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Environmental management systems and financial performance: the joint effect of switching cost and competitive intensity

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ABSTRACT

Despite the importance of environmental management systems, previous findings on its relationship with financial performance are inconsistent. This study aims to investigate how the relationship between environmental management systems and financial performance is moderated by switching cost, competitive intensity and their interaction drawing on contingency theory and an interactional perspective. We conducted two waves of survey to collect data from 214 Chinese manufacturing firms and employed hierarchical moderated regression analysis to test the research hypotheses. The results reveal that there is a positive relationship between environmental management systems and financial performance. This relationship is negatively moderated by switching cost and is positively moderated by competitive intensity. In addition, switching cost and competitive intensity have a negative joint moderating effect on the relationship between environmental management systems and financial performance. This study advances environmental management systems research by identifying the market conditions that augment or constrain the impact of environmental management systems on financial performance.

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1. Introduction

Along with the increasing environmental regulations, government pressures and green marketing opportunities, research on environmental management systems (EMSs) has steadily expanded (Cong and Wei, 2010, 2012; Sroufe, 2003; Lo et al., 2012; von Malmborg, 2002). An EMS refers to a series of activities relating to internal policies including collecting, assessing, planning and implementing, which influence the organization and its relationships with the natural environment (Feng et al., 2014). However, the existing empirical research has not yet reached a consensus on the relationship between EMSs and financial performance. Some studies indicated that EMSs enhance financial performance due to improved corporate image, quality green products, and reduced internal cost through eco-friendly new technologies (e.g., Sroufe, 2003; Darnall et al., 2008; Chan et al., 2012), while others failed to find a significant relationship (e.g., Baker and Sinkula, 2005). The inconsistent previous findings call for additional research into contingency factors that may explain under what conditions EMSs influence financial performance. In other words, it is important to understand whether the relationship between EMSs and financial performance depends upon particular contingencies.

In this study, we suggest that market factors need to be taken into consideration when examining the EMSs–financial performance relationship, because the opportunities and constraints of adopting EMSs are greatly determined by market conditions (Darnall et al., 2008). Also, the successful transformation of EMSs into improved financial performance depends on a proactive focus on customer behaviors and market competition (Chan et al., 2012). To clarify the nature of the EMSs–financial performance relationship, contingency theory and the interactional perspective are adopted. According to contingency theory, scholars should pay more attention to the potential influence of market conditions when investigating the performance effects of EMSs (Hatch and Cunliffe, 2006). In addition, the interactional perspective indicates that the interaction between dispositions and situations

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can explain the organizational behavior better than dispositions or situations separately (Pfeffer, 1997). This perspective suggests that different situational factors should be considered simultaneously when explaining how organizational characteristics affect organizational performance. Drawing upon these two theoretical perspectives, we propose that market factors may moderate the relationship between EMSs and financial performance. This issue is crucial but remains mostly overlooked in previous studies on EMSs.

We focus on two market contingencies, switching cost (SC) and competitive intensity (CI), which manifest the nature of firms' relationships with their customers and competitors respectively. Resource-based view (RBV) suggests that a firm should leverage its heterogeneous resources to better meet customer needs and restrict market competition to achieve a sustained competitive advantage (Peteraf and Barney, 2003; Sirmon et al., 2007). Thus, a firm's competitive advantage and performance gained from EMSs may be influenced by the behaviors of its customers and competitors. In addition, according to the strategic analysis perspective, customers and competitors are the most important market players that influence the strategic choices of a firm (Grant, 2010). Thus, customers and competitors are likely to affect the performance effects of the firm's strategic choices (Zhou and Li, 2010). Based on these theoretical perspectives, SC and CI may be the most important market contingencies influencing firms' adoption and implementation of EMSs, and their abilities to profit from such management systems.

Furthermore, it is likely to be inappropriate to isolate the moderating effects of SC and CI when investigating the performance effects of EMSs, because customer switching and market competition often coexist for a firm and may act concurrently (Seiders et al., 2005). Therefore, it is necessary to simultaneously consider the separate and joint moderating effects of SC and CI. Moreover, Lumpkin and Dess (2001) suggested that the moderating effect of environmental hostility on the relationship between entrepreneurial orientation and performance may be influenced by other contingency factors. Similarly, the effect of CI may be influenced by other factors such as SC because firms have to compete for customers. Thus, examining the combined moderating roles of SC and CI may extend our understanding on when EMSs impact financial performance and may offer rich and useful implications to practitioners. To the best of our knowledge, few studies have examined how these two essential market factors jointly influence the EMSs–financial performance relationship.

To fill these research gaps and gain new insights into the performance effects of EMSs, we address two important questions: (1) How SC and CI play contingency roles to moderate the relationship between EMSs and financial performance; (2) How SC and CI jointly moderate the relationship between EMSs and financial performance. The purpose of this study is to examine whether and how the performance effects of EMSs depend on SC, CI, and/or their combination. Our research contributes to the EMSs literature by clarifying two types of market conditions (i.e., SC and CI) that influence the relationship between EMSs and financial performance. The findings of our research highlight that the effect of EMSs on performance is not necessarily positive but may vary according to the combined influence of SC and CI. Thus, this study provides insightful implications for both theory and practice.

The remainder of this study is organized as follows. In the next section, we develop research hypotheses. Then, research methods employed in this study are described and the analysis results are depicted. Following that, we discuss the implications of the findings for theory and practice. Finally, conclusions are drawn, with further discussion in regards to the limitations of this study and suggestions for future research.

2. Theoretical background and research hypotheses

By integrating RBV with contingency theory, we propose that the relationship between EMSs and financial performance may depend on certain market conditions, particularly SC and CI. Fig. 1 presents the conceptual model, which highlights the moderating effects of SC, CI, and their combined effect on the EMSs–financial performance relationship. Fig. 1 also delineates the research hypotheses developed in our research.

2.1. EMSs and financial performance

When investigating the performance effect of EMSs, financial performance and social performance are two important aspects of consideration (Baird et al., 2012). While financial performance concerns more about the profits and material benefits created by a firm, social performance focuses on a firm's relationship with the society (Baird et al., 2012; Waddock and Graves, 1997). Although the focuses of these two types of firm performance are different, some scholars argued that they are interrelated with each other (Beurden and Gossling, 2008).

EMSs may represent part of social performance, since it demonstrates a firm's commitment to social responsibility through minimizing environmental impacts of its operations (Darnall et al., 2008). As its objectives and outcomes greatly enhance a firm's environmental protection and positive image building towards stakeholders, existing literature revealed that EMSs are positively related to social performance (Darnall et al., 2008). To complement previous research, this study specifically focuses on the relationship between EMSs and financial performance, and how this relationship is moderated by contingency factors in order to provide further explanation to inconsistent findings in previous research (Baker and Sinkula, 2005; Chan et al., 2012; Darnall et al., 2008; Vachon and Klassen, 2008; Yang et al., 2010).

An EMS involves commitments for pollution prevention, building environmental policies or planning, implementing activities to deal with environmental concerns, measuring and assessing potential environmental impacts, establishing quantifiable goals to reduce environmental impacts, reviewing the implementation progress, and making adjustment to ensure the achievement of environmental goals (Coglianese and Nash, 2001; Yang et al., 2010). Although EMSs adoption is costly, several previous studies suggested that firms can profit from EMSs implementation (Sroufe, 2003; Darnall et al., 2008; Chan et al., 2012) in several ways.

First, EMSs adoption may help firms gain government support to respond to external pressures (Darnall et al., 2008). As not every firm has adequate internal resources required for EMSs implementation, regulators usually provide grants and technical assistance to encourage firms to adopt EMSs (Dahlström et al., 2003). The government-sponsored grants and technical assistance are useful for firms to mitigate costs associated with EMSs adoption. By implementing EMSs proactively, firms can also have access to regulators more easily and be more qualified to participate in

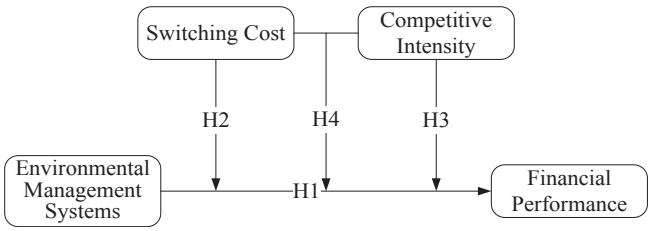

Fig. 1. Conceptual model.

government-sponsored EMS programs (Darnall and Edwards, 2006). Moreover, firms are likely to establish greater external legitimacy and corporate image through responding to institutional pressures of protecting the environment (De Bakker et al., 2002; Sroufe, 2003; Zhang et al., 2008). Because of the enhanced external legitimacy and corporate image, firms adopting EMSs can benefit from charging a premium price and increased customer loyalty. Such corporate image is an intangible asset which allows firms to market their EMSs as selling points for their products, thus differentiating their products from competitors (Bansal and Hunter, 2003; Darnall et al., 2008).

Second, according to RBV of the firm, EMSs are strategic resources that can help a firm gain competitive advantage and achieve better performance (Menguc and Ozanne, 2005; Russo and Fouts, 1997). Klassen and Whybark (1999) argued that adopting EMSs may allow firms to access unique resources and capabilities. Firms with sufficient resources and capabilities are more likely to minimize their environmental impacts. In addition, since EMSs encourage information sharing and joint problem solving when addressing environmental issues, a firm's knowledge-based skills will be developed and enhanced (Darnall et al., 2008). By developing knowledge-based capitals, firms can achieve greater success at reducing environmental protection costs (Christmann, 2000), gaining an advantage over competitors and winning customers (Lo et al., 2012; Vachon and Klassen, 2008).

Finally, EMSs may help firms gain competitive advantage through providing cost savings opportunities (Yang et al., 2010; Sroufe, 2003). EMSs encourage firms to establish environmental planning throughout the full range of the firm's activities, from raw materials acquisition, through manufacture, to product distribution to minimize the lifecycle costs of their products and develop new products with lower life-cycle costs (Melnyk et al., 2003). Menguc and Ozanne (2005) found that firms attempting to reduce physical waste or dispose of physical waste through environmental-friendly ways, may reduce costs and improve profitability. Recently, Wong et al. (2012) suggested that the use of reusable components and parts extracted from returned products offers cost saving opportunities for firms. Hence, we propose the following hypothesis:

H1. There is a positive relationship between EMSs and financial performance.

2.2. The moderating effect of SC

SC represents an obstacle for customers to change their product providers (Wathne et al., 2001), and it is a crucial factor that determines the competitiveness of a market environment (Jones et al., 2002). SC is defined as the costs that consumers have to pay during the process of switching from one product provider to another (Antón et al., 2007; Yee et al., 2010). When customers switch product providers they need to bear various costs ranging from time spent searching for and evaluating potential alternatives, learning how to operate new product, and building relationship with the new provider to the benefits lost by changing provider (Jones et al., 2002; Yee et al., 2010).

SC moderates the effects of EMSs on firms' financial performance due to the following logics. If a customer perceives SC as low, dissatisfaction with the firm will motivate his/her intention to switch product provider. Thus, firms adopting EMSs may attract more customers and improve the repeat purchase rate based on their superior public image and green products. However, if a customer perceives SC as high, he/she may become less sensitive to its provider's behaviors (Yee et al., 2010). This will potentially prohibit socially responsible firms to intentionally make more profit due to the relatively fixed supplier–customer relationships (Friedl and Wagner, 2012). Since high SC discourages changing the current provider, thereby yielding less profit incentive for firms to actively adopt EMSs. Therefore, when SC is low rather than high, EMSs may lead to greater performance. Therefore, we hypothesize:

H2. SC negatively moderates the relationship between EMSs and financial performance.

2.3. The moderating effect of CI

CI is another important factor determining the competitiveness of market environment, which reflects the level of competition among firms (Auh and Menguc, 2005; Tsai and Yang, 2013). Enhanced CI features greater competition among incumbents, and fewer opportunities for further growth (Auh and Menguc, 2005; Li et al., 2008). When CI is low, firms can operate with their existing systems to take full advantage of the transparent predictability of their own behavior (Auh and Menguc, 2005). However, more intense competition will force firms to adapt their operational strategies accordingly. When the competition is intense, firms will need to undertake proactive activities, such as looking for new ways to compete and exploring differentiation based on eco-friendly procedures and products to escape from price or promotion wars.

We posit that CI may also moderate the relationship between EMSs and financial performance for three major reasons. First, differentiation is likely to mitigate the potential threat of competition (Tsai and Yang, 2013). Firms adopting EMSs are likely to build differentiation advantages (Bansal and Hunter, 2003; Darnall et al., 2008). EMSs adoption may also increase customer loyalty through improved firm image and product quality. Thus, firms implementing EMSs are more capable of winning price or promotion wars. Second, information processing theory suggests that firms adopting EMSs are in a favorable position since they can rapidly acquire and interpret a wide range of competitor information and utilize the information to develop creative responses to environmental issues (Tsai and Yang, 2013). As competition intensifies, the need to gather and analyze competitor information will be heated. Hence, increased competition in markets may place a premium on EMSs. Third, with the rising of global environmental concerns, customers are increasingly demanding for eco-friendly products from their suppliers (Banerjee et al., 2003). Thus, if a firm can implement EMSs to come up with new solutions to reduce the negative environmental impacts of its operations and/or products, the performance effects of EMSs will be even more salient under a condition of high rather than low level of CI (Chan et al., 2012). Based on these arguments, it is predicted:

H3. CI positively moderates the relationship between EMSs and financial performance.

2.4. The joint moderating effects of SC and CI

In addition to their independent moderating effects, SC and CI may jointly moderate the relationship between EMSs and financial performance. Since customer switching and market competition often coexist in the market and may act together (Seiders et al., 2005), these two factors are likely to have a synergistic moderating effect on the degree to which EMSs contribute to financial performance. Moreover, environmental dynamism and hostility may interactively influence the effectiveness of organizational strategic decisions (Luo and Park, 2001). Lee et al. (2001) also suggested that SC becomes more important when there are a great

number of alternative providers in a market. We thus conjecture that SC and CI may interactively affect the impact of EMSs on financial performance. In other words, the moderating effect of each of these two factors is likely to be dependent on the other.

Furthermore, separating the impacts of each contingent factor may underestimate the complex forms of interaction and may thus oversimplify the actual situations under which EMSs influence financial performance (Tsai and Yang, 2013). In contrast, when considered simultaneously, SC and CI may "yield a more interpretable and theoretically interesting pattern than any of the factors would show in isolation" (Rousseau and Fried, 2001, p. 4). From an interactional perspective, we examine how the interaction of SC and CI affects the performance effects of EMSs. An interactional perspective here suggests that the combination of SC and CI will form a set of market conditions according to the levels of the two variables and that these different market conditions may have different influences on the performance effects of EMSs. Since the four kinds of different market conditions (i.e., low and high levels of SC and CI) may generate different opportunities, constraints and challenges in a market, the strength of the relationship between EMSs and financial performance may vary across these market conditions. At one extreme, under the condition of low SC and high CI, firms should gain the most benefit by implementing EMSs. If customers can switch to a new provider with a low cost and competitors can begin price or promotion wars rapidly, firms are most likely to realize the maximum value of their EMSs adoption because they can better take advantage of customer switching and can provide products that are more differentiated than their competitors.

At the opposite extreme, under the condition of high SC and low CI, the effect of EMSs on financial performance diminishes. When customer switching is costly and competition is not intense, firms implementing EMSs may improve performance but only to a lesser degree. Therefore, it may be less cost effective for a firm to adopt EMSs under such conditions. Situated between these two extremes, the remaining two conditions (i.e., low SC with low CI and high SC with high CI) may have an intermediate effect on the strength of the relationship between EMSs and financial performance. However, few studies have investigated which of these two factors has a stronger effect on the effectiveness of organizational decisions. In this study, we suggest that SC may have a greater influence on the performance effects of EMSs because attracting and retaining customers require innovative activities such as EMSs within the firm, whereas CI may not always justify EMSs as firms can achieve competitive advantages through other approaches (Benner and Tushman, 2003; Tsai and Yang, 2013). This speculation is also supported by Henard and Szymanski's (2001) finding that meeting customer needs has a greater impact on new product performance than competition does. Therefore, we conjecture that EMSs may improve financial performance to a larger degree under the condition of low SC and low CI than under the condition of high SC and high CI. These arguments lead to the following hypothesis:

H4. SC and CI have a negative joint moderating effect on the relationship between EMSs and financial performance.

3. Methods

3.1. Data collection

Because of China's size and economic diversity, we strategically chose five provinces or municipalities that represent different economic levels and are geographically diverse: Shaanxi, Shandong, Beijing, Jiangsu and Guangdong. Shaanxi, a traditional industrial province in northwestern inland China, represents a relatively early stage of economic reform and market formation. Shandong and Jiangsu are located in the Bohai Sea Coastal Region and in the Yangtze River Delta respectively, and both enjoy a relatively high degree of economic development. Beijing and Guangdong are located in the Bohai Sea Coastal Region and in the affluent Pearl River Delta respectively, reflect the average level of economic development. These five provinces are representative of the various

Fig. 2. The locations of sampled provinces or municipalities.

regions of China. The locations of sampled provinces or municipalities are shown in Fig. 2.

To obtain a representative sample of firms, we randomly selected firms from the China Business Yellow Pages. In each province, we randomly chose 150 firms, and in total, 750 firms were sampled. The selected firms represent a wide range of industries, including communication and computers related equipment, machinery, transport equipment, electrical machinery and equipment, and rubber and plastics, among others. An initial telephone enquiry was conducted before the formal survey, and 246 firms agreed to participate in the survey. In each selected firm two key informants were identified to fill out the questionnaire. The key informants typically held positions such as CEO/president, vice president, or director in charge of marketing and purchasing, and were knowledgeable about the firm's internal and external processes. Existing environmental literature has used subjective perceptions of respondents to operationalize performance (e.g. Chan et al., 2012; López-Gamero et al., 2010; Youn et al., 2013). The main reason is that respondents were more open to offering their perceptions rather than offering precise quantitative data (Aragón-Correa et al., 2008; López-Gamero et al., 2010).

In this study, we conducted two waves of survey. At T1, informants reported EMSs, SC, CI, market turbulence and firm innovativeness. The questionnaire together with a covering letter explaining our research objectives and ensuring confidentiality was then mailed to one respondent identified in the firm. We also indicated that if the informant felt that it was difficult for him/her to answer certain questions, he/she could recommend a more appropriate person to answer those questions. Three follow-up calls and mailings were made at 2, 4, and 8 weeks to improve the response rate. During the survey, about 200 follow-up calls were made and 100 follow-up letters were sent. At T2, about 1.5 years after T1, we asked another informant in each firm to respond to the scales of financial performance.

Finally, we received 214 valid questionnaires. Among them, 53 were from Shandong (24.8%), 50 were from Shaanxi (23.3%), 39 were from Beijing (18.2%), 38 were from Guangdong (17.8%), and 34 were Jiangsu (15.9%). These firms covered a wide range of ownership types, including state-owned and controlled enterprises (27.3%), privately owned and controlled enterprises (35.8%), and joint ventures (36.9%). The response rate was 28.5%. The response rate for this study is comparable to or better than other survey-based studies in environmental strategy management (e.g., 24.7% in Darnall et al., 2008; 21.4% in Yang et al., 2010).

To test for non-response bias, the sample was split into two groups based on the time they returned the questionnaire (Armstrong and Overton, 1977). We compared number of employees, annual sales and all variables used in this study between early and late responses. No significant differences were found between them at the significance level of 0.05, suggesting that non-response bias was not an issue.

3.2. Measures

We measured the variables through adopting or adapting existing scales that have been validated in previous studies. Since the scales used in this study were adopted or adapted from English literature, we used the translation and back-translation approach to develop the Chinese version of those measures. Before the formal survey, eight managers that are familiar with the operational practices in China and three experiential researchers that are well versed in both English and Chinese reviewed the questionnaire to improve clarity and resolve any unfamiliar or unclear wording. We pre-tested the initial version of the questionnaire with ten randomly selected firms in Xi'an. Managers from top- or middle-level positions within their organizations evaluated the clarity and understandability of the scales. Based on the managers' feedback, we further refined the survey questions and completed the final version of the questionnaire.

All of the measures were seven-point Likert scales. The informants were requested to indicate the extent to which they agreed with the scale items by providing scores from "1 = strongly disagree" to "7 = strongly agree" or by evaluating the performance measures on a scale ranging from "1 = very low" to "7 = very high". The value of each construct is the average of individual item's rating. The measurement items used in this study are presented in Appendix A.

This study measured EMSs as the extent to which an organization implements environmental practices. The scale for EMSs consisted of seven items that were adopted from Yang et al. (2010). We measured SC as the costs that a customer has to pay during the process of switching from one firm to another. Corresponding to Yee et al. (2010), we applied four items to measure SC. CI refers to the degree of competition in an industry. It was measured using six items adapted from Auh and Menguc (2005). We measured financial performance as a firm's financial and market performance relative to those of its major competitors. The seven items measuring financial performance were taken from Li et al. (2009) and Flynn et al. (2010).

When testing the hypothesized relationships, we controlled for several factors that might confound the effects. This study measured firm size by the logarithm of the number of employees. Firm age was measured as the logarithm of the number of years since the firm's establishment. This study measured market turbulence as the rate of change in customer demands. Our scale for market turbulence consisted of four items that were adapted from Germain et al. (2008). The scale for firm innovativeness was adapted from Panayides and VenusLun (2009) and was assessed by five items.

3.3. Construct reliability and validity

We firstly conducted a confirmatory factor analysis (CFA) by linking each item to its intended construct using the maximum likelihood estimation method in LISREL 8.80. The fit indices for the CFA model indicated a good fit of the model to the data based on the recommended criteria: $\chi^2/df < 3$ (Hekman et al., 2009), NNFI > 0.90, CFI > 0.90, RMSEA < 0.08 and SRMR < 0.08 (Hair et al., 2010). We then assessed the degree of internal consistency among the items of each construct with Cronbach's alpha reliability coefficient in SPSS 21.0. The Cronbach's alpha values for the constructs ranged from 0.891 to 0.972 (see Table 1), all of which exceeded the recommended 0.70 threshold (Hair et al., 2010). For evaluating reliability, we calculated composite reliability (CR) and Corrected Item-Total Correlation (CITC). The recommended criterion for them is 0.60 and 0.30 respectively (Fornell and Larcker, 1981; Kerlinger, 1986). The results in Table 1 provide evidence that all constructs have sufficient reliability.

Furthermore, we assessed the content validity, convergent validity and discriminant validity. The content validity of the constructs was ensured by the extensive literature review, feedback from executives and academicians and the pilot test. The convergent and discriminant validity of the scales were examined using the method recommended by Fornell and Larcker (1981).

The factor loading of each scale item was statistically significant ($p < 0.001$) and above 0.60, which indicated adequate convergent validity of each construct (Fornell and Larcker, 1981). We also assessed convergent validity of each construct using average variance extracted (AVE). The AVE values for the constructs ranged from 0.684 to 0.894, all of which were greater than the 0.50

Table 1
Statistics of the measurement analysis.

Constructs	Scale items	Standardized factor loadings	CITC range of the underlying items	Cronbach's α	Composite reliability
Environmental management systems	EMS1	0.89	0.913	0.972	0.970
	EMS2	0.96	0.935		
	EMS3	0.92	0.900		
	EMS5	0.95	0.934		
	EMS7	0.93	0.908		
Switching cost	SC1	0.94	0.925	0.971	0.971
	SC2	0.96	0.917		
	SC3	0.97	0.949		
	SC4	0.92	0.921		
Competitive intensity	CI1	0.73	0.700	0.891	0.896
	CI2	0.90	0.797		
	CI3	0.87	0.808		
	CI5	0.82	0.779		
Financial performance	FP1	0.89	0.643	0.918	0.915
	FP3	0.90	0.786		
	FP4	0.82	0.852		
	FP5	0.81	0.862		
	FP6	0.73	0.809		
Market turbulence	MT1	0.92	0.918	0.972	0.971
	MT2	0.90	0.897		
	MT3	0.97	0.947		
	MT4	0.98	0.954		
Firm innovativeness	FI1	0.95	0.928	0.967	0.966
	FI2	0.94	0.936		
	FI3	0.92	0.902		
	FI5	0.90	0.908		

Fit indices: $\chi^2(284) = 721.42$, NNFI = 0.93, CFI = 0.95, RMSEA = 0.076 and SRMR = 0.072.

threshold (Bagozzi and Yi, 1988). These results suggested that each construct exhibited good convergent validity.

According to Fornell and Larcker (1981), if the AVE values for any two constructs are greater than the corresponding squared correlation estimate, the discriminant validity between the two constructs is verified. The results in Table 2 demonstrated that the square roots of the AVE values for each pair of the constructs were greater than the corresponding correlation estimate, indicating discriminant validity between the constructs. Moreover, we also assessed the discriminant validity of the constructs with chi-square difference tests and confidence intervals for the inter-construct correlation estimates (Anderson and Gerbing, 1988). The results of the fifteen chi-square difference tests in the CFA models indicated that for each of the fifteen pairs of constructs, the chi-square value obtained for the constrained model was significantly greater than the chi-square value obtained for the unconstrained model, which ensures the discriminant validity between any two of the constructs. In addition, we calculated the confidence interval (±two standard errors) around the correlation estimate between any two constructs. The results showed that none of the fifteen confidence intervals included 1.0, further demonstrating discriminant validity.

3.4. Common method variance

This study used several procedures suggested by Podsakoff et al. (2003) to reduce and evaluate the possibility of common method variance (CMV). First, the independent/moderating and dependent variables were based on data collecting at different points of time and from different informants. Thus, the influence of CMV can be reduced. Second, the order of the questions was mixed by putting the items of each construct on different pages with items of the other constructs to reduce the contextual influences. Third, we conducted an exploratory factor analysis (EFA) to determine whether a single factor explained the majority of the variance among the constructs. The results showed that six factors were necessary to account for the variances in these constructs and that the first factor explained less than 50% of the variance (37.0% of 87.4%). Thus, CMV was not a significant concern in this study. Fourth, we carried out CFA for Harman's single-factor analysis. Harman's single-factor model of variables yielded $\chi^2(299) = 6359.49$ (compared with $\chi^2(284) = 721.42$ for the CFA model). The fit indicated that several distinct factors exist in our research, which further suggested that CMV is not a serious

Table 2
Properties of measurement scales.

Constructs	Mean	S.D.	1	2	3	4	5	6	7
1. Environmental management systems	4.754	1.088	**0.931**						
2. Switching cost	4.021	1.498	−0.200**	**0.945**					
3. Competitive intensity	5.016	1.005	0.379***	0.221**	**0.827**				
4. Financial performance	4.998	0.919	0.429***	0.037	0.252***	**0.840**			
5. Market turbulence	3.659	1.303	−0.017	0.620***	0.355***	0.146*	**0.946**		
6. Firm innovativeness	4.993	1.103	0.638***	0.012	0.512***	0.456***	0.108	**0.937**	
7. Firm size	5.715	1.572	0.179**	0.071	0.286***	0.120	0.132	0.215**	
8. Firm age	2.446	0.787	0.056	0.047	0.173*	0.126	0.138*	0.040	0.500***

Note: *$\alpha = 0.05$; **$\alpha = 0.01$; ***$\alpha = 0.001$; square root of AVE is on the diagonal.

problem. Finally, we reexamined the measurement model by adding a method factor in addition to the traits (Cote and Buckley, 1987). The results of the method factor model indicated that the model fit indices were only marginally improved (NNFI by 0.01 and CFI by 0.01), with the common method factor accounting for 2.74% of the total variance. In addition, the factor loadings were still significant in spite of the inclusion of a method factor, indicating that the model was robust (Flynn et al., 2010).

4. Analysis and results

In this study, hierarchical moderated regression analysis was employed to test the hypotheses. We entered the control variables into the regression equation in model 1, all three predictors in model 2, three two-way interactions in model 3, and the three-way interaction in model 4. The results of the regression analysis are shown in Table 3. As presented in Table 3, the relationship between EMSs and financial performance is positive and significant ($\beta = 0.228$, $p < 0.05$). Thus, H1 is supported. This is consistent with the findings in previous studies (e.g., Sroufe, 2003; Darnall et al., 2008; Chan et al., 2012). Following previous studies (e.g., Hekman et al., 2009; Shalley et al., 2009), we first assessed the results of H4. As illustrated in Table 3, the increase in R^2 from model 3 to model 4 is 0.009, and it is significant ($p < 0.10$), which indicates that the addition of the three-way interaction among EMSs, SC, and CI significantly increased 0.9% of the explanation of variance in financial performance. In addition, model 4 in Table 3 reveals that the coefficient for the three-way interaction effect is negative and significant ($\beta = -0.159$, $p < 0.10$). These findings provide support for H4.

To further check the nature of the three-way interaction, we calculated the slopes of the simple regression equations of financial performance on EMSs for each of the four types of market conditions of low and high levels of SC and CI (i.e., one standard deviation below and above their respective means) and examined whether each simple slope was significantly different from zero (Aiken and West, 1991). Because the sample size in our study is not particularly large, we follow the suggestions of previous studies (Bing et al., 2007; Sauley and Bedeian, 1989) in using 0.10 as the significance level to increase the chances of detecting the effects of interactions.

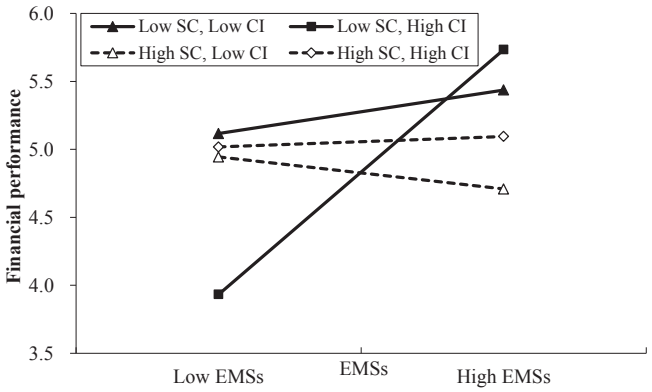

Fig. 3. Joint moderating effects of SC and CI on the relationship between EMSs and financial performance.

The results of the slope tests showed that the effect of EMSs on performance was the most positive and significant under low SC and high CI (simple slope = 0.828, $p < 0.001$); the second most positive and significant effect occurred under low SC and low CI (simple slope = 0.147, $p < 0.10$); the least positive effect occurred under high SC and high CI (simple slope = 0.035, $p > 0.10$); and the effect was negative but insignificant happened under high SC and low CI (simple slope = −0.108, $p > 0.10$). In this study, we also graphed the four preceding simple regression lines following Dawson and Richter's (2006) approach. As depicted in Fig. 3, the different slopes of these simple regression lines indicate that the effects of EMSs on financial performance are different across the different kinds of market conditions of SC and CI.

Furthermore, Fig. 3 illustrates that the positive slope of financial performance that regressed on EMSs under low SC and high CI is far greater than the positive slope under high SC and high CI. To test whether the difference between this pair of simple slopes is significantly different from zero, we conducted a supplementary analysis of slope difference following Dawson and Richter's (2006) method. The results indicate that the simple slope under low SC and high CI is significantly greater than the simple slope under high

Table 3
Results of hierarchical moderated regression analysis.

Variables	Model 1	Model 2	Model 3	Model 4
Control variables				
Firm size	−0.049	−0.049	−0.046	−0.042
Firm age	0.121†	0.116	0.072	0.079
Market turbulence	0.087	0.111	0.213*	0.234*
Firm innovativeness	0.453***	0.301**	0.286**	0.332**
Main effects				
Environmental management systems (EMSs)		0.228*	0.308**	0.267**
Switching cost (SC)		0.017	−0.099	−0.062
Competitive intensity (CI)		−0.038	−0.011	−0.058
Two-way interactions				
EMSs × SC			−0.285***	−0.310***
EMSs × CI			0.160*	0.244**
SC × CI			0.154†	0.183*
Three-way interaction				
EMSs × SC × CI				−0.159†
F	15.501***	9.884***	9.686***	9.138***
R^2	0.229	0.251	0.323	0.332
ΔR^2		0.023	0.072	0.009
F change for ΔR^2		2.083†	7.157***	2.800†

Note: $^{\dagger}\alpha = 0.10$; $^{*}\alpha = 0.05$; $^{**}\alpha = 0.01$; $^{***}\alpha = 0.001$.

SC and high CI ($\Delta\beta = 0.793$, $p < 0.001$). This finding shows that EMSs generate much higher performance when SC is low and CI is high than when both SC and CI are high.

Finally, we examined H2 and H3. However, we did not interpret the two-way interactions because their effects on financial performance depend on a variable that is not included in the interaction if the effect of three-way interaction is significant (Aiken and West, 1991). In Table 3, we found that the increase in R^2 from model 2 to model 3 is significant ($\Delta R^2 = 0.072$, $p < 0.001$). Model 3 reveals that the coefficient for the two-way interaction between EMSs and SC is negative and significant ($\beta = -0.285$, $p < 0.001$). Thus, H2 is supported. Moreover, model 3 indicates that the coefficient for the two-way interaction between EMSs and CI is positive and significant ($\beta = 0.160$, $p < 0.05$). This result provides support for H3.

5. Discussion and managerial implications

5.1. Discussion

In this study, we aim to advance the environmental strategy literature by simultaneously examining the individual and joint moderating effects of SC and CI on the relationship between EMSs and financial performance. The results reveal that both SC and CI have independent moderating effects on the EMSs–financial performance relationship. This finding is consistent with the argument of Zhu and Sarkis (2007) that firms should implement environmental practices to achieve improved performance in highly competitive markets. This study also indicates that, as expected, when SC is low and CI is high, EMSs have the most positive impact on financial performance. Interestingly, the performance effect of EMSs becomes negative when SC is high and CI is low. This highlights the potential risks of implementing EMSs, including increased costs in human resources and management, especially when costs for a customer switching to another product or service provider is high and market competition is low. These findings show distinct impacts of EMSs on financial performance under the simultaneous influence of SC and CI. Further inspection of four simple regression lines (see Fig. 3) illustrates how the direction and magnitude of the EMSs–financial performance relationship are affected by SC and CI concurrently. In specific, when SC is high, the performance effect of EMSs goes from negative to positive as the level of CI increases. The finding that the positive relationship between EMSs and financial performance is not significant in the context of high SC and high CI is surprising but plausible because loyal customers coupled with frequent price or promotion wars are likely to neutralize the potential benefits of EMSs. Moreover, when SC is high and CI is low, EMSs could be detrimental to performance because the profits from EMSs cannot be sufficient to remedy the costs of adopting EMSs. It appears that fierce market competition strengthens the necessity of EMSs adoption under less customer switching conditions. In other words, the ability of profiting from EMSs for firms that operate in markets with high customer SC may depend greatly on whether the competition is intense or not.

Similarly, when SC is low, the positive performance effect of EMSs increases with the level of CI. These findings reveal that CI may have consistently positive moderating effect on the relationship between EMSs and financial performance regardless of the level of SC. However, CI alone may be insufficient because excessive competition may render the adoption of EMSs unprofitable for firms when the level of SC is high. Although implementing EMSs may be beneficial due to a differentiation advantage, “intense competition produces pressure on firms to improve efficiency and lower prices, which may lead to tighter margins” (Tsai and Yang, 2013, pp. 1288). Thus, adopting EMSs may not enhance performance under conditions of high CI and high SC. However, if SC is low such competition will be coupled with frequent customer switching behaviors. Under this condition, implementing EMSs appears to be relatively beneficial for firms because the value of differentiation increases.

Furthermore, when CI is low, the performance effect of EMSs decreases with the level of SC. This finding indicates that firms with idiosyncratic resources, such as EMSs, will not be able to continue to exploit these resources to gain a competitive advantage if their markets remain relatively high on customer switching and low on competition. Similarly, when CI is high, the performance effect of EMSs decreases considerably with the level of SC, and the effect is the most positive at a low level of SC while it is the least positive at a high level of SC. These findings are remarkable because the previous EMSs research on the moderating effects of SC and CI are quite limited and has not investigated how the individual moderating effect of either SC or CI is dependent on each other. Overall, it appears that SC and CI jointly interact with EMSs to influence the level of financial performance.

5.2. Theory contributions

Our research contributes to EMSs research in several ways. First, this study highlights the important roles of SC and CI in jointly influencing the economic value of EMSs. Our findings reveal that SC and CI synergistically moderate the positive effect of EMSs on performance. The performance effect of EMSs becomes increasingly positive as SC decreases and CI increases concurrently. The highest level of financial performance is generated when EMSs and CI are high and SC is low. That is, EMSs play an important role in helping firms to be prosperous within a market characterized by low SC and high CI. These findings provide support to the contingent RBV, which demonstrates that the value of a firm's unique resources may depend upon relevant environmental conditions (Aragon-Correa and Sharma, 2003). In addition, our findings also serve as supporting evidence for the dynamic capabilities perspective, which suggests that a firm should align its resources and capabilities with the requirements of the business environment to achieve competitive advantage (Teece, 2007). EMSs can help firms reconfigure their unique resources, and thus, the importance of EMSs is amplified in a market of low SC and intense competition.

Second, our findings further indicate that the performance effect of EMSs is contingent on the levels of SC and CI. Contrary to traditional wisdom, higher level of EMSs is not always better. Although EMSs contribute substantially to performance under conditions of low SC and high CI, firms cannot profit from EMSs under conditions of high SC and low CI. In essence, SC and CI jointly form the boundary conditions and limit the value of EMSs. From the perspective of strategic fit (Grant, 2010; Zajac et al., 2000), the level of EMSs should fit with the specific market conditions that are formed by SC and CI to enhance performance.

Third, this study suggests that EMSs are more effective when adapting to SC than when coping with CI. The performance effect of EMSs is positive and significant when both SC and CI are low, while it is insignificant when both SC and CI are high. That is, low SC justifies the implementation of EMSs rather than intense competition. Moreover, the performance effect of EMSs is further augmented by the combination of SC and CI. In other words, the contribution of EMSs under either SC or CI depends on the level of the other. Thus, our findings suggest that the increase in the value of EMSs that occurs due to SC (CI) will be limited unless strong competition (low SC) is also present.

Finally, the results of our research reveal that the coexistence of SC and CI generates different forms of interactions that influence the effect of EMSs on financial performance differently. These

findings could serve as supporting evidence that SC and CI work together to influence the effectiveness of organizational decisions. Thus, this study shows that distinguishing environmental factors and examining their joint effects using an interactional perspective may be particularly useful for offering important theoretical and managerial insights.

5.3. Managerial implications

Our findings provide practical guidelines for managers. First, this study suggests that EMSs is critical for firms that pursue to enhance financial performance in markets with low SC and intense competition. To ensure success under such complex market conditions, firms should cultivate a culture for proactive management of their operations, processes and products to minimize negative environmental impacts. Managers should encourage employees to commit to continuous environmental improvement programs to exploit opportunities and neutralizing threats confronting their firms. In addition, managers should be closely involved in the process of EMSs implementation, and support EMSs initiatives.

Second, managers should pay attention to customer switching behaviors and competitor actions when evaluating the values of EMSs. Disregarding either customer intelligence or competitor intelligence will weaken a firm's ability to profit from EMSs. Since implementing EMSs may be costly and risky, managers should align their firms' EMSs efforts with the requirements of environmental conditions. If firms adopting EMSs do not correctly predict and interpret varying trends with respect to both customer behaviors and competitor actions, they are likely to implement EMSs in the wrong time and/or at improper levels.

Third, managers should also be informed that the value of EMSs differs across different kinds of market conditions and may fail to achieve success under high SC and low CI. To effectively allocate and utilize resources, a firm should match the level of EMSs with its particular market conditions. In a market with low SC and high CI, a firm needs to be proactive to adopt EMSs if it wants to transform market threats into favorable opportunities. However, in a market with less customer switching behavior and high competition, a firm does not need to be very active in implementing EMSs because the effect of EMSs on performance is rather weak. Under such a scenario, firms should slow or cut some of their investments in activities related to EMSs. Furthermore, managers should be aware that EMSs has no influence on financial performance in a market with high SC and low competition. In this situation, the differentiation advantage of EMSs disappears because of the relative high loyalty of customers. In sum, managers should adapt their firms' degree of EMSs implementation to fit with changing market conditions and to take advantage of the opportunities created by these conditions in order to achieve superior performance.

6. Conclusions, limitations and future directions

6.1. Conclusions

Findings in this study reveal that there is a positive relationship between EMSs and financial performance. This relationship is negatively moderated by SC and is positively moderated by CI. In addition, SC and CI have a negative joint moderating effect on the relationship between EMSs and financial performance. Thus, this study underpins the important role of market conditions in influencing the performance effect of EMSs. Market conditions such as SC and CI also influence the relationship between EMSs and financial performance jointly. Overall, this study signals the important role of market conditions and calls for further attention to market conditions as potential moderators when investigating the relationship between EMSs and financial performance.

6.2. Limitations and future directions

This research has some limitations that provide opportunities for future research. First, this study used self-reported subjective data in each firm. This approach may generate CMV issues and inflated the relationship between EMSs and financial performance. This limitation should be taken into account when interpreting our findings. However, self-reported data are not inherently flawed and CMV concerns may be overstated, especially given the complex nature of the interaction effects in our study. Despite the results of statistical remedies which suggest that CMV issues are not sufficiently serious, future research could use multiple data sources to enhance the reliability of our findings. For example, future studies may combine subjective and objective measures of financial performance.

Second, our study examines the joint moderating effects of SC and CI. However, other factors, such as environmental uncertainty and learning orientation may also affect the relationship between EMSs and financial performance. Future research therefore could examine whether and how interactions of other environmental and organizational factors influence the impact of EMSs on financial performance. A configurational approach should also be followed to gain more insightful findings. Additionally, future researchers could investigate whether the moderating effects of SC and CI depend on any additional factors, such as the stage of a firm's industry lifecycle to enrich the research implications.

Third, we only focused on financial performance in this study. In addition to financial performance, investigating the impact of EMSs on other forms of firm performance (e.g., operational performance and social performance) may provide more insightful findings. Future studies could consider the influence of EMSs on other forms of firm performance to enrich and extend the literature on environment management.

Finally, the underlying mechanisms through which EMSs influence financial performance (i.e., the possible mediator) are still not well addressed. To the best of our knowledge, little research has empirically investigated this important issue. Future research may provide useful insights into management practices by exploring why and how other factors, such as customer satisfaction may serve as the pathways that mediate the link between EMSs and financial performance.

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Appendix A. List of measurement items

Environmental management systems

EMS1: The business plan includes an extensive, detailed section that describes our objectives for environmental management
EMS2: New environmental issues are continually identified and evaluated for their long-term impact

EMS3: We have a responsibility to make environmental demands on our suppliers (e.g., recycle content of packaging, solvent emissions, etc.)
EMS4: We provide our suppliers with detailed, written environmental requirements[1]
EMS5: Environmental lifecycle assessment has been used to redesign our product or manufacturing process
EMS6: Formal plans and procedures are in place to identify and respond to potential environmental accidents[1]
EMS7: A formal, detailed system is used to consider environmental issues at the beginning of every manufacturing process change

Switching cost

Customers have to pay a high cost …

SC1: For searching and evaluating information of alternative product providers before changing product provider
SC2: To learn new product after changing product provider
SC3: To build new relationships after changing product provider
SC4: For the benefits lost by changing product provider

Competitive intensity

CI1: Competition in our industry is cutthroat
CI2: There are many "promotion wars" in our industry
CI3: Any action that a company takes, others can make a response swiftly
CI4: Price competition is a hallmark of our industry[1]
CI5: One hears of a new competitive move almost every day
CI6: Our competitors are relatively strong[1]

Financial performance

FP1: Return on investment
FP2: Return on assets[1]
FP3: Return on sales
FP4: Net profit margin
FP5: Growth in sales
FP6: Growth in profit
FP7: Growth in market share[1]

Market turbulence

MT1: The volumes of demand are difficult to predict
MT2: Customer demand fluctuates drastically from week to week
MT3: Sales forecasts are likely to be inaccurate
MT4: Market trends are difficult to monitor

Firm innovativeness

FI1: Improvement and innovation are pervasive in our supply chain management
FI2: New ways and techniques are often used in our supply chain management
FI3: We are creative in the methods of operation in the supply chain
FI4: We frequently introduce new products or services[1]
FI5: We often improve the supply chain management process

[1] Items are deleted after reliability or validity analysis.

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