

# 1 **An investigation of the drivers, barriers and incentives for** 2 **environmental management systems in the Malaysian food and beverage** 3 **industry**

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## 13 **Abstract**

14 Food production and consumption is one of the major causes of global environmental  
15 degradation. One way to address environmental impacts in the food and beverage (F&B)  
16 sector is via the adoption of environmental management systems (EMS). To date, EMS  
17 research has focused predominantly on countries and sectors based in the Global North  
18 despite growing recognition of the global extent of environmental impacts from food  
19 production and consumption. In order to widen our knowledge of this topic in an under-  
20 researched emerging economy, this study examined factors determining EMS adoption  
21 within the Malaysian F&B industry. Drawn from a survey of 42 companies this research  
22 investigated the drivers, barriers, and incentives to the adoption of the internationally  
23 recognized standard, ISO 14001. Discrepancies between the perceptions of small and  
24 medium sized enterprises and large companies' as well as different product market groups  
25 were observed. It was found that large companies tend to have better understanding of the  
26 EMS concept and the enhancement of company image and improvement of environmental  
27 performance were the main drivers to implement EMS. High implementation costs and the  
28 lack of knowledge on the ISO14001 standard were identified as the primary barriers to EMS  
29 adoption. Tax relief for certified companies, as well as training and capacity building were  
30 considered as the most important incentives. Strategies were proposed to improve the

31 environmental performance of Malaysian F&B companies which can strengthen the  
32 competitiveness of Malaysian F&B products in the global food market.

33 **Keywords:** Environmental management system, ISO 14001, sustainable consumption and  
34 production, food and beverage, Malaysia

## 35 **1 Introduction**

36 Food production and consumption is one of the major causes of global environmental  
37 degradation (Garnett, 2008). Impacts include irreversible land use change for crop  
38 cultivation, air, land and water pollution from food processing, and escalating greenhouse gas  
39 (GHG) emissions from within the food supply chain and the decomposition of organic waste.  
40 (Papargyropoulou et al., 2014). Consumers of food are increasingly demanding more varied  
41 and seasonal food products, which in turn have increased the complexity of global food  
42 supply chains (Padfield et al., 2012). Despite the growing interest in food waste minimisation  
43 initiatives, it is common practice for edible food waste to be disposed of to landfill  
44 (Papargyropoulou et al., 2016). The anaerobic digestion of food waste in landfill produces  
45 methane that is twenty-one times more potent than carbon dioxide. Considering the  
46 exponential growth of the human population, it is expected that GHG emissions from food  
47 production and consumption will continue to increase (Searchinger et al, 2013).

48 The concept of sustainable consumption and production (SCP) aims to reduce society's  
49 ecological footprint whilst maintaining economic prosperity (Bentley, 2008). The concept  
50 rests on the ideals of cleaner production, waste and pollution prevention, eco-efficiency, and  
51 green productivity. Sustainable consumption promotes an efficient allocation of resources in  
52 the entire supply chain. SCP embraces life-cycle perspectives in order to improve  
53 organizational environmental performance throughout the value chain (UNEP, 2012).  
54 Environmental management systems (EMS) are one way to achieve SCP as it provides an  
55 organization with a framework to mitigate impacts to ecological footprints. The framework is  
56 based on a continuous improvement cycle incorporating the 'plan-do-check-act principle' to  
57 improve environmental performance. The standard specifies requirements to ensure that an  
58 organization meets their environmental objectives through a consistent control of operations  
59 (Massoud et al., 2010).

60 The most well-known standard for EMS is the International Organization  
61 Standardization (ISO) 14001 (Jones et al., 2012). The standard was developed by ISO in  
62 1996 and mandates the adopter to establish environmental policy, planning, implementation,

63 checking and corrective actions, as well as management review (Nishitani, 2010). The  
64 benefits of adopting ISO 14001 certification include improvements to both organizational and  
65 environmental performance. The standard has become more prevalent in the trade of  
66 international F&B products, especially as a means to gain access to environmentally  
67 conscious market such as Europe, Japan, and United States (Nishitani, 2010). Studies have  
68 highlighted the positive effect of ISO 14001 standard on the export performance (Bellesi et  
69 al., 2005). The importance of the EMS standard is mainly in response to customer  
70 requirement for green products (Turk, 2009). EMS allows companies to create a  
71 differentiation of products in the marketplace and to ensure third-party guarantees over a  
72 company's environmental performance (Nishitani, 2010).

73 Less positively, it has been reported that an EMS standard has the potential to  
74 marginalise companies (Neumayer and Perkins, 2004) leading to a clear divide between those  
75 companies that can meet the environmental certification requirements of specific sectors and  
76 countries and those that cannot. This is reflected in the uneven global adoption of the ISO  
77 14001 standard which has seen an exponential rise in certifications in the Global North (e.g.  
78 Europe [37.5 %]) and comparatively fewer adoptions in the Global South (e.g. Southeast Asia  
79 [3.5 %], Africa [0.9 %], Middle East [1.4 %], Central and South America [3.1 %]) (ISO,  
80 2016). The exception is China which tops the global list of countries with companies  
81 achieving the ISO14001 standard (ISO, 2016).

82 Similarly, the majority of past EMS studies focus on countries in the Global North, such  
83 as those in Europe and United States (Salim et al, 2017). Few contributions have been made  
84 to offer holistic perspectives on the identification of drivers, barriers, and the potential  
85 pathways to overcome the barriers (Boiral et al., 2017). Researchers have tended to exclude  
86 small and medium enterprises (SMEs) from their analysis of case studies in developing  
87 countries. Tackling SMEs is particularly problematic considering the sheer number of  
88 companies and the difficulties in coordinating activities for such businesses that typically  
89 operate on relatively slim profit margins (Lewis et al., 2015). Few studies have examined the  
90 impacts of supply chain exclusivity of EMS standards (Neumayer and Perkins, 2004).

91 In order to widen our knowledge of this topic in an under-researched country in the  
92 Global South, this study examined factors determining EMS adoption within the Malaysian  
93 F&B industry. It is reported that food and beverage (F&B) products shares approximately 10  
94 % of the country's manufacturing output (AHK Malaysia, 2012) making it a salient case  
95 study for investigation. Food waste in Malaysia remains a major challenge, where food waste  
96 makes up the largest proportion (45 %) of the total solid waste generation (NSWMD, 2013).

97 As in the case with many countries in the Global South, a significant amount of food waste is  
98 generated on both the production and consumption side (Papargyropoulou et al., 2014). In  
99 Malaysia, the situation is likely to change following the Prime Minister's ambitious  
100 commitment to reduce the country's environmental footprint at the 2009 Climate Summit in  
101 Copenhagen (Manzo and Padfield, 2016). Despite Malaysia's status as one of the largest  
102 GHG emitters in Southeast Asia, few companies in the F&B sector have implemented the  
103 EMS standard, where it accounts for only 6 % of the total ISO 14001 adoptions in Malaysia  
104 (ISO, 2016). Identifying the drivers, barriers, and appropriate incentives is an important step  
105 in formulating a systematic plan for the adoption of EMS in the Malaysian F&B sector,  
106 which in turn can support improved competitiveness and inclusivity of Malaysian F&B  
107 products in global food markets.

## 108 **2 Research Methodology**

### 109 **2.1 Data collection**

110 The flow of research methods applied in this study is presented in Fig. 1. Three  
111 approaches to data collection were applied: i) a desk based study; ii) direct site visits and; iii)  
112 a questionnaire survey.

113 (Insert Figure 1 Here).

114 The desk based study was employed to review previous research, investigate current  
115 Malaysian environmental policy and practices, and to research the context of the Malaysian  
116 F&B sector. Government reports are widely available through the corresponding  
117 governmental departments such as Ministry of Natural Resources and Environment, SME  
118 Corporation Malaysia, and Department of Statistics Malaysia (DOSM). A desk based study  
119 was also performed to analyse European import data from Malaysia from European  
120 Commission (2017), the EMS adoption trend from ISO (2016), and the overall export of  
121 Malaysia from DOSM (2017). Due to the unavailability of sector-specific trends of the  
122 standard, the depicted figures cover all industry sectors certification density. Europe was  
123 chosen in this study because it has pioneered a range of sustainability policy initiatives,  
124 including policies for food products (European Commission, 2008). This data is used to  
125 observe the negative influence of the increasing importance of EMS standard on Malaysian  
126 imports to Europe.

127 A bilingual (English and Chinese) questionnaire was designed which covered three areas  
128 of enquiry: drivers, barriers and incentives to implement EMS. The respondents were asked

129 to identify the three most important drivers, barriers and incentives. The general company  
130 information (e.g. firm size, commodity type, product markets, and type of certifications) and  
131 the perception towards EMS were also drawn from the respondents (e.g. environmental  
132 awareness, future adoption of EMS standards, and knowledge on ISO 14001).

133 The companies selected for the case study were chosen based on two factors: the  
134 company should be a Malaysian F&B company and its product(s) manufactured within  
135 Malaysia. Once the companies had been identified, the questionnaire was undertaken via one  
136 of the following methods: an electronic survey, telephone survey, an on-site visit and survey,  
137 or during an industry product conference. The owner, managers, or the decision makers of the  
138 companies were targeted for questioning since it was assumed individuals in positions of  
139 authority would be best placed to respond to questions (Lewis et al., 2015). The on-site visits  
140 and surveys were particularly useful as they allowed for face-to-face interviews and the  
141 opportunity to observe the place of work. Questionnaires sent via e-mail were generally less  
142 effective in terms of response rate (Studer et al., 2006) but useful to reach companies in  
143 remote locations.

## 144 **2.2 Sample and company description**

145 Following a successful pilot study performed by undertaking site visits and survey  
146 questionnaire, a total of 42 F&B companies successfully completed the questionnaire. The  
147 sample size is consistent with previous studies in developing countries i.e. Brazil (Campos,  
148 2012), Lebanon (Massoud et al., 2010), and Malaysia (Tan, 2005) where the sample size  
149 ranged from between 18 and 45 companies. Table 1 describes the firm size and product  
150 markets of the surveyed companies. It was found that 34 companies (81 %) were identified as  
151 SMEs, whilst 8 others (19 %) were large companies. In terms of product markets, most F&B  
152 companies focus on local market (43 %), whereas exporting companies to regional (Asia) and  
153 international markets share an equal distribution (28 %). The majority of the surveyed  
154 companies were located in the F&B manufacturing states of Malaysia: Selangor (43 %) and  
155 Kuala Lumpur (26 %) and followed by Johor (12 %), Sarawak (7 %), Pulau Pinang (5 %),  
156 and other states (7 %).

157 (Insert Table 1 Here)

158 In terms of sub-sector, beverage and alcohol (29 %) and confectionaries (26 %) companies  
159 comprised of the largest proportion. This was followed by sauces (14 %), salts,  
160 herbs and spices (10 %). The least studied sector is oil & fats and vegetable products with an  
161 equal number (2 %). This distribution is relatively consistent with the overall F&B company

162 profile in Malaysia where it comprises a large number of beverage processing, fish and meat  
163 products, confectionaries, and vegetable products (MIDA, 2013).

164 In terms of business certifications, 67 % of the companies surveyed had Halal  
165 certification. The number is followed by the Hazard Analysis and Critical Control Points  
166 (HACCP) (57 %) and an equal number of ISO 9001 and ISO 22001 certifications (29 %).  
167 Only two companies (4 %) had obtained ISO 14001 that is likely to reflect the low levels of  
168 environmental certification within the Malaysia F&B industry as a whole. As discussed  
169 below the ISO14001 standard has not gained importance for local market entry at present.  
170 Figure 2 depicts the number of certifications as categorised by F&B sub-sector.

171 (Insert Figure 2 Here)

### 172 **2.3 Data management and analysis**

173 The data collected from the survey process were numerically coded using the SPSS  
174 Statistical Software. Drivers, barriers, and incentives were coded as binary data (i.e. either a  
175 ‘yes’ or ‘no’ response), whereas attitude, perceptions towards EMS, and company  
176 characteristics were coded as categorical data (Massoud et al., 2010). The first approach  
177 involves descriptive statistics of the firm-level characteristics (firm size, products market, and  
178 certifications). The second part presents the distribution of the perceived drivers, barriers, and  
179 incentives. The descriptive result of the temporal distribution of European imports from  
180 Malaysia and ISO 14001 certifications trend was presented to examine the supply chain  
181 exclusivity.

182 The difference between company size<sup>1</sup> and product markets was analysed using the two-  
183 way MANOVA (Prajogo and McDermott, 2014). The dependent variables used in the study  
184 include the environmental initiatives as well as the drivers, barriers, and incentives. The *F*-  
185 Value and *P*-Value of Wilks’ Lambda indicator in the ‘Tests of Between-Subjects Effects’  
186 was used to determine the statistical significance of the correlation. Wilks’ Lambda is the  
187 most widely used indicator in quantitative research (Todorov and Filzmoser, 2010). The limit  
188 for statistical significance to assess the correlation is  $P < 0.1$ . The ‘Estimated Marginal  
189 Means’ was used to identify the mean discrepancy between each independent variables group  
190 (e.g. differences between SMEs and large companies).

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<sup>1</sup> SME Corporation Malaysia (2015) defines small and medium enterprises within manufacturing sector as an establishment which has a sales turnover no more than RM 50 million or full-time employees not exceeding 200 workers.

## 191 3 Analysis and Findings

### 192 3.1 Environmental initiatives

193 The survey revealed that most F&B companies (98 %) recognized the importance of  
194 mitigating on-site environmental impacts (e.g. effluent discharge, air pollution, waste  
195 disposal) which implies that they have a high environmental awareness. However, only 7  
196 companies (17 %) had a good level of understanding of the EMS concept. Approximately 17  
197 % of the companies had limited knowledge of EMS whilst 14 companies (33 %) were  
198 completely unfamiliar with the concept. The two-way MANOVA result suggests that large  
199 companies tend to display a greater understanding on the concept ( $P < 0.05$ ). In terms of their  
200 intention to adopt EMS, only 55 % of the companies were interested to adopt the ISO 14001  
201 certification and 14 % were unsure whether they would adopt the standard in the future.

### 202 3.2 Drivers, barriers and incentives

203 Figure 3 depicts the perceived drivers for EMS adoptions. This study found that the key  
204 drivers were to enhance company image (62 %) and to improve environmental performance  
205 (60 %). Other drivers such as following international industry trends (38 %), reduce  
206 operational costs (36 %), and meeting customers demand (33 %) were reported as relatively  
207 important factors. The enhancement of company image and reduction of operational costs  
208 were salient drivers for large companies ( $P < 0.1$ ), whereas use as a marketing tool was  
209 highly regarded by SMEs ( $P < 0.1$ ). Product markets was also reported as a significant  
210 determinant for operational cost saving driver, where companies targeting local and regional  
211 markets regarded it as an important driver ( $P < 0.01$ ). Use as a marketing tool (26 %),  
212 overcome export barrier (19 %), and meeting company requirements (14 %) were the least  
213 important barriers.

214 (Insert Figure 3 Here)

215 Figure 4 reports Malaysian F&B companies' barriers to implement EMS standards. High  
216 certification costs (57 %), lack of in-house knowledge (50 %), and the lack of government  
217 support and incentives (48 %) were perceived as the most salient barriers for Malaysian F&B  
218 companies to implement EMS. Other factors such as not a legal requirement (31 %), unclear  
219 benefits (31 %), and no customers demand (29 %) were perceived as relatively significant  
220 barriers which hinder EMS adoption. Product markets were found to be a predictor of the  
221 non-existence of legal requirements to adopt EMS standard ( $P < 0.05$ ). The least recognized  
222 barriers were time demand (19 %), not required for export (14 %), and not a CEO priority (12  
223 %).

224 (Insert Figure 4 Here)

225 This study revealed that the most important incentive is tax relief (64 %). This is  
226 consistent with research by Studer et al. (2008) who found that stakeholders perceived  
227 financial incentives to be more effective to reduce the barriers to implement EMS. Malaysian  
228 F&B companies recognized the importance to develop their knowledge and capability before  
229 the implementation of EMS, where training and capacity building (62 %), and enhanced  
230 knowledge on ISO 14001 standards (52 %) were regarded as important incentives. The  
231 measures with the least incentives were the provision of soft loans (26 %), public-private  
232 partnership (27 %), and the establishment of a national institute (10 %). Figure 5 depicts the  
233 most important incentives to increase the adoption of EMS among Malaysian F&B  
234 companies.

235 (Insert Figure 5 Here)

#### 236 **4 Discussion**

237 The majority of the companies surveyed in this research recognize the importance of  
238 EMS to reduce their environmental impacts and the potential benefits to their corporate  
239 image. Companies recognized less the financial savings of EMS since only 13 % perceived  
240 there to be potential in reducing operational costs. This implies a lack of knowledge in terms  
241 of the cost saving potential of EMS but also the lack of demand in efforts to save costs in  
242 terms of raw materials, water and waste reduction (McKeiver and Gadenne, 2005). This  
243 finding is perhaps unsurprising considering the highly subsidised economy of Malaysia that  
244 acts as a disincentive to companies in reducing wastage and improving production efficiency  
245 (Papargyropoulou et al., 2012). This position may change in time as the cost of living  
246 becomes more expensive and government subsidies are removed on key commodities.

247 The study also found that the motivation to improve corporate environmental  
248 performance is a significant driver to implement the ISO 14001 standard. This finding is  
249 consistent with a study by Fryxell and Szeto (2002) who found that the improvement of  
250 environmental performance was perceived as an important driver. This indicates a strong  
251 internal motivation from Malaysian F&B companies to acquire EMS than the external ones.  
252 Furthermore, consistent with research by Brammer et al. (2012) environmental awareness  
253 was higher amongst larger Malaysian F&B companies as compared with SMEs.

254 Notwithstanding the high environmental awareness displayed, there is a low intention to  
255 adopt the EMS standard. This finding is likely associated with the low engagement and



256 support from industry associations and related government agencies to promote  
257 environmental certifications as a way to reduce cost and gain access to international markets.  
258 According to KPMG (1997) the absence of a competent body and accredited verifiers in  
259 Malaysia and the lack of clarity on the potential benefit of EMS have been the major  
260 challenge for the F&B sector to implement EMS standards. With improved knowledge on the  
261 benefits of EMS, especially in terms of the economic savings, adoption rates are likely to  
262 increase in the future.

263 This study did not confirm a previous study by McKeiver and Gadenne (2009) where  
264 customers demand was reported as a strong driver. This is likely attributed to the weak  
265 environmental awareness among domestic customers and, thus the limited preference towards  
266 green products (Goh and Wahid, 2015). Fostering local public knowledge on environmental  
267 awareness and sustainable consumption patterns is, therefore, an important task in order to  
268 create stronger external pressure towards F&B companies to adopt voluntary EMS standards  
269 (Papargyropoulou et al., 2012).

270 Inconsistent with the findings of a study examining environmental management systems  
271 in the Chinese manufacturing sector (Zeng et al. 2005), overcoming export barriers is  
272 perceived as a weak driver to implement EMS in the Malaysian F&B industry. In the future  
273 this could become an important driver for Malaysian companies, especially if efforts are  
274 made by industry and governmental bodies to develop businesses beyond national and  
275 regional markets (Qi et al., 2011). An indirect way of improving the rate and number of  
276 companies adopting EMS in Malaysia is via international market penetration. International  
277 markets, notably those in Europe, Japan, and North America generally require companies to  
278 meet more stringent food standards, such as high levels of environmental performance  
279 (Nishitani, 2010). It should be noted that increasing the export of F&B products to the  
280 international markets to improve environmental performance does raise questions over the  
281 potential increase in GHG emissions from cross-country transportation (Liu et al., 2016).

282 The high aggregate investment values for certification such as registration fees, auditing  
283 costs, and any other related costs may go beyond the SMEs' financial capability, especially in  
284 the Global South (Staniškis et al., 2012). SMEs, in particular, are profit-oriented and focus on  
285 short-term financial goals (Lewis et al., 2015). The argument is consistent with the finding of  
286 this study where SMEs tend to perceive costs saving as their main driver to implement EMS.  
287 According to an estimate by the Global Environmental and Technology Foundation the cost  
288 for ISO 14001 is between USD 24,000 and USD 128,000 per site (dependent on company  
289 size), with an annual maintenance cost between USD 5,000 to USD 10,000 (Jiang and

290 Bansal, 2003). Such a high cost almost certainly excludes the majority of SMEs from  
291 participating within the scheme.

292 The limited government engagement and training for F&B companies is likely to have  
293 contributed towards the lack of knowledge to manage environmental impacts. This issue also  
294 points toward the unavailability of environmental education and technical assistances  
295 (technological infrastructures, information system, regulatory enforcement, etc.) from  
296 government and industry bodies for environmental management. In Hong Kong (Studer et al.,  
297 2006) and New Zealand (Lewis et al., 2015) research indicates that a lack of knowledge was  
298 a less salient barrier to EMS adoption. Although it was reported that government have a  
299 significant role in shaping corporate environmental responsibility, such as coercive and  
300 normative powers (Delmas and Toffel, 2004), the Malaysian government can play a more  
301 significant role by developing further the current environmental regulatory instruments and  
302 technological infrastructure.

303 The relationship between the barriers and the incentives points towards the need for  
304 improving company and public awareness on the potential benefits from adopting EMS  
305 (Papargyropoulou et al., 2012). Developed countries tend to have well-established  
306 environmental regulations and incentives, notably high stringency of regulatory enforcement,  
307 availability of financial incentives, and wide accessibility of information regarding EMS,  
308 which in turn results in widespread adoption of ISO 14001 standards (Neumayer and Perkins,  
309 2004). For instance, Hong Kong provides both monetary and non-monetary incentives such  
310 as tax deduction, award schemes, eco-labelling, technical guidance, financial assistance, and  
311 affordable consultancy fees (Steger 2000). The Singaporean government also promotes  
312 subsidies for EMS certification and consultancy services costs for up to 70 % through the  
313 Capacity Development Grant as well as providing tax deduction for certified companies,  
314 especially SMEs (Quazi et al., 2001).

#### 315 **4.1 ISO 14001 and supply chain exclusivity**

316 As introduced earlier, the adoption of the ISO 14001 standard has not been globally  
317 homogenous (ISO, 2016). In countries where there is legislation to achieve an EMS standard,  
318 coercive pressures are exerted to their suppliers to adopt a specific environmental standard  
319 (Arimura et al., 2011). This type of policy protects customers against unethical and  
320 unsustainable behaviour of focal companies' upstream partners (Gualandris et al., 2015).

321 Prakash and Potoski (2006) argued that for environmentally conscious markets (e.g.  
322 Europe, Japan, United States) where adoption of ISO 14001 standards is widespread, it

323 commonly consists of domestic customers with a high demand on green products (Bellesi et  
324 al., 2005). From a broader economic perspective, environmentally conscious markets chose  
325 to reduce trade with polluting firms in a way to reduce the imported negative externalities due  
326 to the low goods price and quality (Ludema and Wooton, 1994). The adoption of EMS  
327 standard can be one way for a company in developing countries to increase the visibility of  
328 their environmental responsibilities to discerning foreign customers in order to satisfy their  
329 demand but also to gain entry to a fair competition in a free-market economy (Bellesi et al.,  
330 2005).

331 In order to analyse supply chain exclusivity within the context of the Malaysian F&B  
332 sector, comparative figures between the import ratio from Malaysia to Europe and Japan (Fig.  
333 6 and Fig. 7) as well as the ISO 14001 density in the countries are presented (Fig. 8). It is  
334 apparent from the figures that European food and beverage import from Malaysia have  
335 experienced a steep decline alongside an increase in the number of ISO 14001 certifications  
336 in Europe; whilst the growth rate and the number of ISO 14001 in Malaysia remains poorly  
337 represented. Europe's total import from Malaysia also experienced a downward trend after  
338 2000. Although in terms of Malaysian export value there is an upward trend, the ratio of  
339 export<sup>2</sup> over GDP has declined in the past decade which implies that the role of overall  
340 export in Malaysia is decreasing (Fig. 8).

341 (Insert Figure 6 Here)

342 (Insert Figure 7 Here)

343 (Insert Figure 8 Here)

344 The exclusion of Malaysian F&B products from the European market could continue if  
345 the global demand towards green products increases. This issue creates a divide between  
346 multinational companies who can afford to certify with ISO 14001 standards and SMEs who  
347 do not have the capacity to do so. This study found that the two multinational companies  
348 studied are certified with ISO 14001 standards and export their goods to environmentally  
349 conscious markets. On the contrary, uncertified F&B SMEs can only gain entry to local and  
350 Asian markets because of their inability to obtain the necessary instrument to overcome  
351 environmental trade barriers.

352 It is argued that if Malaysia continues along the same trend, economic losses may occur  
353 in either the context of market losses or the natural capital depletion which is fuelled by  
354 unsustainable consumption and climate change. Moving Malaysia towards a widespread

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<sup>2</sup> Following a study by Nishitani (2010), the export ratio is calculated as the value of export (in million MYR) divided by the Malaysian GDP.

355 adoption of EMS standards not only prevents internal environmental and economic damages  
356 but also helps boost the economy by attracting countries seeking investments tied to  
357 environmental performance (OECD 2014).

#### 358 **4.2 Future steps for EMS adoption in Malaysia**

359 The findings from this study suggest there is an important role to play for government,  
360 F&B industry bodies, and educational institutions in promoting the adoption of EMS to the  
361 industry and public as a whole. A strategy to promote EMS adoption could take the form of  
362 mandatory EMS requirements through legislation (Nikolaou et al., 2012) and to encourage  
363 voluntary adoption supported by capacity building exercises via financial as well as technical  
364 incentives (Zeng et al., 2005). This initiative could support improved inclusivity of Malaysian  
365 F&B products in the global food market (Neumayer and Perkins, 2004).

366 Likewise, balancing incentives with financial disincentives could also encourage the  
367 adoption of EMS (Majumdar and Marcus, 2001). For example, the removal of subsidies  
368 (Papargyropoulou et al., 2012) and carbon pricing (Fan et al., 2014) will enable government  
369 agencies to allocate more finance towards environmental causes. Finance could also be  
370 directed to natural resource conservation, recycling activities, and a shift into renewable  
371 energy among Malaysian F&B companies.

372 Developing a national standard on EMS also offers an affordable alternative to the  
373 expensive and extensive documentation required for the ISO 14001 standard, especially for  
374 SMEs. The development should be in accordance with the framework of ISO 14001  
375 standards for its global recognition, e.g. Eco-Management and Audit Scheme (EMAS) in  
376 Europe and Eco-Action 21 (2017) in Japan. The establishment of a Malaysian national EMS  
377 standard is important owing to the fact that 80 % of F&B companies in the country are SMEs  
378 which commonly have poor financial capacity to adopt international standards.

379 Establishing a national strategy is also an approach to facilitate a transition towards SCP.  
380 To date, the Malaysian government has established twenty-two SCP policies and these are  
381 embedded within the 10th Malaysia Plan, Government Transformation Programme, and  
382 Economic Transformation Programme (Adham et al., 2013). However, implementation is  
383 obstructed by weak regulatory enforcement, out-dated policy instruments, and limited  
384 allocation of financial resources. Enhancing the current regulations, more stringent  
385 enforcement and the development of F&B industry related strategies will help to increase the  
386 priority of the environment for both companies and customers. In a recent study of GHG  
387 trends within the Malaysian F&B industry, a sector-specific strategy (in this case sustainable

388 food systems strategy) was recommended for a more integrated and sustainable F&B sector  
389 (Padfield et al., 2012).

390 There is also a clear need to advance the public's environmental awareness in order to  
391 create a demand-driven EMS adoption within the Malaysian F&B industry (Massoud et al.,  
392 2010). Educating citizens will drive change to the cultural value, attitudes, and behaviours of  
393 customers (Lee et al., 2016); thereby enabling sustainable consumption which will exert more  
394 localised demand for green products (Adham et al., 2013).

## 395 **5 Conclusion**

396 This paper investigated the drivers, barriers, and incentives for Malaysian F&B  
397 companies to implement the ISO 14001 standard. Drawn from a sample of companies based  
398 predominantly in the manufacturing states of the country, the study found that despite the  
399 levels of environmental awareness shown by Malaysian F&B companies, only a small  
400 number of the sample have adopted the ISO 14001 standard or are likely to in the future. The  
401 decision to adopt ISO 14001 was primarily driven by the motivation to enhance company  
402 image and reputation, as well as to improve environmental performance, particularly by large  
403 companies. The primary barriers to EMS adoption are the high certification costs, the lack of  
404 in-house knowledge and the lack of government support and incentives. Considering many  
405 F&B companies are SMEs operating on narrow profit margins, the ISO 14001 standard is  
406 perceived as a disincentive to their organizational performance. The finding suggests that  
407 only large and multinational companies will take the necessary action to adopt ISO 14001  
408 since these organisations are more likely to meet the requirements expected of international  
409 markets.

410 There has been a declining share of European imports from Malaysian F&B companies  
411 in parallel to an increase in European ISO 14001 certifications. It is argued that adopting  
412 EMS standard offers a solution to promote environmental improvement, whilst exposing  
413 Malaysian F&B industries beyond national and regional markets. Such an approach will help  
414 address boost the entry of Malaysian F&B companies into international markets, which in  
415 turn can support dual economic and environmental objectives. Strategies to increase the  
416 adoption of EMS within the F&B sector include mandatory regulations, devising national  
417 strategies and a Malaysian internationally recognized EMS standard.

418 This study primarily focused on F&B company perceptions. Future research can build on  
419 these findings by examining the perceptions and expectations amongst a wide range of local,

420 national and international stakeholders, notably industry representative organisations,  
421 governmental agencies, non-governmental organizations, food purchasers and retailers (i.e.  
422 catering companies and supermarket chains in different countries) and international standards  
423 setting organizations (i.e. ISO). In addition to widening the sample size for future studies,  
424 theoretical perspectives can be examined, such as contingency perspectives and stakeholder  
425 theory. Further research may also include cross-country investigations to capture the spatial  
426 and cultural effect on the drivers, barriers, and incentives to EMS adoption.

#### 427 **Conflict of Interest**

428 The authors declare that they have no conflict of interest.

#### 429 **Acknowledgement**

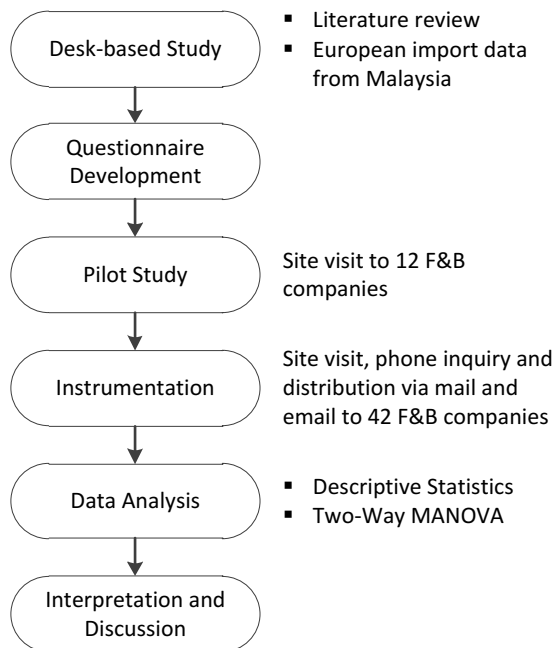
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438 **Tables**

439 **Table 1** Distribution of firm size, product markets, and location

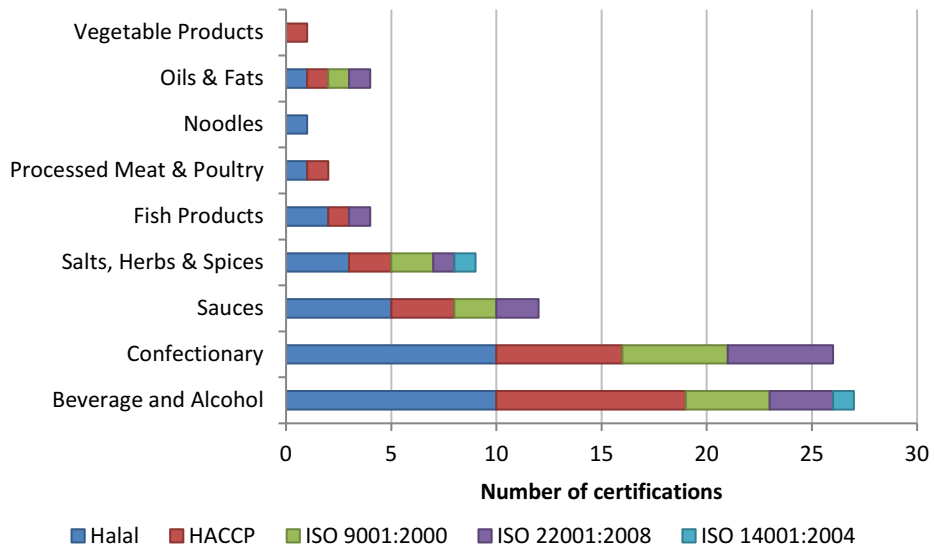
Item	Count	Percentage
<b>Firm size</b>		
SME	34	81
Large company	8	19
<b>Product markets</b>		
Local market	18	43
Regional market	12	28
International market	12	28
<b>States</b>		
Selangor	18	43
Kuala Lumpur	11	26
Johor	5	12
Sarawak	3	7
Pulau Pinang	2	5
Others	3	7

440 **Figures**



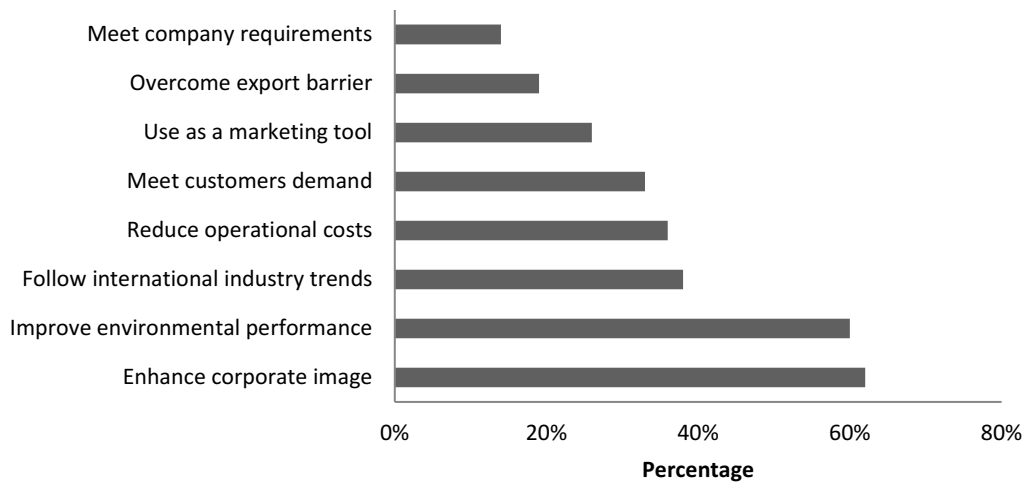
441

442 **Fig. 1** Methodology flow



443

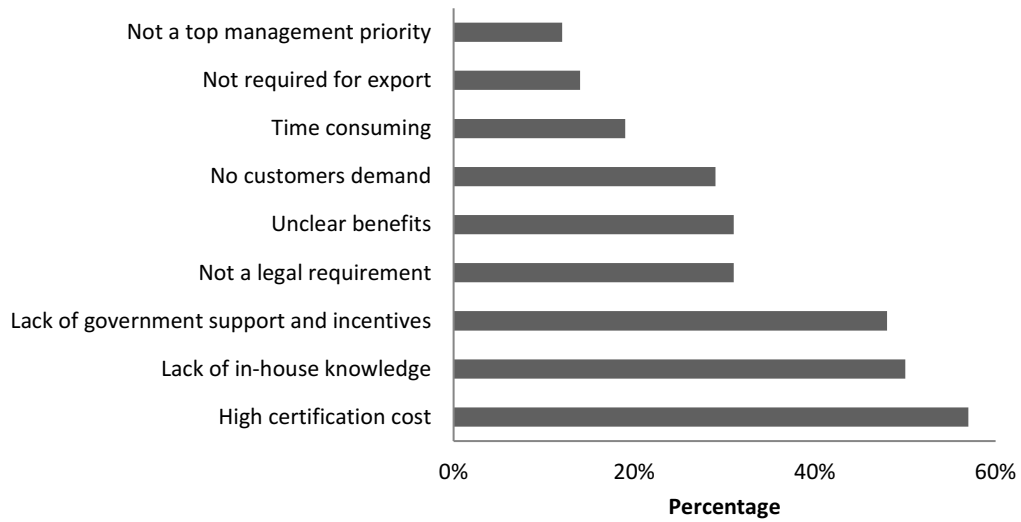
444 **Fig. 2** Number of certifications categorised by food and beverage sub-sector



445

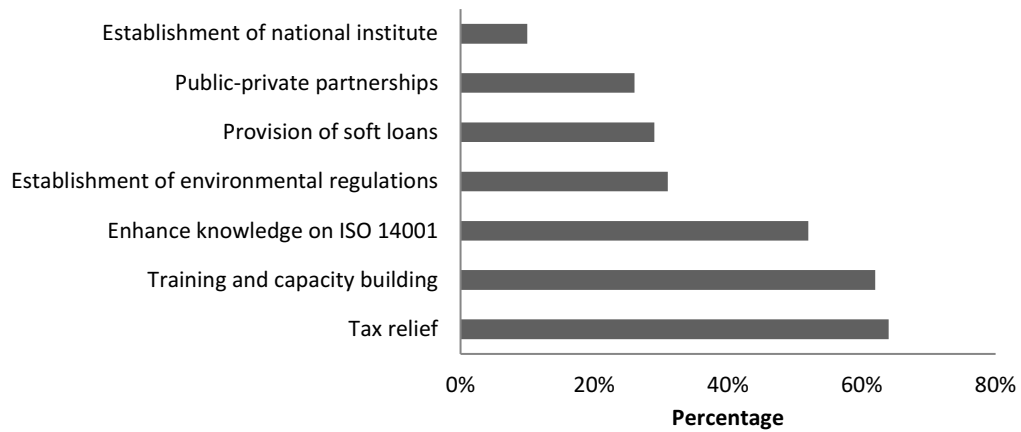
446 **Fig. 3** Perceived drivers to implement EMS





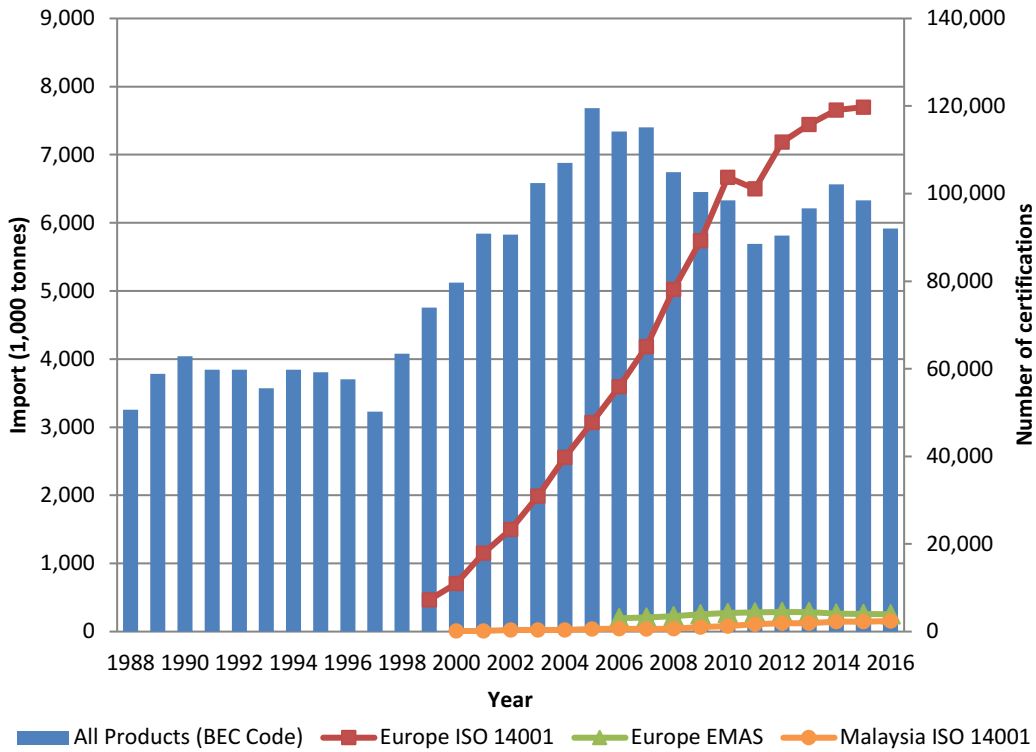
447

448 **Fig. 4** Perceived barriers to implement EMS



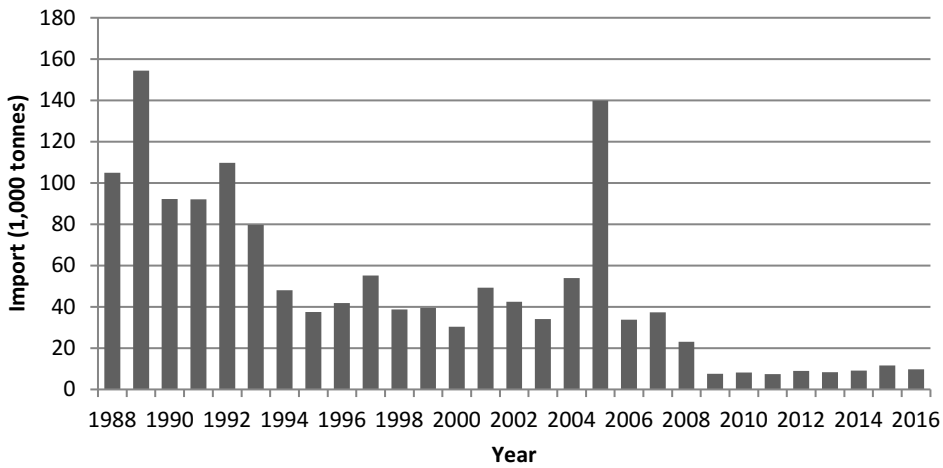
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450 **Fig. 5** Expected incentives to implement EMS



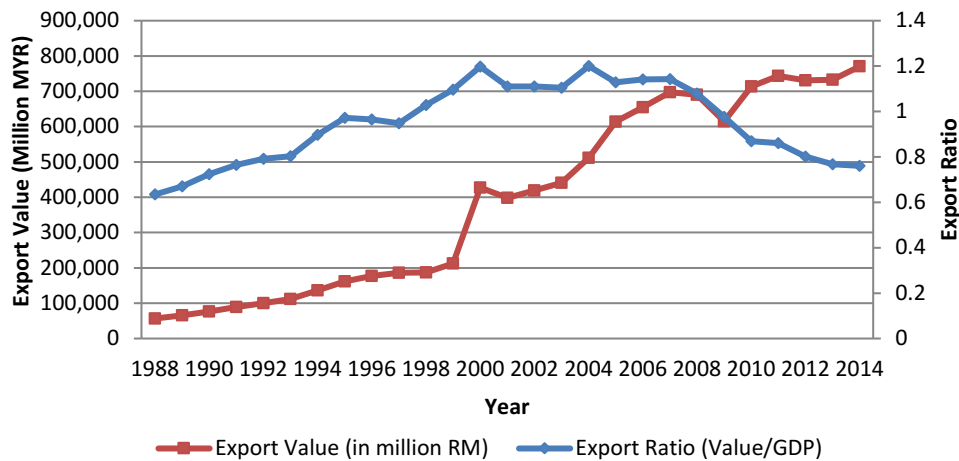
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**Fig. 6** Europe import from Malaysia (all products) and the number of EMS scheme adoptions in Europe and Malaysia (European Commission 2017; ISO 2016)



455  
456

**Fig. 7** Europe food and beverage import from Malaysia (European Commission 2017)



457

458 **Fig. 8** Malaysia export value and ratio to all countries (DOSM, 2017)

459 **References**

460 Adham KN, Merle K, Weihs G (2013) Sustainable consumption and production in Malaysia:  
 461 a baseline study of government policies, institutions and practices. Economic  
 462 Planning Unit, Prime Minister's Department, Putrajaya

463 AHK Malaysia (2012) Market watch 2012: the Malaysian food industry. Malaysia-German  
 464 Chamber of Commerce and Industry. [www.malaysia.ahk.de/en/services/market-](http://www.malaysia.ahk.de/en/services/market-entry/market-information/food-sector/)  
 465 [entry/market-information/food-sector/](http://www.malaysia.ahk.de/en/services/market-entry/market-information/food-sector/). Accessed 3 January 2017

466 Arimura TH, Darnall N, Katayama H (2011) Is ISO 14001 a gateway to more advanced  
 467 voluntary action? The case of green supply chain management. *J Environ Econ*  
 468 *Manage* 61:170-182. doi:10.1016/j.jeem.2010.11.003

469 Bellesi F, Lehrer D, Tal A (2005) Comparative advantage: the impact of ISO 14001  
 470 environmental certification on exports. *Environ Sci Technol* 39:1943-1953.  
 471 doi:10.1021/es0497983

472 Bentley M (2008) Planning for change: guidelines for national programmes on sustainable  
 473 consumption and production. United Nations Environment Programme, Paris

474 Boiral O, Guillaumie L, Heras-Saizarbitoria I, Tene CVT (2017) Adoption and outcomes of  
 475 ISO 14001: a systematic review. *Int J Manag Rev*. doi: 10.1111/ijmr.12139

- 476 Brammer S, Hojmosse S, Marchant K (2012) Environmental management in SMEs in the  
477 UK: practices, pressures and perceived benefits. *Bus Strat Env* 21:423-434.  
478 doi:10.1002/bse.717
- 479 Campos LM (2012) Environmental management systems (EMS) for small companies: a  
480 study in Southern Brazil. *J Clean Prod* 32:141-148. doi:10.1016/j.jclepro.2012.03.029
- 481 Delmas M, Toffel M (2004) Stakeholders and environmental management practices: an  
482 institutional framework. *Bus Strat Env* 21:423-434. doi:10.1002/bse.717
- 483 Eco-Action 21 (2017) What is Eco Action 21? Institute for Promoting Sustainable Societies.  
484 www.ea21.jp/ea21/index.html. Accessed 9 June 2017
- 485 DOSM (2017) External trade . Department of Statistics Malaysia. www.dosm.gov.my.  
486 Accessed 10 June 2017
- 487 European Commission (2008) Communication from the Commission to the European  
488 Parliament, The Council, The European economic and social committee and the  
489 committee of the regions on the sustainable consumption and production and  
490 sustainable industrial policy action plan. eur-lex.europa.eu/legal-content/. Accessed  
491 13 February 2017
- 492 European Commission (2017) Eurostat. epp.eurostat.ec.europa.eu/newxtweb/. Accessed 10  
493 June 2017
- 494 Fan J, Zhao D, Wu Y, Wei J (2014) Carbon pricing and electricity market reforms in China.  
495 *Clean Techn Environ* 16:921-933. doi:10.1007/s10098-013-0691-6
- 496 Fryxell GE, Szeto A (2002) The influence of motivations for seeking ISO 14001 certification:  
497 an empirical study of ISO 14001 certified facilities in Hong Kong. *J Environ Manage*  
498 65:223-238. doi:10.1006/jema.2001.0538
- 499 Garnett T (2008) Cooking up a storm: food, greenhouse gas emissions and our changing  
500 climate. Food Climate Research Network, Guildford
- 501 Goh YN, Wahid NA (2015) A review on green purchase behaviour trend of Malaysian  
502 consumers. *Asian Soc Sci* 11:103-110. doi:10.5539/ass.v11n2p103

503 Gualandris J, Klassen RD, Vachon S, Kalchschmidt M (2015) Sustainable evaluation and  
504 verification in supply chains: aligning and leveraging accountability to stakeholders. *J*  
505 *Oper Manag* 38:1-13. doi:10.1016/j.jom.2015.06.002

506 ISO (2016) ISO survey 2015. International Organization for Standardization.  
507 www.iso.org/iso/iso-survey. Accessed 2 January 2017

508 Jiang RJ, Bansal P (2003) Seeing the need for ISO 14001. *J Manage Stud* 40:1047-1067.  
509 doi:10.1111/1467-6486.00370

510 Jones N, Panoriou E, Thiveou K, Roumeliotis S, Allan S, Clark JRA, Evangelinos KI (2012)  
511 Investigating benefits from the implementation of environmental management  
512 systems in a Greek university. *Clean Techn Environ* 14:669-676. doi:10.1007/s10098-  
513 011-0431-8

514 KPMG Environmental Consulting (1997) The environmental challenge and small and  
515 medium-sized enterprises in Europe. KPMG Environmental Consulting, The Hague

516 Lee CT, Klemeš JJ, Hashim H, Ho CS (2016) Mobilising the potential towards low-carbon  
517 emissions society in Asia. *Clean Techn Environ* 18:2337-2345. doi:10.1007/s10098-  
518 016-1288-7

519 Lewis KV, Cassells S, Roxas H (2015) SMEs and the potential for a collaborative path to  
520 environmental responsibility. *Bus Strat Env* 24:750-764. doi:10.1002/bse.1843

521 Liu X, Klemeš JJ, Varbanov PS, Čuček L, Qian Y (2016) Virtual carbon and water flows  
522 embodied in international trade: a review on consumption-based analysis. *J Clean*  
523 *Prod* 146:20-28. doi:10.1016/j.jclepro.2016.03.129

524 Ludema RD, Wooton I (1994) Cross-border externalities and trade liberalization: the strategic  
525 control of pollution. *Can J Econ* 27:950-966. doi:10.2307/136193

526 Majumdar SK, Marcus AA (2001) Rules versus discretion: the productivity consequences of  
527 flexible regulation. *Acad Manag J* 44:170-179. doi:10.2307/3069344

528 Manzo K, Padfield R (2016) Palm oil not polar bears: climate change and development in  
529 Malaysian media. *T I Brith Geogr* 41:460-476. doi:10.1111/tran.12129

- 530 Massoud MA, Fayad R, El-Fadel M, Kamleh R (2010) Drivers, barriers and incentives to  
531 implementing environmental management systems in the food industry: a case of  
532 Lebanon. *J Clean Prod* 18:200-209. doi:10.1016/j.jclepro.2009.09.022
- 533 McKeiver C, Gadenne D (2005) Environmental management systems in small and medium  
534 businesses. *Int Small Bus J* 23:513-537. doi:10.1177/0266242605055910
- 535 Mezher T, Zreik C (2000) Current environmental management practices in the Lebanese  
536 manufacturing sector. *Corp Soc Resp Env Ma* 7:131-142. doi: 10.1002/1099-  
537 0925(200009)7:3<131::AID-EMA134>3.0.CO;2-C
- 538 MIDA (2013) Food industry in Malaysia. Malaysian Investment Development Authority.  
539 [www.mida.gov.my/home/food-technology-and-sustainable-resources/posts/](http://www.mida.gov.my/home/food-technology-and-sustainable-resources/posts/).  
540 Accessed 31 May 2016
- 541 Neumayer E, Perkins R (2004) What explains the uneven take-up of ISO 14001 at the global  
542 level? A panel-data analysis. *Environ Plann A* 36:823-839. doi:10.1068/a36144
- 543 Nikolaou I, Evangelinos KI, Emmanouil D, Leal W (2012) Voluntary versus mandatory EMS  
544 implementation: management awareness in EMS-certified firms. *Asia Pac J Manag*  
545 8:1-12. doi:10.1177/2319510X1200800102
- 546 Nishitani K (2010) Demand for ISO 14001 adoption in the global supply chain: An empirical  
547 analysis focusing on environmentally conscious markets. *Resour Energy Econ*  
548 32:395-407. doi:10.1016/j.reseneeco.2009.11.002
- 549 NSWMD (2013) Survey on solid waste composition, characteristics & existing practice of  
550 solid waste recycling in Malaysia. National Solid Waste Management Department.  
551 [jpspn.kpkt.gov.my/index.php/pages/view/66](http://jpspn.kpkt.gov.my/index.php/pages/view/66). Accessed 23 January 2017
- 552 OECD (2014) Towards green growth in Southeast Asia. OECD Green Growth Studies.  
553 doi:10.1787/9789264224100-en
- 554 Padfield R, Papargyropoulou E, Preece C (2012) A preliminary assessment of greenhouse gas  
555 emission trends in the production and consumption of food in Malaysia. *Int J Tech*  
556 3:55-66. doi:10.14716/ijtech.v3i1.81

557 Papargyropoulou E, Lozano R, Steinberger JK, Wright N, bin Ujang Z (2014) The food waste  
558 hierarchy as a framework for the management of food surplus and food waste. *J Clean*  
559 *Prod* 76:106-115. doi:10.1016/j.jclepro.2014.04.020

560 Papargyropoulou E., Wright, N., Lozano R., Steinberger J., Padfield, R. and Ujang, Z.  
561 (2016) Conceptual framework for the study of food waste generation and prevention  
562 in the hospitality sector. *Waste management* 49:326-336. doi: j.wasman.2016.01.017

563 Papargyropoulou E, Padfield R, Harrison O, Preece C (2012) The rise of sustainability  
564 services for the built environment in Malaysia. *Sustain Cities Soc* 5:44-51.  
565 doi:10.1016/j.scs.2012.05.008

566 Prajogo D, McDermott CM (2014) Antecedents of service innovation in SMEs: comparing  
567 the effects of external and internal factors. *J Small Bus Manag.* 52:521-540. doi:  
568 10.1111/jsbm.12047

569 Prakash A, Potoski M (2006) Racing to the bottom? Trade, environmental governance, and  
570 ISO 14001. *Am J Polit Sci* 50:350-364. doi:10.1111/j.1540-5907.2006.00188.x

571 Qi GY, Zeng SX, Tam CM, Yin HT, Wu JF, Dai ZH (2011) Diffusion of ISO 14001  
572 environmental management systems in China: rethinking on stakeholders' roles. *J*  
573 *Clean Prod* 19:1250-1256. doi:10.1016/j.jclepro.2011.03.006

574 Quazi HA, Khoo YK, Tan CM, Wong PS (2001) Motivation for ISO 14000 certification:  
575 development of a predictive model. *Omega* 29:522-542. doi:10.1016/S0305-  
576 0483(01)00042-1

577 Salim H., Padfield R., Hansen S. B., Ali Y, Mohamad S., Syayuti K, Tham M.,  
578 Papargyropoulou E. (2017) Global trends in environmental management systems and  
579 ISO14001 research. *J Clean Prod.* doi: 10.1016/j.jclepro.2017.09.017

580 Searchinger T, Hanson C, Ranganathan J, Lipinski B, Waite R, Winterbottom R, Dinshaw A,  
581 Heimlich R (2013) Creating a sustainable food future: interim findings. [www.wri.org](http://www.wri.org).  
582 Accessed 5 September 2017

583 SME Corporation Malaysia (2015) SME definitions. [www.smecorp.gov.my](http://www.smecorp.gov.my). Accessed 29  
584 January 2017

585 Staniškis J, Arbačiauskas V, Varžinskas V (2012) Sustainable consumption and production as  
586 a system: experience in Lithuania. *Clean Techn Environ* 14. doi:10.1007/s10098-012-  
587 0509-y

588 Steger U (2000) Environmental management systems: empirical evidence and further  
589 perspectives. *Eur Manage J* 18:23-27. doi:10.1016/S0263-2373(99)00066-3

590 Studer S, Tsang S, Welford R, Hills P (2008) SMEs and voluntary environmental initiatives:  
591 a study of stakeholders' perspectives in Hong Kong. *J Environ Plan Manage* 51:285-  
592 301. doi:10.1080/09640560701865073

593 Studer S, Welford R, Hills P (2006) Engaging Hong Kong businesses in environmental  
594 change: drivers and barriers. *Bus Strat Env* 15:416-431. doi:10.1002/bse.516

595 Tan LP (2005) Implementing ISO 14001: Is it beneficial for firms in newly industrialized  
596 Malaysia? *J Clean Prod* 13:397-404. doi:10.1016/j.jclepro.2003.12.002

597 Todorov V, Filzmoser P (2010) Robust statistic for the one-way MANOVA. *Comput Stat*  
598 *Data Anal.* 54:37-48. doi: 10.1016/j.csda.2009.08.015

599 Turk AM (2009) The benefits associated with ISO 14001 certification for construction firms:  
600 Turkish case. *J Clean Prod* 17:559-569. doi: 10.1016/j.jclepro.2008.11.001

601 UNEP (2012) Global outlook on SCP policies: taking action together. United Nations  
602 Environment Programme. [sustainabledevelopment.un.org](http://sustainabledevelopment.un.org). Accessed 4 February 2017

603 Zeng SX, Tam CM, Tam VW, Deng ZM (2005) Towards implementation of ISO 14001  
604 environmental management systems in selected industries in China. *J Clean Prod*  
605 13:645-656. doi:10.1016/j.jclepro.2003.12.009

606