



International integration: a hope for a greener China?

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Abstract

Purpose – In recent years, “trade up” argument has gained momentum. It argues that international integration can benefit developing countries’ environments by fostering the adoption of voluntary environmental standards, such as International Organization for Standardization (ISO) 14001 certification. Based on this argument, a social marketing program that encourages greenness among buyers, especially downstream industrial buyers (for example, auto industry) in developed countries could motivate firms in developing countries go green. The purpose of this paper is to provide an investigation on whether “trade up” is a real hope, and what is required to make it real.

Design/methodology/approach – Theoretical modeling and case studies.

Findings – This paper finds that international trade does gear up the adoption of ISO 14001 standards in China through increasing pressures from international green customers. However, our analyses suggest that the adoption of ISO 14001 certification does not necessarily improve firms’ compliance with existing environmental regulations in China. The actual impact depends on how stringently environmental agency carries out inspections. We also find that in China, ISO 14001 certification motivates little, if any, environmental performance improvement beyond bottom-line environmental regulations.

Research limitations/implications – This finding suggests that the “trade up” argument as well as a social marketing strategy targeting international buyers (including downstream industries) need to be scrutinized carefully before being used to guide practice.

Originality/value – Few efforts have been made to explore the actual impacts of ISO 14001 certification in developing countries. This paper fills this gap. It provides empirical support for Andreasen’s argument that social marketing should be applied more broadly to achieve the desired impacts.

Keywords International trade, Social marketing, Green marketing, Quality standards, Environmental regulations, China

Paper type Research paper



Introduction

Social marketing aims to use marketing principles and techniques to influence a target audience to voluntarily change their behavior in order to improve their personal welfares and that of the society as a whole (Andreasen, 1994; Kotler *et al.*, 2002, p. 394). Since the early days of social marketing, environmental issues have been on the radar screen, including promoting involvement of recycling (Zikmund and Stanton, 1971), promoting eco-literacy (Taylor and Muller, 1992), encouraging consumption reduction (Peattie and Peattie, 2009) or encouraging product substitutions in favor of those with little environmental impacts (for example, Greenpeace's grassroots advertising campaign to persuade consumers to buy Greenfreeze refrigerator in advancing its goal to eliminate the use of chlorofluorocarbons and hydrofluorocarbons, see Kalke, 1994; Stafford *et al.*, 2000). Together, with the increasing popularity of green marketing (Hoffman, 2000; Kilbourne and Beckman, 1998), the efforts that aim to persuade customers to buy environmentally sounder products have dominated environmentally related marketing research and practices (Peattie and Peattie, 2009). The belief is that rapid increase of green consumerism will gear production process or products to become more sustainable.

Such a belief has its supporters not only from domestic market but also international market. For example, scholars (Delmas, 2000; Adams, 1999; Corbett and Kirsch, 2001; Prakash and Potoski, 2006) have argued that international green buyers, most of which are in developed countries, could force the producers in developing nations to green their production process. This view has been coined as "trade up" argument, which obtained its evidential support from the increasing adoption of International Organization for Standardization (ISO) 14001 certification in developing countries. The ISO 14001 standards is a standardized environmental management system (EMS) standard, which helps facilities to manage environmental issues, thereby mitigating their environmental footprints. In their paper, Prakash and Potoski (2006) showed that international trade drives the increasing adoption of ISO 14001 standards in developing countries, which serves as a force countering environmental "races to the bottom". Christmann and Taylor (2001) found that export-oriented firms in China are more likely to certify with ISO 14001 standards. They argued that ISO 14001 certification and self-regulation in general "complements traditional government regulation and might even be an alternative in the countries where the traditional regulatory system is not working".

Based on this argument, a social marketing program that encourages greenness among buyers, especially downstream industrial buyers (for example, in auto industry) in developed countries, could help firms in developing countries go green. This paper provides an investigation on whether "trade up" is a real hope, and what is required to make it real. The "trade up" argument requires investigating two components. First, international trade promotes the spread of advanced environmental management tools, such as ISO 14001 certification, in developing economies. Second, advanced management systems transplanted to developing countries, such as ISO 14001 certification, can help improve firms' actual environmental performance in these countries. Christmann and Taylor (2001) and Prakash and Potoski (2006) focused on the first component but left the second component untouched. This paper fills this gap through a theoretical model and in-depth case study of eight certification bodies. A certification body has the best knowledge regarding certification processes and firms' changes in environmental performance only next to firms but is more likely to make truthful reports than firms.

To our best knowledge, this is the first study that investigates the environmental impact of ISO 14001 from the perspective of certification bodies.

More broadly, this paper contributes to the literature on social marketing by asking the following questions. Even though social marketing campaigns have successfully converted international buyers to green purchasers, can it in fact lead to environmental performance improvement among firms in developing economies? If not, what elements have been lost in this social marketing strategy? How can we do better to achieve the desired social changes? The rest of the paper proceeds as follows. The second section analyses the interactions among green customers, firms, certification bodies and the government. The third section illustrates our theoretical model. Our empirical approach is explained in the fourth section. Results from in-depth case studies are reported and analysed in next section. And the last section concludes with a summary of the findings and a discussion of policy implications.

ISO 14001 certification

On the heels of ISO 9000's success as a quality management standard, the ISO established the ISO 14001 EMS standard as a framework for facilities to manage their environmental issues. ISO 14001 requires firms seeking registration to conform to a series of detailed procedural and documentation requirements, to commit to continual improvement of EMSs, to comply with applicable laws and regulations, and to work toward pollution prevention. The promise of ISO 14001 is that by certifying to this standard, firms should have better control of their environmental operations, thereby mitigating their environmental footprints.

Figure 1 describes how ISO 14001 certification changes the dynamics among customers, firms and environmental agency and how this change has elevated the potential impacts from customers. The solid line shows the interactions among customers, firms, and environmental agency before ISO 14001 certification. With these interactions, customers, even though they favor environmentally friendly production and products, have no teeth in forcing firms to adopt greener practices. The key issue is the lack of credible information regarding firms' environmental behaviors. In other words, the problem of information asymmetry prevents customers from rewarding green firms.

Akerlof (1970) illustrated this with an example from used-car sales. He described a market in which sellers knew the quality of their vehicles, but buyers did not. He hypothesized that if they could not acquire credible information, buyers would be

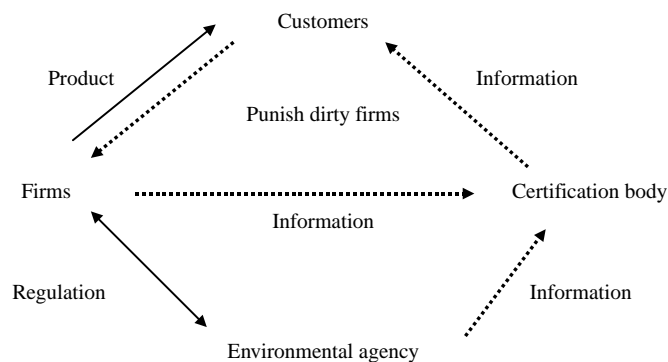


Figure 1.
Interactions among the market, certification body, and government

unwilling to pay more for (reportedly) high quality cars. Sellers, he argued, would then have no incentive to provide high quality vehicles and would withdraw them from the market. In an analogy, when they cannot obtain credible information on firms' environmental performance, green customers are not able to reward those claiming to be environmentally friendly and therefore encourage greener production/products even though they desire so.

In theory, the environmental agency responsible for enforcing regulations should have information on firms' environmental performance. They also have credibility in providing such information to customers. However, in practice, the information often is kept from the public and difficult to comprehend when available, especially in developing countries. In China, we, as university researchers with backgrounds from China, have had great difficulties in obtaining the information. It is therefore safe to assume that this information generally is unavailable to customers. Therefore, before ISO 14001 certification came into place, information asymmetry made it impossible for green customers to reward green firms, and in turn firms have less incentive to improve.

The dynamics, however, totally have changed with ISO 14001 certification. As shown in Figure 1, the certification body collects relevant information from both environmental agencies and firms, and then decides whether to certify. Issued by a third party through an independent audit, ISO 14001 certification provides not only a credible signal regarding a firm's environmental performance but more importantly a signal that is easy to understand. Customers do not need much expertise to understand the difference between being and not being ISO 14001 certified. As such, ISO 14001 certification offers an effective tool to mitigate information asymmetry (King *et al.*, 2005; Jiang and Bansal, 2003). With this signal, green customers are able to informatively punish dirty firms by switching to ISO-certified firms, and therefore create pressure for firms to adopt ISO 14001 certification. As such, ISO 14001 system removed the first barrier for green customers to change producers' behaviors.

As for the environmental impact of ISO 14001 certification, it is not as clear as the adoption decision. In this paper, we differentiate two types of environmental performance improvement:

- (1) non-compliant firms achieve compliance with environmental regulations; and
- (2) compliant firms achieve performance improvement beyond environmental regulations.

ISO 14001 certification requires that firms be in compliance with all applicable environmental regulations to be certified. This is critical for firms that are not in compliance with environmental regulations. Before ISO 14001 certification came into place, non-compliant firms needed to balance mitigation costs vs expected fines. In contrast, firms need to balance mitigation costs vs expected fines plus the loss of customers with the ISO 14001 certification system in place. Therefore, the introduction of the ISO 14001 certification system may greatly boost firms' compliance with environmental regulations and therefore lead to environmental benefits. Dasgupta *et al.* (2000) found that ISO 14001 adoption improved Mexican facilities' self-reported compliance with public law. Although it aims for performance beyond environmental regulations, ISO 14001 certification does not establish absolute requirements for environmental performance. Therefore, ISO 14001 certification does not guarantee any performance improvement beyond meeting regulations.

Below, we build a simple and formalized model to illustrate the dynamics among green customers, firms, environmental agency and certification bodies. This model guides our empirical study of the adoption of ISO 14001 certification and its potential environmental impacts. It also offers a framework for analysing what elements are critical to warrant the effectiveness of a social marketing program that aims to benefit developing countries' environment through leveraging international purchasing power.

A formal model for ISO 14001 certification

Assume that a firm's operation causes x units of pollution. The firm can take mitigation m at a cost of $C(m)$ to reduce the harm its operation causes to the environment. The environmental agency inspects the firm and then decides whether the firm complies with all regulations. The probability that the environmental agency determines the firm as non-compliant, $f(x - m, G)$, is a function of the firm's environmental harm, $x - m$, and an enforcement error G . The enforcement error could be intentional and affected by local regulatory institutions – such as local protectionism, economic priorities, the bargaining power of large firms and corrupt officials – all of which may render environmental enforcement open to negotiation.

Once determined as “non-compliant,” the firm needs to pay a fine F . The firm sells to N customers, of which α percent are green customers who tend to buy from firms with good environmental records. We use p to denote the profits that the firm obtains from selling to each customer. We further assume $C'(m) > 0$ and $C''(m) > 0$ with respect to m , and, $f'(x - m, G) > 0$ and $f''(x - m, G) > 0$ with respect to x .

Without ISO 14001 certification, firms try to maximize their utility:

$$\max p * N - F * f(x - m, G) - C(m). \quad (1)$$

Note that because of information asymmetry, green customers cannot differentiate firms with good environmental records from those with bad records and therefore every customer behaves similarly. Firms will choose the level of mitigation that maximizes equation (1), that is:

$$C'(\hat{m}^{N-ISO}) = F * f'(x - \hat{m}^{N-ISO}, G). \quad (2)$$

The left hand side is the marginal mitigation cost. The right hand side is the marginal benefit from mitigation, which manifests as avoided fines. A firm will choose the mitigation level where the marginal cost equals the marginal benefit. Now let's look at what would happen if ISO 14001 were in place. Because ISO 14001 certification requires firms to be in compliance with all applicable environmental regulations, a non-compliant firm cannot obtain a certificate. Therefore, a firm with a pollution level of $x - m$ will have a probability $f(x - m, G)$ of failing the certification process. Assume that green customers will punish dirty firms by switching to ISO-certified firms; non-ISO certified firms then will lose their green customers. In other words, ISO 14001 certification help firms to retain green customers. The certification is not free; it costs the firm L in monetary terms. Then, the firm's utility function becomes:

$$\max f(x - m, G)[p(1 - \alpha)N] + [1 - f(x - m, G)] * pN - F * f(x - m, G) - C(m) - L. \quad (3)$$

A firm will pick up its level of mitigation that maximizes equation (3), that is:

$$C'(\hat{m}^{ISO}) = (F + p\alpha N) * f'(x - \hat{m}^{ISO}, G). \tag{4}$$

Intuitively, the existence of ISO 14001 certification imposes extra costs on non-compliant firms because green customers will eschew them in favor of those with ISO 14001 certification. In other words, firms have extra benefits from mitigation because mitigation allows them to obtain certification and retain green customers. This is exactly what is revealed in equation (4). Now firms have extra benefit to do mitigation, and thus they mitigate more than what they would do without the ISO 14001 certification system, that is $\hat{m}^{ISO} > \hat{m}^{N-ISO}$. What's more, the extra benefits of mitigation grow larger as the number of green customers increases, eventually leading to more mitigation. Formally, we have:

- Pl.* (i) The introduction of the ISO 14001 certification system leads firms to implement more mitigation than what they would otherwise, that is, $\hat{m}^{ISO} > \hat{m}^{N-ISO}$ and (ii) \hat{m}^{ISO} increases with the percentage of green customers α .

The mathematical proof of this proposition is in Appendix 1. Figure 2 shows the intuitions behind the model. The introduction of the ISO 14001 certification system shifts a firm's marginal benefit curve upward, signifying that one more unit of mitigation brings extra benefits, that is, retaining green customers. As shown in Figure 3, the level of mitigation that firms choose is higher when the ISO 14001 certification is in place than otherwise. It also is clear that the marginal benefit curve moves further upward as the portion of green customers α grows, leading firms to implement more mitigation.

Pursuing ISO 14001 certification is a firm's voluntary choice. Firms may choose not to pursue ISO 14001 certification. Now let's look at when firms tend to pursue ISO 14001 certification and when they do not. Equation (3) describes a firm's utility when

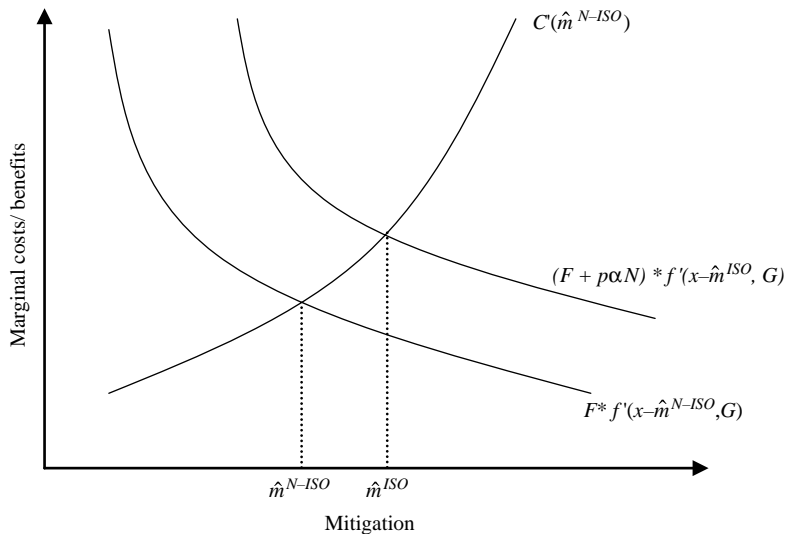
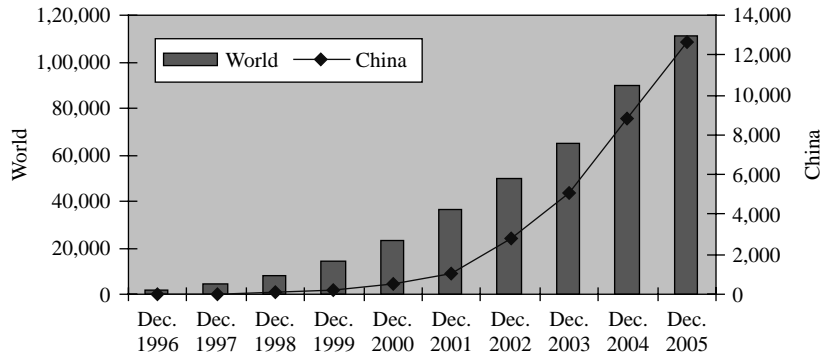


Figure 2.
Level of mitigation with
and without ISO 14001
certification

Figure 3.
The adoption of ISO 14001 standards



pursuing certification. In contrast, the following equation depicts a firm’s utility when it decides not to pursue ISO 14001 certification:

$$\max p(1 - \alpha)N - F*f(x - m, G) - C(m). \tag{5}$$

It is not hard to find that when they decide not to pursue ISO 14001 certification, firms will choose a mitigation level equivalent to what firms would choose if the ISO 14001 certification system were not available, that is \hat{m}^{N-ISO} . Intuitively, this is the case because when it decides not to pursue the ISO 14001 certification, what firms need to balance is mitigation costs against avoided fines, which exactly is the cost-benefit analysis firms do when the ISO 14001 certification system is not available.

Firms will choose to pursue ISO 14001 certification if the following condition is satisfied:

$$f(x - \hat{m}^{ISO}, G)[p(1 - \alpha)N] + [1 - f(x - \hat{m}^{ISO}, G)]*pN - F*f(x - \hat{m}^{ISO}, G) - C(\hat{m}^{ISO}) - L > p(1 - \alpha)N - F*f(x - \hat{m}^{N-ISO}, G) - C(\hat{m}^{N-ISO}).$$

Appendix 2 shows that this condition is more likely to be satisfied when the portion of green customers is larger. Formally, we have:

P2. Firms are more likely to pursue ISO 14001 certification when the portion of green customers is larger.

P2 simply states that the more green customers an industry has, the more environmental benefits ISO 14001 certification will bring, and thus the more likely firms will pursue ISO 14001 certification. In other words, if few green customers exist in the market, we should expect that little environmental benefit will come with the ISO 14001 certification, and as a result, firms will have little incentive to pursue it.

As mentioned earlier, in the context of ISO 14001 certification, the “trade up” argument requires two components. First, international trade promotes the adoption of ISO 14001 certification in developing economies. Second, ISO 14001 certification helps improve firms’ actual environmental performance in these countries. *P2* addresses the first component. As globalization occurs, international green customers place extra pressure on firms in developing countries to be green. This is exactly what scholars of the “trade up” argument (Christmann and Taylor, 2001; Prakash and Potoski, 2006) have discovered; that is, international trade promotes the adoption of ISO 14001

certification in developing countries. In their research, the scholars of the “trade up” argument implicitly have assumed that ISO 14001 certification equates to environmental performance improvement. However, this may not be true, especially in developing worlds on which the “trade up” argument focuses.

To better characterize the relationship between ISO 14001 certification and firms’ environmental performance improvement, it is of importance to differentiate two types of environmental performance improvement:

- (1) non-compliant firms achieve compliance with environmental regulations and
- (2) compliant firms achieve performance improvement beyond environmental regulations.

To our best knowledge, the current literature studying the environmental impacts of ISO 14001 certification largely has ignored the differences between these two types of improvement, which turn out to be critical as we illustrate below.

P1 informs us that firms tend to do more mitigation after the introduction of ISO 14001 certification. However, this general observation has two important qualifications. First, ISO 14001 certification has no teeth with compliant firms. When firms already comply with all applicable environmental regulations, $f'(x - \hat{m}, G)$ approaches zero because $\partial f'(x - \hat{m}, G)/\partial \hat{m} < 0$. When $f'(x - \hat{m}, G)$ approaches zero, the difference between the right hand sides of equations (2) and (4) disappears, which suggests that ISO 14001 certification will not guarantee environmental benefits beyond applicable environmental regulations.

This echoes the major critiques on ISO 14001 standards; that is, ISO certification is a process-based instead of performance-based instrument. As Delmas (2005) emphasized, “like ISO 9000, ISO 14001 does not focus on outcomes, such as pollution, but focuses on process”. “ISO 14001 does not establish absolute requirements for environmental performance – other than a commitment to compliance with applicable regulations – and it does not explicitly identify environmental performance as a factor in the actual certification process”. Therefore, firms may seek ISO certification as a public seal of an environmentally friendly operation, and fail to follow all standards in daily operations and achieve continual improvement. Because ISO certification does not require firms to achieve performance improvement beyond regulations, firms are not penalized if they do not[1]. Therefore, we have:

- H1.* ISO 14001 does not lead to environmental performance beyond environmental regulations.

Theoretically, ISO 14001 certification should guarantee that non-compliant firms achieve compliance with all applicable environmental regulations because certification does require compliance as a prerequisite. Non-compliance is more common than one may think. Walls *et al.* (2008) studied 184 firms among US S&P 500 firms in 22 manufacturing and primary industries, and found that about 29.6 percent of firms “self-reported” compliance issues (e.g. fines, penalties, etc.) (Walls *et al.*, 2008). Ma and Ortolano (2000, p. 144) reported that 64 percent of firms surveyed in Changzhou and Shunde in China do not comply with effluent standards.

As non-compliance is fairly common, ISO 14001 certification seems to offer great hope for environmental benefits through promoting compliance with environmental regulations. However, a closer look at equations (2) and (4) suggests that this

conclusion needs qualification as well. When $f'(x - \hat{m}, G)$ is small and approaching zero, the difference between the right hand sides of equation (2) and (4) disappears, which suggests that ISO 14001 certification will not bring much environmental benefits. So the question is when $f'(x - \hat{m}, G)$ is small. Remember, $f(x - m, G)$ characterizes how an environmental agency's decision of non-compliance responds to a firm's mitigation. A small $f'(x - \hat{m}, G)$ means that an environmental agency's decision is not determined dominantly by mitigation and has a significant enforcement error G . The enforcement error could be intentional and affected by local regulatory institutions, such as local protectionism, economic priorities, the bargaining power of large firms and corrupted officials – all of which may render environmental enforcement open to negotiation. Formally, we have:

- P3.* The more sensitive $f(x - m, G)$ (the probability that the environmental agency deems a firm as “non-compliant”) is to mitigation, the larger \hat{m}^{ISO} would be. In other words, little environmental improvement would occur if $f(x - m, G)$ does not respond to mitigation but is clouded with enforcement errors.

P3 highlights the role of environmental agency in the potential environmental impact of ISO 14001 certification. If an environmental agency's decision of non-compliance, which directly determines whether firms receive ISO 14001 certification, is clouded by enforcement error G instead of responding to a firm's real environmental performance, then the impacts of ISO 14001 certification will be negated. The benefit of promoting firms' compliance with applicable environmental regulations, which is theoretically sound, may not materialize in practice.

The empirical examination of *P1* needs firm-level data, which currently is not available. In the next two sections, we look at the adoption of ISO 14001 certification (*P2*) and its environmental impacts (*H1* and *P3*) through in-depth case studies of eight certification bodies.

Empirical methods

Although the theoretical model developed above apparently has a general application, the goal of this study is to investigate the adoption of ISO 14001 certification and the extent to which ISO 14001 certification can be considered as an effective way to improve firms' environmental performance in developing countries. We focus on China as it is the country where ISO 14001 certification experienced the most growth in recent years. Figure 3 shows that in the last five years, the growth of ISO 14001 certification in China outpaced the overall worldwide growth. Today, China has the second largest number of ISO 14001 certificates, only next to Japan.

We examine the issue from the perspective of certification bodies instead of certified firms, which, to our best knowledge, has not been done previously. Several dimensions related to ISO 14001 certification are investigated, such as the motivations to pursue certification, the certification process, implementation of ISO 14001 standards and the environmental impacts of ISO 14001 certification.

The method of case study is used because it is considered the best way to study issues with many different dimensions. The advantages of using the case study method have been discussed extensively in the literature (Yin, 1981, 1984; Eisenhardt and Bourgeois, 1988; Eisenhardt, 1989; Zbaracki, 1998; Bansal and Roth, 2000). For the most part, by considering multiple cases, researchers can compare and validate ideas

and inferences arising from the analysis of each case. Furthermore, the comparison and inference process helps to develop new ideas and theories using an inductive approach, or to verify proposed theories. As no previous studies have examined the environmental impacts of ISO 14001 certification in China – which has very different political, regulatory and economic contexts compared to Western countries, case study is the best approach for studying such a new and complex situation that involves many variables that are difficult to isolate.

Instead of using a random or representative sample of a population as in a statistical study, the case study method selects a limited number of cases from the population. Given the selective choice of cases, we are able to increase the depth and width of the issues studied through these selected cases, which may not be possible using a random or representative sample. This approach can enrich our understanding of the questions under study and confront various theories. The population in this study consists of all authorized ISO 14001 EMS certification bodies in China. By May 2008, China had 66 certification bodies with each having several branches in different regions (China National Commission of Certification and Accreditation (CNCA), 2008). These 66 certification bodies first were identified using a list compiled by the CNCA and then contacted selectively.

We have limited our study to eight cases. It would have been easy to increase the size of our sample; however, it became clear during the process of data collection that fewer and fewer new information emerged regarding the issues under study. This typical phenomenon of “theoretical saturation” (Glaser and Strauss, 1967) suggests that enough data have been collected in the eight cases to meet our research objectives. We have avoided selecting cases from the same region. The eight certification bodies are located across the country and from the north to the south: Heilongjiang, Case 2; Jilin, Case 1; Hebei, Cases 3 and 4; Shaanxi, Case 6; Shanghai, Case 5; and Guangdong, Cases 7 and 8. The certification bodies certify firms from all industries. Thus, issues studied and reported here are interpreted as representative of the entire economy instead of being industry or region specific.

Data are collected through structured interviews. The interview consists of four major components: motivations to pursue certification, the certification process, implementation of ISO 14001 standards and environmental impacts of ISO 14001 certification. Each part is composed of several related questions. The interviewees are senior auditors from these certification bodies. The two authors coded the interview transcriptions independently and verified them for consistency. Where disagreement arose, the authors conducted a follow-up phone interview for clarification and additional information beyond the questionnaire. We report the results in the next section.

Results

Motivations for ISO 14001 certification

We have provided the interviewees seven motivations to rate on a scale of one to five in terms of importance, including social responsibility, profitability, reputation, corporate mandate, regulatory pressure, and demands from foreign and domestic customers. We further asked the interviewees to list important factors that are not included in our list. None of the eight interviewees gave any factor other than the ones listed, which

suggests that our list covers the most important motivations for pursuing ISO 14001 certification.

Among the seven factors, the one factor that stands out is demand from foreign customers. Seven out of eight interviewees list it as the most important factor, while one interviewee listed it as the second most important. This finding is very much consistent with the literature on international diffusion of ISO 14001 standards (Delmas, 2000; Adams, 1999; Corbett and Kirsch, 2001; Prakash and Potoski, 2006). This literature has shown that green pressure from international customers is the most significant driver behind the global spread of ISO 14001 standards. One interviewee commented:

Ninety-five percent of the firms that I know of are pursuing EMS certification because of the demand from their customers, most importantly, international customers. The other 5 percent take advice from consulting firms, doing EMS while they are pursuing the Quality Management System (QMS). EMS is only a complementary certification (Case 5).

This finding is consistent with the aggregate data we have examined. The data show that ISO 14001 certification in China is concentrated highly in export-oriented industries. Table I lists the six industrial sectors with the highest total number of ISO 14001 certifications. These six industries jointly account for 68 percent of China's total ISO 14001 certifications in 2006 (CNASCA, 2007). The top four sectors with the highest total number of ISO 14001 certifications also are those with the highest number of certifications per thousand firms among all industrial sectors. Particularly, the electric, electronic, and telecommunication equipment and machinery sector outnumber all the other sectors in both measures by a large margin. A similar pattern of sectoral concentration also is found in China's foreign trade in 2006. The six sectors listed in Table I contributed to 73.8 percent of China's total exports (MOFCOM, 2006)[2]. In other words, the ISO 14001 certifications have been most concentrated in export-oriented sectors, providing evidence that international customers is the factor that gears up the adoption of ISO 14001 standards. As a report in the *People's Daily*, the most authoritative newspaper in China, has noted:

ISO 14001 will be an important instrument for China to do international trade after it enters the World Trade Organization (WTO), [and] the ISO 14001 is a key solution to environmental requirements as one of the leading non-tariff barriers in international trade (*People's Daily*, 2001).

Driven by this, firms that want to engage in international trade seek ISO 14001 certification as a demonstration of their environmental consciousness.

In sum, our analyses suggest that green pressure from international customers is the most important force driving Chinese firms to pursue ISO 14001 certification.

Industrial sector	Total ISO	ISO/1000 firms
Electric, electronic, and telecommunication equipment and machinery	3,093	116
Smelting and pressing of metals and metal products	2,329	82
Chemical materials, chemical and fiber products	1,916	87
Rubber and plastic products	1,384	82
General machinery and equipment	1,225	35
Non-metal mineral products	1,110	51

Table I.
Sectors with highest ISO
14001 certifications

This provides empirical support for *P2* that emerged from our theoretical model. The introduction of ISO 14001 certification helps eliminate information asymmetry, which in turn empowers green customers to exert additional pressure on firms. To secure access to these green customers, firms must obtain a certification of EMS; otherwise, they will lose a part of the market. In comparison, before the introduction of the ISO 14001 certification system, customers cannot tell firms with good and bad environmental performance, and therefore firms have no pressure from customers to go green.

This, once again, highlights that the first component of the “trade up” argument – namely, that international trade promotes the spread of advanced environmental management tools – is valid. Now, we turn to the second component of the “trade up” argument, which has been left unexplored in the literature. That is, have advanced management systems that are transplanted to China, such as ISO 14001 certification, actually helped improve firms’ environmental performance?

Achievement of regulatory requirements

Non-compliance with environmental regulations is a fairly common phenomenon in developing countries. Ma and Ortolano (2000, p. 144) found that 64 percent of firms surveyed in Changzhou and Shunde are out of compliance with effluent standards. Our theoretical analysis in the second section suggested that ISO 14001 certification provides additional pressure for firms to achieve compliance with environmental regulations.

Before the introduction of the ISO 14001 certification system, non-compliant firms needed to balance mitigation costs vs expected fines. If the expected fine is not large enough to justify the mitigation cost, firms would choose to remain out of compliance and pay the fine. In contrast, after the introduction of the ISO 14001 certification system, firms need to balance mitigation costs against expected fines plus the loss of green customers. Therefore, if the population of green customers is large enough, the introduction of the ISO 14001 certification system may boost firms’ compliance with environmental regulations greatly and therefore lead to environmental benefits. This argument seems sound in theory. However, in practice, as highlighted in *P3*, uncertainties exist in the link between ISO 14001 certification and firms’ compliance behavior.

Half of the interviewees (Cases 1, 2, 4, and 7) reported that of all the firms that they have certified, more than 50 percent actually have reduced adverse environmental impacts from their production processes because ISO 14001 certification forces them to move from non-compliance to compliance. When issuing an ISO 14001 certificate, the interviewees reported, three key requirements must be identified:

- (1) identification of important environmental factors;
- (2) proof of compliance with environmental laws; and
- (3) proof of compliance with all applicable environmental standards.

Firms must identify the key environmental factors related to their operations, and develop appropriate plans to control and mitigate adverse impacts. For instance, a chemical plant may identify toxic chemical release as its main environmental factor and thus must implement accident prevention and emergency response measures. Examples of the second requirement include approval documents from environmental agency with regard to the environmental aspects of a firm’s expansion and operations. The third requirement typically refers to standards of waste discharges. Firms have to

obtain official documents from environmental agency indicating that they have met all discharge standards for gas, water and solid wastes. These are treated as bottom-line requirements by all interviewees.

In sum, ISO 14001 certification does give firms extra pressure to comply with environmental regulations because non-compliance with applicable regulations will prevent firms from “being certified” and therefore cause them to lose green customers. When non-compliance is common, ISO 14001 certification serves as a powerful tool fueled by the demand of green customers to reduce firms’ environmental footprints. However, the other half of our interviewees (Cases 3, 5, 6, and 8) have expressed concerns that this potentially powerful tool may falter. That is to say, in today’s China, even the bottom-line benefits of ISO 14001 certification – helping firms achieve compliance with environmental regulations – may not materialize. The reasons run as follows.

As discussed earlier, ISO 14001 certification hinges crucially on whether firms can present official documents showing that they have met various environmental standards. The link may break if government has other priorities (in most cases, economic growth) or the environmental agency’s inspection is corrupt. Flexible investigation is not uncommon, and local investigators and firms even may collude to create false environmental documents. If these documents are verified to be issued by environmental agency and auditors find no obvious violations during on-spot observations, the ISO certification body cannot challenge these documents and refuse certification. The situation even deteriorates when a firm is a major contributor to the local economy and therefore possesses substantial bargaining power:

Often, a major contributor to the local economy also is the primary polluter to the local environment. Where do the officials expect to receive benefits from if the plant is in trouble [...]? (Case 3).

This concern is consistent with Child and Tsai’s (2005) study. The Chinese Government considers environmental issues to be important, but in practice, officials in general are open to discussion when non-compliance occurs. This highlights the importance of environmental agency in determining the environmental impacts of ISO 14001 certification, which *P3* emphasizes. *P3* suggests that when the environmental agency’s decision is not determined dominantly by mitigation but is influenced significantly by enforcement error, the desired environmental benefits from ISO 14001 certification may be negated. The impact of ISO 14001 certification will be substantial with an able and legitimate environmental agency but compromised otherwise. To avoid solely relying on official documents from environmental agency, one interviewee (Case 3) suggests that ISO 14001 certification bodies establish their own environmental monitoring laboratory so that they can perform independent tests and assessments.

In a nutshell, ISO 14001 certification can encourage the achievement of compliance theoretically; however, the actual strength depends on how stringently environmental agency carries out inspections. Another question related to firms’ environmental performance improvement is whether ISO 14001 certification can help firms achieve performance above and beyond environmental regulations. We turn to this question now.

Improvement beyond regulations

When it comes to whether ISO 14001 certification can result in environmental performance improvement beyond environmental regulations, all interviewees, although they make

their lives in this business, expressed pessimistic views. Without exception, they agreed that ISO 14001 certification has little potential to help firms to achieve environmental performance beyond regulations, which confirms research *H1*. Two quotes follows:

Frankly speaking, a successfully implemented EMS significantly will improve firms' environmental performance. Unfortunately, however, there are not many cases currently in which EMS is implemented completely and consistently. For the most part, it is a management system on paper, the so-called *liang-ceng-pi* (two-layer) management. Thus, EMS has not been very effective in improving firms' environmental performance (Case 3).

The impacts exist but are very limited. After all, environmental awareness is still at low levels. EMS certification is more of a reputation consideration and a fulfillment of customer demands, instead of an environmental instrument (Case 5).

ISO 14001 certification intends to build institutions into firms to ensure continual environmental performance improvement above and beyond environmental regulations. Apparently, this intention falls short in China, according to our interviewees. The reasons are twofold.

First, the motivations for adopting ISO 14001 certification mostly are from outside demands (international green consumers) instead of environmental awareness (social responsibility)[3]. ISO 14001 certification is taken as a symbolic gesture instead of a tool to reduce firms' environmental footprints. Firms have not gone much beyond fulfilling bottom-line certification requirements, i.e. having paperwork ready and obtaining official documents. The management systems developed on paper seldom are implemented. This is exactly what the aforementioned quotes reveal.

In our interviews, we ask the interviewees what percentage of the firms to which they issued certificates have developed a plan to implement the ISO 14001 standards, and redesigned their products or production processes to protect the environment. All eight interviewees said that less than 30 percent (as low as 10 percent in some cases) of the firms to which they have issued certificates have changed their product design or manufacturing processes. Three interviewees (Cases 5, 6, and 8) said no firms they have certified redesigned either products or production processes:

Firms live for profits, and often in the short-term. It is too costly for them to fundamentally change their production processes or product designs simply for a piece of paper – the ISO 14001 certification (Case 6).

Even for those firms who have modified their production processes by installing waste treatment equipment, the equipment is not operated at full gear:

Some firms have installed waste treatment equipment. To save costs, however, the equipment only is run to meet regulatory standards at the time of investigation. The standards are not met in their daily operations (Case 6).

Seven out of eight interviewees said that less than 50 percent of certified firms have made concrete plans to implement the certified EMS. Concrete plans that involve capital and personnel commitments require much more input from certified firms and accordingly incur substantial costs. Firms are not willing to bear these costs without seeing economic returns. This suggests that the EMS may be fully fledged on paper but not implemented in practice.

Second, ISO 14001 certification is taken as a one-time act instead of a continuous and consistent effort. Firms do not maintain and improve their EMSs after initial

certification because of the lack of motivation and expertise. Maintaining and continuously improving the certified EMS usually requires follow-up training and inspections. Unfortunately, these services still are superficial or totally missing:

There are annual inspections after initial approval. The inspection still focuses on proof of non-violation of current laws and regulations, and environmental monitoring reports. However, firms sometimes cannot keep up with the latest environmental requirements because they lack environmental expertise. This is what certification bodies can help with. Certification bodies can provide training on the latest environment laws and regulations, organize visits to firms that have implemented EMS successfully, and promote communication among certified firms. However, certification bodies seldom organize such activities due to the fear of losing their clients [because these will incur extra costs to their clients]. The majority of certification bodies seldom contact certified firms other than for routine inspections after initial approval, let alone providing other follow-up services (Case 5).

Concluding remarks

With a “trade up” view, Prakash and Potoski (2006) argued that international green buyers, most of which are in developed countries, could force the producers in developing nations to green their production process, therefore benefiting developing countries’ environment. Following this argument, a seemingly feasible social marketing strategy would be encouraging international buyers, especially downstream industries, to change their purchase preference. This paper suggests that this view might be too optimistic.

Based on an in-depth case study of eight certification bodies, this paper finds that international trade does gear up the adoption of ISO 14001 standards in China, which is consistent with findings from previous studies. However, as for the environmental impacts of ISO 14001 certification, this paper finds that:

- The actual strength of ISO 14001 certification in promoting firms’ compliance with existing regulations is uncertain. It depends on how stringently environmental agency carries out inspections and enforces regulations.
- ISO 14001 certification offers little, if any, environmental performance improvement beyond meeting bottom-line environmental regulations.

This finding suggests that we need to treat the “trade up” argument as well as a social marketing strategy targeting international buyers (including downstream industries) with caution. For such a strategy to work, it requires a careful analysis of various stakeholders who have a role in the system. A successful social marketing strategy should start with a thorough analysis of stakeholders that could affect the outcome of interest. Social marketing researchers and practitioners normally fix their minds upon changing downstream player’s behaviors, for example, encouraging potential drunk driver to refrain from drinking and driving, or encouraging potential buyers to favor more environmental friendly product and production. In his new book Andreasen (2006) argued that such a “downstream approach” has hugely underestimated social marketing’s real potential. He suggested that social marketing principles and tools should be applied more broadly to influence such diverse audiences as legislator, community leaders, media executives, corporate managers, and health professionals. In light of our analysis of the adoption and implementation of ISO 14001 certification in China, more successes could be achieved if a social marketing program targeting

environmental officials leads them to enforce regulation more rigorously, and a social marketing program targeting corporate managers leads them to implement ISO 14001 certification more faithfully (Yin and Schmeidler, 2008).

Based on the “trade up” argument, scholars have suggested that “in countries where the domestic environmental protection regime is not developed, ISO 14001 appears, albeit incorrectly, to provide a complete solution on its own” (Conway, 1996). Based on our findings, the authors contend that we need to treat these arguments with extra caution. A successful strategy has to prioritize enhancing environmental regulation systems[4], and meanwhile mobilizing all stakeholders including customers, environmental officials and corporate managers to go green through multiple carefully designed social marketing programs.

This study has limitations upon which future research could make an improvement. While an in-depth case study of certification bodies is necessary to understand a complex phenomenon that is rarely studied and is the best approach given the data availability in China nowadays, it has limitations. The information gathered from certification bodies is already aggregated. This neglects the heterogeneity across facilities adopting ISO 14001 standards. Some recent studies (Barla, 2007; Yin and Schmeidler, 2008) show that the implementation and impact of ISO 14001 standards is very variable across adopting facilities. This limitation also suggests interesting research for the future. Future research may revisit the research questions of this study through studying individual facilities. Both statistical analysis and case study are necessary. It is of interest to discover what factors (especially market factors) have an impact on the linkage between the adoption of ISO 14001 standards and facilities’ environmental performance changes through statistical analyses. In the meanwhile, it requires an in-depth case study to “get beneath the skin” of adopting facilities to understand facilities’ strategic/organizational responses to ISO 14001 adoption and how green customers could play a role to ensure that actual environmental benefits result from ISO 14001 certification. All of these studies will ultimately facilitate finding sound social marketing strategies which can help institutions like ISO 14001 certification to reach its full strength and therefore help developing countries to protect/improve their environment.

Notes

1. The supporters of ISO 14001 certification do not agree (Potoski and Prakash, 2005; Kang, 2005). They hold that in the process of ISO 14001 certification, the requirement for a third-party audit adds the extra pressure of external scrutiny and questioning by independent professionals. These can help firms improve their management systems and thus enhance environmental performance. These scholars view performance improvement as a natural outcome of the enhancement of management systems.

Therefore, it is an empirical matter whether ISO 14001 will result in performance improvement. Many empirical studies have been conducted, but no agreement has been reached. In their studies, Potoski and Prakash (2005), Melnyk *et al.* (2003), and Kang (2005) found that ISO 14001-certified firms improved their environmental performance to a larger extent compared to non-certified firms. However, Matthews (2001), Dahlstrom *et al.* (2003), Yin (2003), Andrews *et al.* (2003), and King *et al.* (2005) found that ISO 14001 certification brought very few environmental benefits. Barla (2007) and Yin and Schmeidler (forthcoming) show that the impact of ISO 14001 certification is very variable across adopting plants.

2. Data on China's foreign trade by industrial products are obtained from the Ministry of Commerce of the People's Republic of China (MOFCOM).
3. None of the interviewees have rated social responsibility (environmental consciousness) as one of the most significant motivations. Instead, five out of eight interviewees put social responsibility as the least significant factor among all listed motivations. This is consistent with findings from the literature on the adoption of ISO 14001 certification. Studies have found that facilities may pursue ISO 14001 certification for reasons other than environmental benefits, although it is a system for environmental management. More often than not, facilities adopt it as a corporate mandate (Kang, 2005; Boiral, 2007), a public demonstration of environmental friendliness (Andrews *et al.*, 2001), or a tool for gaining competitive advantage by increasing international trade opportunities and forging a greater market share (Delmas, 2000; Adams, 1999). According to a recent survey of ISO 14001-certified facilities in the USA (Schmeidler and Yin, 2007), the corporate mandate, customer expectations and regulatory considerations are listed as the three most important reasons for pursuing ISO 14001 certification above environmental benefits.
4. This is a structural approach for social changes as defined in Andreasen (2002). Andreasen (2002) argued that social marketing (as a tool for individual approach) could be used as complement rather than substitute to structural and community approaches. This is exactly what we suggest here.

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Appendix 1. Proof of Proposition 1

Part (i)

Define $G(m)$ as the first-order condition of equation (1).

From equation (2), we have:

$$G(\hat{m}^{N-ISO}) = F^*f'(x - \hat{m}^{N-ISO}, \varepsilon) - C'(\hat{m}^{N-ISO}) = 0.$$

From equation (4), we have:

$$G(\hat{m}^{ISO}) = F^*f'(x - \hat{m}^{ISO}, \varepsilon) - C'(\hat{m}^{ISO}) = -p\alpha N^*f'(x - \hat{m}^{ISO}, \varepsilon) < 0.$$

Therefore, $\hat{m}^{ISO} > \hat{m}^{N-ISO}$ QED.

Part (ii)

Taking the total differentiation of equation (4), we have:

$$\frac{\partial \hat{m}^{ISO}}{\partial \alpha} = \frac{pN^*f'(x - \hat{m}^{ISO}, \varepsilon)}{(F + p\alpha N^*)f''(x - \hat{m}^{ISO}, \varepsilon) + C''(\hat{m}^{ISO})} > 0.$$

QED.

Appendix 2. Proof of Proposition 2

$$\begin{aligned} & f(x - \hat{m}^{ISO}, \varepsilon)[p(1 - \alpha)N] + [1 - f(x - \hat{m}^{ISO}, \varepsilon)]*pN - F^*f(x - \hat{m}^{ISO}, \varepsilon) - C(\hat{m}^{ISO}) - L \\ & > f(x - \hat{m}^{N-ISO}, \varepsilon)[p(1 - \alpha)N] + [1 - f(x - \hat{m}^{N-ISO}, \varepsilon)]*pN - F^*f(x - \hat{m}^{N-ISO}, \varepsilon) \\ & \quad - C(\hat{m}^{N-ISO}) - L \\ & > p(1 - \alpha)N - F^*f(x - \hat{m}^{N-ISO}, \varepsilon) - C(\hat{m}^{N-ISO}). \end{aligned}$$

The first inequality is true because \hat{m}^{ISO} maximizes equation (3). The participation condition is satisfied as long as the second inequality stands true. It is easy to find that the second condition is more likely to be true when α is larger, that is, the portion of green customers is larger.

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