Environmental Management Systems as Sources of Competitive Advantage

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Abstract

An increasing number of firms are adopting environmental management systems as a way of dealing with challenges from the natural environment. Many of these firms also decide to have their environmental management systems certified according to one or both of the available international standards, ISO 14001 and EMAS (The European Union's Eco Management and Audit Scheme). Both the environmental management system and the certification process involve significant investment of financial resources and management effort, which raises the question of what benefits firms might derive from these activities. Three levels of strategic advantage are identified in this paper. The first level of advantage is transient on nature, being based on competitive preemption and development of first mover advantage. The second level involves development of valuable competencies and more durable resources inside the firm, while the third level advantage depends on the extent to which such resources can be extended and conserved when emphasis shifts from an internal pollution prevention focus towards life cycle oriented environmental management.

Key words: Natural environment, strategy, resource-based view.

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1. Introduction

The natural environment plays an increasingly important role in the literature on management of organizations. A considerable number of contributions appeared a few years ago that examined the role of business organizations in furthering the objectives of sustainable development (World Commission on Environment and Development 1987). These numerous contributions were often more concerned with the relationship between on the one hand the sustainability objective and on the other hand more traditional objectives of business firms (Gladwin, Kennelly et al. 1995; Shrivastava 1995; Starik and Rands 1995), than with the more mundane tasks of actually moving towards these objectives. Subsequent to this, a more down to earth emphasis on when it pays to be green has appeared which emphasizes the application of mainstream theoretical constructs to the problem of becoming more sustainable (Reinhardt 1999, 2000). A multitude of papers and books have addressed the relationship between business and the natural environment from different perspectives: industrial organization (Porter and van der Linde 1995a,b), accounting (Owen 1992; Epstein 1996), agency theory (Gabel and Sinclair-Desgagné 1993), resource based view of the firm (Hart 1995; Russo and Fouts 1997; Sharma and Vredenburg 1998), information systems design (Shaft, Ellington et al. 1997) and neo-institutional organization theory (Jennings and Zandbergen 1995).

At the practical level, one of the areas where much effort has been expended on the part of firms is adoption of standardized environmental management systems such as those specified in the ISO 14001 and EMAS[1] standards. By the end of November 1999, 27,502 firms had obtained the ISO 14001 certificate

1 EMAS is the acronym for the 'Eco-Management and Audit Scheme' set up by the European Commission in accordance with the EMAS directive no. 1863/1993 and launched into operation in 1995. EMAS has been revised and the new version, officially in Official Journal of the European Communities L114 of 24/04/01, can be found at http://europa.eu.int/comm/environment/emas/intro_en.htm. Strictly speaking, EMAS is not a standard but a scheme. However, as both the 'old' and the 'new' EMAS incorporates many of the same elements as ISO 14001 (explicitly for EMAS II and through a bridging document for EMAS I), this paper uses the term standard to denote both. I am grateful to Mattias Gelber for making this point.

globally, while there were 3,829 [European] sites registered under EMAS.[2] While these numbers may seem small compared to the total number of firms, they nevertheless show a significant growth in numbers given that the two schemes were officially launched only a few years ago (1995 for EMAS and 1996 for ISO 14001).

The decision to install an environmental management system and to have it certified may be driven by either defensive or offensive motives (or a mixture of the two). Becoming ISO 14001 certified or obtaining EMAS registration may be nothing but a simple reaction to coercive pressure from powerful customers or stakeholders wishing to project a proactive environmental profile of their own. If for example General Motors or Asea Brown Boveri were to tell their suppliers that they must be ISO 14001 certified within a certain period of time or risk losing their orders, many would undoubtedly react by trying to obtain the certification. However, firms adopting a certified environmental management system may instead be responding to other factors that lead them to perceive a 'green' profile as an opportunity for growth and profit, and ISO 14001or EMAS as a convenient and attractive path towards that profile.

The distinction between the two approaches, between proactive and reactive, may be clear on an *ex-ante* basis. While it is tempting to argue that firms, approaching certification from a proactive standpoint, are more likely to derive real profit from the exercise, it is not necessarily true. Reactive firms may suddenly discover that significant benefits (cost savings, market niches, opportunities for product differentiation) await them if they become proactive whereas proactive firms may become complacent and rest on their laurels. In other words, the outcome of certification is uncertain and depends both on the interaction between the firms' organization and the process of developing and certifying the environmental management system and on the interaction between these processes and the firm's *business environment* in general.

2 In contrast to ISO 14001, EMAS registrations apply to sites. Thus one large firm may have many EMAS registrations.

Installing a new environmental management system or adapting an existing system according to standardized criteria and procedures, as required by both ISO 14001 and EMAS, involves significant cost, as does the subsequent verification or assessment of the system by third party verifiers or certifiers.[3] Estimates of implementation cost vary greatly, data often not distinguishing between the costs of the management system itself, costs of certification or verification, and costs incurred as a result of the whole exercise, i.e. costs of rectifying instances of non-compliance discovered during the ISO 14001 or EMAS process. A 1997 survey of German EMAS sites reported by Freimann and Schwedes (1999) put the average cost of obtaining EMAS at €80,000,[4] with costs ranging from

Given these initial costs, and the ongoing expense of maintaining the environmental management system once it has been implemented,[5] firms must justify the decision to become certified or registered. Many of the firms in the survey reported by Freimann and Schwedes reported significant savings on overall operating costs, with 15% of the respondents claiming annual savings of more than €250,000. These savings may go a long way towards justifying the decision to obtain ISO 14001 or EMAS. However, cost-based arguments for and against these certified environmental management systems are at best crude, and they overlook the fundamental distinction between different kinds of competitive advantage that may accrue to a firm as a result of implementation of ISO 14001 or EMAS. This paper argues that such systems present an opportunity to develop organizational capabilities and resources that are valuable at several levels, and with different time horizons. The argument involves a distinction between three levels of resource or competency development occurring

3 ISO 14001 and EMAS use distinctly different terminologies to describe procedures that are in many ways similar.

4 One EURO (€) corresponds roughly to $1.

5 EMAS registration must be reviewed every 3 years and a revised environmental statement submitted every year. ISO 14001 also requires annual reviews, albeit this is not laid down in the standard itself. The requirements are found in the rules and regulations governing the operation of international standardization bodies. In the case of Europe a dedicated organization called European Accreditation has issued detailed guidelines for the work of verifiers involved in checking ISO 14001 certifications (EA document 7/02 see http://www.european-accreditation.org/documents.html#EA7).

as a result of the decision to implement an environmental management system according to the EMAS or ISO 14001 standards.

The first level is a temporary advantage that basically follows from being able to claim that the firm has one of these systems, at a time when rivals do not. This advantage is essentially unrelated to the firm's view of the natural environment. The second level of valuable resource development involves those changes in the way the organization manages its relationship with the natural environment that takes place as a consequence of going through the process leading to certification or registration. The third level of resource development is a consequence of the diminishing returns associated with environmental management inside the focal organization itself (and the variable but essentially limited durability of the resources developed at the first two levels). This level involves the development of capabilities that look beyond the boundaries of the focal organization to other parts of the supply chain of which the organization is part. Developing skills of taking into account the environmental characteristics and impacts of both upstream suppliers and downstream customers and interacting with these may allow the focal organization to sustain its current competitiveness and also allow it to change its output in response to environmental constraints anywhere in the supply chain.

The following section briefly outlines the characteristics of the process leading to a certified environmental management system and explains the differences between ISO 14001 and EMAS. The third section examines the existing literature that seeks to marry constructs of environmental management and the natural environment to the constructs prevalent in the so-called 'resource based view' of the firm. The following three sections develop the argument that introduction of environmental management systems certified under ISO 14001 or EMAS create valuable resources (market positions, internal competencies and social skills) at three levels as a result of first mover advantages, environmental performance differentials and supply chain interaction. Section seven discusses the applicability and testability of the ideas proposed and offers concluding remarks.

2. ISO 14001 and EMAS characteristics and the nature of an EMS

This section describes the nature of an Environmental Management System, with a view to concentrating on the characteristics that may contribute to the development of valuable resources and competencies in firms adopting such a system. To set the stage we begin by briefly reviewing the differences between the ISO 14001 and EMAS standards that apply to environmental management systems and then present the components of the former as a long sequence of different organizational routines.

3. EMAS and ISO 14001

The current environmental management system standards emerged in the mid-1990s as developments of the older British Standard 7750. The 'Eco Management and Audit Scheme' (EMAS) was the first of the current standards to emerge but was restricted in scope and coverage, centering on industry exclusively, adopting a site-by-site approach and being restricted to EU member states. The ISO 14001 standard is global but less stringent with respect to requirements for public reporting and a stronger commitment to legal compliance. The two standards have been brought closer by the recently adopted revisions[6] to EMAS (known as EMAS II), and by pressure on firms to report on their environmental performance regardless of whether they have ISO 14001. A list of the major differences between the original EMAS and ISO 14001 runs to seven items (Roberts and Robinson 1998). Some are formal and concern the procedure through which certification is given by the 'competent body'.[7] Apart from

6 The major changes include a broadening of EMAS scope to cover all sectors, specification of ISO 14001 as the EMS required by EMAS, a softening of the strict site orientation, recognition of indirect (non-controlled) environmental aspects and the adoption of a distinct logo. For further detail, see http://europa.eu.int/comm/environment/emas/reference_en.htm

7 The two standards abound with specialized language. ISO 14001 uses expressions such as 'certification' and 'verification', while EMAS describes very similar procedures using the expression 'verification', 'validation' and 'registration'. This reflects that EMAS is essentially a government creation, even if it relies on private 'verifiers' and 'validators'. Thus, on top of the verification validated by an 'acreditied' verifier, firms must apply for and obtain the formal

the practical details of coverage (EMAS initially applied only to industry) and the policy of site registration (as opposed to firm level certification in ISO 14001), the more substantial differences concern EMAS requirement for a public environmental statement, verified by a third party, a stronger requirement to be in compliance with all relevant regulations (ISO 14001 requires only that firms state that they are 'committed' to compliance), a 3 year renewal cycle for EMAS, and finally, a much stronger commitment to continuous improvement using EVBAT (Economically Viable Best Available Technology). ISO only encourages this.[8]

Table 1. Management areas considered in an EMS cycle

Planning	1. Initial review
	2. Register of environmental aspects
	3. Environmental policy
	4. Environmental legislation and regulation
	5. Objectives and targets
	6. Environmental management programs
Implementation and operation	7. Environmental structure and responsibility
	8. Training, awareness and competence
	9. Environmental communication
	10. Environmental management system documentation
	11. Environmental document control
	12. Operational control
	13. Emergency preparedness and response
Checking and corrective action	14. Monitoring and measurement
	15. Nonconformance, correction and prevention
	16. Environmental records
	17. EMS audit
Review	18. Management review

This paper does not seek to trace the historical origins of these differences. More interesting are the similarities in terms of the large number of items or

registration from a national (in one of the EU countries) 'competent body' which is part of government.

8 The revisions to EMAS does not substantially affect these differences, except in the case of EVBAT, which is no longer part of EMAS II.

routines that together make up the process leading to a certification or registration. One of the many handbooks in this area (Roberts and Robinson, 1998) simply follows the 18 management areas that are required for ISO 14001 (table 1).[9] For each of these areas a set of routines required to cover the area is specified. In many cases the routines identified could be further divided into distinct subroutines. Item 15 in table 1, for example, concerns 'determination of nonconformance' which is part of the overall checking and correction routine for an environmental management system and involves the determination of whether the actual environmental management system erected in a firm conforms to the standard. Table 2 shows the steps involved in addressing this particular item.

Table 2

Diagnosis	Essential components of the EMS are missing or not functioning, such that the environmental policy, objectives, targets and the EMS itself are compromised.
Correction	On the basis of written procedure which specifies who investigates nonconformance, and who has authority to take corrective action.
Prevention	Analysis of relevant preventive measures, their implementation and the links to other procedures affected by the change.

The routines involved in both EMAS and ISO 14001 are used with varying frequency, depending on the requirements of the standard and the internal requirements of the accreditation bodies governing the work of verifiers or validators. However, ascertaining that a firm is conforming to the requirements of the standard at a particular point in time is not a guarantee that conformance is enduring. The firm may change it's organization or personnel turnover may erode the degree to which conformance can be said to remain. Nevertheless, both standards require considerable development of and regular activation of routines. Whether the standards and their associated routines result in better en-

9 Since ISO 14001 can be upgraded to EMAS according to an unpublished 'bridging' document we omit the distinction between the two systems for the time being.

vironmental performance, or do so in the most efficient way, appears not to have been much studied.

4. Natural environments and the Resource Based Perspective

Although the roots of the resource based perspective on the firms go far back, to Edith Penrose (Penrose 1959) and beyond, this view only became popular from the mid-1980s onwards, with the landmark contributions by Lippman and Rumelt, Wernerfeldt, Dierickx and Cool and Barney (Lippman and Rumelt 1982; Rumelt 1984; Wernerfelt 1984; Barney 1986; Dierickx and Cool 1989). In the context of the natural environment this perspective on the firm was taken up very thoroughly by Hart (1995), who suggested that a resource based perspective on the firm would be incomplete and often seriously lacking if it did not take into account that a firm's competitive ability also depends on its relationship with the natural environment. Hart further argued that this relationship is crucially dependent on the pressure for more sustainably oriented behavior exerted on firms by stakeholders (Hart, 1995).

4.1 The resource-based perspective

The resource-based perspective emphasizes the ability of firms to accumulate strategic resources that can generate rent and will continue to do so over time. The conditions under which this will occur have been identified as the existence of resource heterogeneity, inimitability of the resources, appropriability of rents and the existence of opportunity (Dierickx and Cool 1989; Peteraf 1993). The following paragraphs briefly note the core arguments supporting each of these conditions. This allows for the subsequent discussion of the extent to which an environmental management system, appropriately certified, may be the source of competitive advantage at different levels.

Resources have to be heterogeneous among firms in the sense that some firms possess resources that are superior to those of other firms, yet in limited supply (in the short term). Scarcity gives rise to rents when the resources are applied

(Rumelt 1987). Heterogeneous resources may generate rents even if they are not in short supply but instead are withheld intentionally by those controlling them, for example if the heterogeneity is the result of first mover advantages or irreversible commitment (Ghemawat 1986; Lieberman and Montgomery 1988).

Inimitability refers to the requirement that resources must be difficult to copy once their value is evident to competitors. If imitation is possible the advantage created by the resource is not sustainable. Thus resources must be imperfectly imitable (Dierickx and Cool 1989) and also imperfectly substitutable. Of the two constraints the former has received most attention in the resource-based literature. The key to understanding why imitation can be imperfect over long periods of time lies in a series of different mechanisms acting on firm resources, especially causal ambiguity (Lippman and Rumelt 1982) but also producer learning, buyer switching cost, producer reputation, buyer search cost and channel crowding (Lippman and Rumelt 1982). Furthermore, the valuable resources are developed inside the firm in ways that are socially complex and not clearly expressed by anyone involved (Dierickx and Cool 1989).

The third condition that must be met before a resource is valuable is that it must not be footloose, or mobile. If this was the case, the resource or its owner might be able to appropriate some or all of the rent in place of the firm (Dierickx and Cool 1989). There may be many reasons why factors of production, or resources, are unable to capture rents for themselves, including poorly defined ownership arrangements and unique relations between the resource and its place of use (Williamson 1979). Note, however, that this is not an either or discussion, but rather a matter of degree as to how much sharing of rents must take place (Peteraf 1993).

The fourth and final condition for a resource to be valuable is that there must be an opportunity to use it. These *ex-ante* limits to competition (Peteraf 1993) requires that there be previously untapped market opportunities open in which the valuable resource(s) can be deployed. This is the same as saying that for resources to be employed to generate rent, there is not room for preceding competition over positions (Barney 1986).

4.2 Natural environmental dimensions and firm resources

When it was initially suggested that countries with strong environmental regulation in effect helped resident firms becoming more competitive by forcing them into a first-mover advantage by requiring them to develop environmental competencies ahead of competitors in less tightly regulated countries [Porter, 1991 #1213; Porter, 1995 #482; Porter, 1995 #510], stinging criticism ensued (Walley and Whitehead 1994), more detailed studies began to emerge. These sought links between environmental performance and economic performance. Most studies in this area rely on US data from the Toxic Release Inventory (TRI) and on data about the financial performance of firms. Some studies concentrate on actual firm performance (measures in terms of return on sales, assets and equity)(Hart and Ahuja 1996), while others emphasize stock performance as the chosen indicator of financial performance (Klassen and McLaughlin 1996; Konar and Cohen 1997). The results are not quite clear. Hart and Ahuja (1996) find that it does indeed 'pay to be green', in the sense that operating performance is improved subsequent to pollution prevention programs being initiated. However, the improvement is subject to diminishing returns and the cross-sectional nature of the data may hide that most of the observed improvement is a once only case of 'picking the low-hanging fruit' (Hart and Ahuja 1996). In another study Toxic Release Inventory data were shown to affect stock prices to varying degrees, with the firms experiencing the largest decreases subsequently reducing their emissions more than their peers (Konar and Cohen 1997). In a study covering several years, Klassen and McLaughlin (1996) find a correlation between stock performance and environmental performance. This suggests that the improvement may be more than a passing one caused by waste reduction and efficiency gains (Sharma and Vredenburg 1998).

Although as yet only partially verified, the indications that sustained economic performance can go hand in hand with environmental performance suggests that firms may be able to develop unique resources that generate rent. The exact nature of these resources is, however, elusive. Stuart Hart (1995) has theorized about the linkages between firm resources and the natural environment, emphasizing three levels of strategic capability: pollution prevention, product steward-

ship and sustainable development. In each of these a key resource and a resulting competitive advantage can be identified. The capabilities are founded on unique resources. For example, pollution prevention, being personnel intensive as opposed to capital-intensive end-of-pipe solutions, requires employee involvement. Product stewardship is even more complex, requiring inclusion of external perspectives and stakeholders. Finally, sustainable development, and particularly those dimensions of it that refer to social equity, requires that the firm can build a strong and shared vision at all levels. The resources involved are valuable, not only because they are tacit, socially complex and rare, but also because they are path dependent and the lower levels (pollution prevention and product stewardship) become embedded in the highest level (Hart 1995).

Until recently the evidence for development of valuable firm resources have been limited to the studies relying on Toxic Release Inventory and financial performance data. A difficulty in these studies is that they may not always control for other possible influences that might affect the outcomes being observed and interpreted. Russo and Fouts (1997) try to avoid the problem of 'stakeholder mismatching' identified by Wood and Jones (Wood and Jones 1995) by controlling for industry growth. This study finds that environmental and economic performance go hand in hand, and that the relationship is stronger in industries with high growth (Russo and Fouts 1997). A study of Canadian oil companies also indicates that such a relationship exists (Sharma and Vredenburg 1998). By studying the oil firms using both case methodology and a survey, Sharma and Vredenburg also shed light on the exact nature of the valuable resources being generated. These include proactive practices such as stakeholder integration, higher order learning and continuous innovation (indicated by patent filings). Specifically, the study identified competitive benefits as cost reduction, operational improvement, better product quality, product innovation, organization-wide learning among employees, employee morale, company reputation and better stakeholder relations (Sharma and Vredenburg 1998).

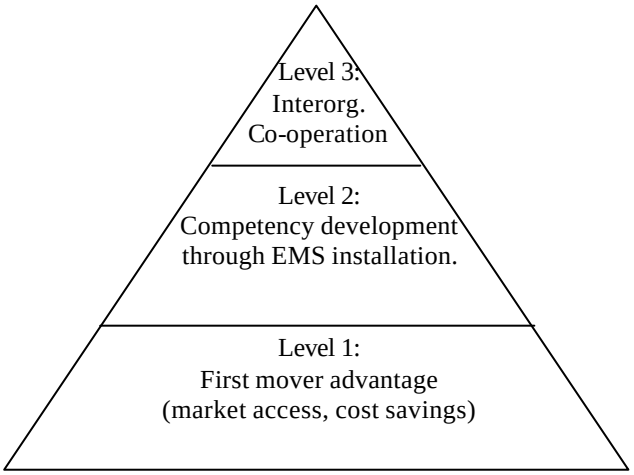
5. Environmental management systems and levels of competitive advantage

Just as there are many different reasons why firms choose to comply or over-comply with existing regulations (Konar and Cohen 1997), the decision to adopt an environmental management system and having it certified are numerous. Many firms are likely to feel the pressure for ISO 14001 or EMAS coming from (industrial) customers. There is, however, only limited support for this idea, at least as far as EMAS is concerned. A survey of 151 German managers reported by Freimann and Schwedes (1999) reports that the matter of 'favored placing of orders' or in other words, customer pressure, was ranked last but one among ten reasons given for obtaining EMAS registration. That is not to say that the managers were unconcerned with customer pressure, since this item was rated 3.6 on a scale where 1 was very important and 6 totally unimportant (Freimann and Schwedes 1999). Topping the list of important reasons were statements to the effect that EMAS helped improve environmental performance, and improved firm image, compliance and employee moral. In contrast, cost savings and competitive advantage were ranked sixth and seventh, respectively.

The prominence given to better environmental performance, image, compliance and staff moral may of course be peculiar to German managers, and indeed Freimann and Schwedes (1999) argue that the responses may well reflect post-hoc rationalization. Similarly, other observers also take a dim view of the reasons for EMAS adoption in Germany (Isaak 1998). A different study of 140 EMAS sites across the 12 EU countries asked about the top three benefits of EMAS registration. This produced a slightly different rating of the *benefits* of registration. Cost savings were rated the most important benefit, followed by better image, improved employee moral and better environmental performance in the following places. Competitive advantage ranked sixth in this study (Hillary 1998).

Both studies refer to elements explicitly or implicitly linked to competitive advantage. In the first study, performance, image, compliance and employee moral all have implications for competitive advantage. The same applies to im-

age, moral and performance in the second study. However, the benefits identified in these studies are not clearly linked to components of an EMS, nor are the benefits very clearly specified. Thus, more precise measurements are required to establish causal links between installation of an EMS and attainment of competitive advantage. As a first step in this direction, a three-level model of certification advantages is proposed. In some ways this model parallels the one proposed by Hart (1995). That model encompasses pollution prevention, product stewardship and sustainable development. However, in contrast to the Hart model, no strict line is drawn between reactive and proactive firms and no linkage is made between the first level advantage (certification to be first mover) and actual environmental performance. Figure 1 outlines the model proposed here. The triangular shape was chosen to reflect the idea that fewer and fewer firms are likely to progress from lower to higher levels.



6. Level 1: First mover advantage

A website located in Japan, using German data regularly tracks the number of ISO 14001 certifications and EMAS registrations in each country.[10] The very high number of Japanese certificates is remarkable but even more striking is the high ranking, in terms of total certifications, of countries such as Thailand (no.

10 http://www.ecology.or.jp/isoworld/english/analy14k.htm

16) and Malaysia (no. 22).[11] The number of certifications in these countries suggests two alternative extremes. One is that we are seeing foreign-owned subsidiaries doing what their parent companies do, getting certified. The other is that local firms are seeking to ensure that they gain or retain market access in markets where environmental pressure and awareness is high. Both explanations suggested are probably true, albeit the market access argument is considered more important in the context of the present discussion.

The mechanism at work when firms first seek a certified or registered environmental management system is that these firms are hoping to gain a first mover advantage (Lieberman and Montgomery 1988). They do this for several distinct but related reasons. The main advantage stems from the fact that firms having a certificate under ISO 14001 or an EMAS registration (or one of the numerous 'green' labels) are able to differentiate themself from the rest of the industry. The immediate value of a certificate is that it signals commitment to the green cause. This value may follow from the association between the (system) label and some generally held perception that the label equates possession with environmental quality of products or environmental performance.

The argument so far has essentially been that the certificate or registration is a piece of paper that gives a first-mover advantage, regardless of actual environmental performance However, some certificates and labels (EMAS and the Scandinavian SWAN label among others) do in fact require performance improvements. To the extent that certification puts the certified firm on a path with continued improvements in environmental performance this is a case of a more durable first mover advantage.

A third reason for obtaining certification or registration may be that firms expect that in addition to the advantages outlined above they will gain an efficiency improvement as a result of the environmental management system installation process. By going through this process new information regarding existing inefficiencies (environmental and other) may accrue. Assuming that firms

11 Some of the sites in Malaysia are subsidiaries of Japanese firms but there seems also to be considerable numbers of firms with ISO 14001 certification (M. Gelber, personal communication).

act on the information and improve their operation they will have a one-off advantage relative to firms that have not made similar gains.

7. Level 2: Advantage through new routines

Environmental management systems involve many procedures, as indicated in tables 1 and 2. These are more numerous when certification institutions require periodic reviews (as in the case of EMAS) than when they do not (as in the case of ISO 14001). Whether an advantage is in fact created depends first on the nature of these procedures and secondly on the extent to which the outcome of these procedures are in fact valuable to the firm.

Both of the main certification schemes in operation rely on the same definition of what constitutes an environmental management system and which procedures a candidate firm and site must undertake to gain certification or registration. Indeed, the revisions to the EMAS scheme explicitly refer to the procedures and requirements of ISO 14001 as the foundation on which EMAS builds.[12]

The requirements for creation of Level 2 advantage identified above were that the environmental management system implementation and certification procedure create a set of routines. These must in turn be valuable to the implementing firm. According to Nelson and Winter (1982), routines are defined as 'regular and predictable behavior patterns'. However, the fact that a firm works through the procedures required for certification or registration does not automatically result in the creation of new routines or that any tacit knowledge is created (Nelson and Winter 1982). For this to happen, the procedure would have to be repeated regularly. This is not a requirement for ISO 14001 but it is a crucial part of EMAS. Under this scheme, each registration must be reviewed every 3 years, in addition to which the registered site must submit an annual environmental statement. Both of these activities are necessarily accompanied by many routine procedures. Despite the emphasis placed on EMAS as a sys-

12 EU document 10677/2/99 REV 2.

tem more likely than ISO 14001 to generate routines and associated tacit knowledge, this does not mean that non-European firms that cannot obtain EMAS registration will never develop routines as part of the environmental management system installation process. Other factors may contribute to repetition of procedures and the building of routines, for example national legislation on environmental or toxic release reporting.

The additional requirement for level 2 advantages is that routines and procedures created as a result of environmental management system installation and maintenance are valuable to the firm. A first step in the process to determine whether this is the case is to examine the set of routines and procedures for heterogeneity, substitutability, mobility and opportunity (Peteraf 1993). To this a second step may be added to further address the possible erosion of any of the four criteria of resource value. This second step involves application of the distinction between control and learning developed by Sitkin, Sutcliffe and Schroeder (1994) in the context of total quality management (Sitkin, Sutcliffe and Schroeder 1994).

The heterogeneity issue has already been examined above: At the formal level, where the question is whether a firm can claim that it is certified, the environmental management system can be a source of heterogeneity as long as competitors do not follow and also adopt a certified environmental management system. Furthermore, to the extent that the process of certification leads to cost savings and efficiency gains not achieved by competitors, this also gives rise to heterogeneity.

A certified environmental management system is not really substitutable. A firm may of course create its own environmental management system and claim that it is better than one that is certified but that requires a long process of building an individual reputation. Part of this process is bypassed by the legitimacy conferred by ISO 14001 and even more by EMAS by virtue of its foundation in government and its general image as a stricter standard.

Imitability is more open to discussion. Both of the certification standards are extremely well documented and there is a mushrooming literature on how to implement and use ISO 14001 and EMAS (Roberts and Robinson 1998). However, the benefits of an environmental management system only emerge if the process of implementation is successfully completed and the organization manages to absorb the many new routines specified in one of the standards. Just as the pollution prevention strategy described by Hart (1995) is 'people intensive, and it depends on tacit skill development through employee involvement' the long series of steps involved in implementing an EMS has many of the same characteristics. The process involves the accumulation of tacit knowledge in many people in the organization. The process involved in the environmental management system also involves some development of socially complex resources, especially in those areas where the system requires management to take a more systemic view of their organization.

The final requirement, existence of demand for products supplied by firms holding ISO 14001 or EMAS is also important. The studies of EMAS described above suggest that managers do not see demand for products from firms with an environmental management certificate. However, even a causal look at a sample of car and truck manufacturers (e.g. Volvo Cars, Volvo-Scania Trucks and BMW) suggests that these firms very actively pursue the objective of having suppliers that are ISO 14001 or EMAS certified. What this discussion is really concerned with is the degree to which firms can differentiate their products on the basis of environmental attributes and especially the ability to include production of public goods into the differentiation (Reinhardt 1999). If ISO 14001 or EMAS allows firms to differentiate, then a valuable resource or capability may be present.

While the preceding section might be taken to indicate that firms embarking on a certified EMS may end up developing valuable capabilities and resources, this is an overly optimistic reading. There are strong reasons to believe that the outcome of EMS implementation and subsequent efforts to become certified or registered may equally well fail to develop any valuable capabilities and resources, let alone significant advantages of preemption. The reasons for this

reservation can be found in the emerging critical literature concerning the problems encountered in TQM implementation. The first reason to be concerned about the efficiency of an EMS is related to possible ambiguity about what the EMS really involves. Just as studies of the TQM literature suggests a gap between the intentions of the originators of the TQM idea and the way it is used as a catch-phrase for many other things (Hackman and Wageman 1995), there may be a lot of talk about environmental protection and sustainability surrounding a firm's decision to implement and certify an EMS. Similarly, once the work gets under way, managers may base the development of a TQM program on rhetoric of success that is in effect a self-fulfilling prophecy. At the same time the TQM rhetoric may be taken seriously and unleash a process in the organization which is difficult to control and which has potentially adverse effects (Zbaracki 1998). In a case study of an electronics firm it was found, for example, that the TQM program might increase productivity, improve quality and lower cost in the long term. However, this was achieved at the expense of short run problems with excess capacity, financial stress, staff cuts and declining commitment to continuous improvement (Sterman, Repenning et al. 1997). Although environmental management systems are different, some of the same, or similar, problems may occur as part of implementation, certification and operation of such a system.

Notwithstanding these potential problems with the use of environmental management systems the extent to which they generate advantage, and the sustainability of this advantage may be analyzed using the distinction between control and learning identified by Sitkin, Sutcliffe and Schroeder (1994). These authors apply a contingency perspective and argue that in settings of low uncertainty, firms emphasize the control dimension of TQM while they have to enhance experimentation and non-routine tasks when uncertainty is high. In the context of natural environment one might of course argue that uncertainty is always high, even though firms may perceive stability. Alternatively, the balance between control and learning approaches may be different, given the differences in factors controlling the level of uncertainty facing firms in relation to the natural environment.

Although the distinction between 'environmental management control' and earning' is thus borrowed from the TQM literature, it may help us distinguish the degree to which valuable resources are developed as a result of an environmental management system installation. In the environmental context, control emphasizes existing operations and efforts reduce emissions (from end-of pipe approaches to pollution prevention) and will as such be characterized by diminishing returns at the margin. In contrast, environmental management learning leans towards continuous awareness that products and services have to be re-designed to allow on-going improvement of environmental performance.

8. Level 3: Advantage from inter-organizational relations

If a firm manages to solve the problems associated with implementation of a certified environmental management system it is in a position where it can use the system to optimize its environmental performance. However, as long as firms contend themselves with things inside their own borders, efforts aimed at polluting less are associated with diminishing marginal returns and eventually the time will come when the firm cannot make further investments to reduce pollution. If further improvements are to be made they must be sought elsewhere in the product supply chain. This is similar to the distinction between pollution prevention and product stewardship (Hart 1995), in the sense that the firm has to move beyond the practicalities of internal coordination to integrate the environmental aspects of both suppliers and customers and optimize environmental performance from there. Product stewardship and even more so sustainable development as proposed by Hart (1995) require inclusion of all stakeholders as well as the development of low-impact technologies and competencies. According to the model proposed by Hart, the two 'upper' levels involve a progression from product stewardship to sustainable development. This requires socially complex skills (for coordination along the supply chain and for bringing in other stakeholders' views) and the rare and firm-specific resource of being able to generate internal consensus about a shared vision. It also requires

skill in differentiating actions that are in the interest of the firm from those that only serve a socially desirable objective.

The question is whether level 3 advantages are helped by a certified environmental management system. Thus, following the identification of socially complex resources, for example a design process that minimizes the life cycle impacts of new products (Hart 1995), we may ask whether an environmental management system contributes to such a process. As in many other situations, the answer is that 'it depends' on the situation. Firms may on the one hand develop products that do minimize life cycle impacts without any formal environmental management system. On the other hand, a formally certified system may provide a number of advantages. These can follow from the legitimacy conferred on the installing firm as a result of certification, thereby rendering the data purportedly underlying life cycle assessments more reliable. In terms of the two alternative certification standards, EMAS has the advantage here due to its stricter criteria and the integrated reporting requirement.

9. Discussion and concluding remarks

Firms that decide to develop an environmental management system and decide to have it certified or verified according to one of the two prevalent standards (ISO 14001 or EMAS) do so for a reason. The limited information regarding managerial motives for and benefits of engaging in the EMAS process points to the desire for better environmental performance and to cost savings. Explicit concerns for firm competitiveness follow further down the lists of motives and benefits.

If examined in detail the environmental management system specification required for certification to the ISO 14001 standard (and thereby also to the more stringent EMAS standard) requires the firm to implement a large number of procedures that, if studiously applied and acted upon, automatically leads to the development of a very large number of routines and sub-routines aimed at improving environmental performance.

It has been argued here that this process has the potential for creating competitive advantage at three distinct levels. At the first level, certified or verified environmental management systems as competitive preemption involve a first-mover advantage for firms that opt for certification. The advantage lasts as long as competitors fail to develop a certified environmental management system, and to a lesser degree as long as these competitors fail to achieve cost savings and efficiency gains through the internal change processes initiated by the EMS development and certification process.

At the second level, the certified environmental management system was examined with respect to its character as a valuable resource or capability. It was found that a certified environmental management system does have the potential to generate a set of valuable competencies as a result of resource heterogeneity, non-substitutability, immobility inimitability and the presence of market demand. However, it was also argued that although the process of installation and certification of an environmental management system may have the potential to generate these resources, the outcome of a certification process is not assured. Parallels drawn from the literature critical of the total quality movement suggested some of the potential obstacles.

Finally, the third level of advantage was specified to accommodate situations where the certified EMS help firms move beyond reducing the impact of their own activities (a process characterized by diminishing returns) to a more supply-chain oriented approach (Sharfman, Ellington et al. 1997; Sharfman, Shaft et al. 1998). It was suggested that while firms may be able to engage in such an approach without having a certified EMS or any EMS, such a system could well help by providing legitimacy to environmental efforts in general and to life cycle oriented claims about product impacts in particular.

The process of gaining advantage from a certified EMS can also be described as having either a control focus or an innovation focus. A control focus, which roughly corresponds to level one in the model presented here) is aimed at risk identification and reduction and as such is likely to encounter decreasing returns (depending on how fast new risks appear). An innovation focus corre-

sponds to levels 2 and 3, as identified here, is more likely to result in a sustainable advantage for the firm.

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