. Legitimacy can improve environmental performance, but this can change depending on the background of the foreign firm and its resource capacity. Although there are limitations in terms of the generalisability of results from firms operating in a single country, the findings from this study shed light on the importance of considering a firm's internal resource capacity in FDI decisions, in addition to more substantial institutional pressure for environmental governance.

Future research on FDI could further adapt the variables, proxies and research instruments developed in this article for their application in other research settings. It could consider more direct measures of the chosen variables depending on data availability. Additionally, assessing FDI flows from countries with divergent economic development may contribute to a more comprehensive understanding of the theories tested here.

CRediT authorship contribution statement

Thiri Shwesin Aung: Conceptualization, Methodology, Software, Data curation, Formal analysis, Validation, Resources, Writing – original draft, Visualization, Investigation. **Indra Overland:** Validation, Resources, Writing, Reviewing, Proof-reading. **Roman Vakulchuk:** Validation, Resources, Writing, Reviewing, Proof-reading.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclepro.2021.127701.

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