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Adoption and maintenance of environmental management systems: critical success factors

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Abstract

The implementation of various management systems and standards has become an important activity for organisations irrespective of their size, sector or nature of the business. Even with a history of implementing change across the organisation, managers continue to experience resistance and challenges when implementing and maintaining the systems/standards, whether they be in quality, occupational health and safety, environmental or any other area. Based on a major research project recently completed, this paper presents the critical success factors for successful implementation of an environmental management system. The project involved three phases of fieldwork: preliminary interviews, a questionnaire survey and in-depth interviews. A brief summary of the findings from each of these phases of research is presented. Based on the findings, the paper discusses the critical success factors for the successful implementation and maintenance of EMS.

Introduction and literature review

This paper discusses the critical success factors (CSF) in the adoption and maintenance of environmental management systems (EMS). It is anticipated that if organisations ensure these factors, in addition to the guidelines provided by the ISO 14000 standard series (for instance in ISO 14004), they will experience less resistance from their stakeholders and consequently will have a successful EMS implementation. For this paper, “successful” implementation has been defined as one being “smoother, faster, effective and sustainable” in nature.

The critical success factors presented in this paper are based on the findings of a large research project that consisted of three major phases of fieldwork as well as secondary sources of information including an extensive review of the literature on environmental
management. However, due to the large number of publications on environmental management, only a brief literature review has been included in this paper.

Especially over the last decade, companies have been striving to achieve competitive and market advantage by implementing and certifying to various management systems and standards (Florida, 1996; Frost, 1999). An EMS is a part of an organisation’s overall management structure and system which aims to address:

... [the] immediate and long-term impact of its products, services and processes on the environment. It provides order and consistency in organisations' methodologies through the allocation of resources, assignment of responsibilities and on-going evaluation of practices, procedures and processes (Hemenway, 1995).

Pressure (Berry and Rondinelli, 1998; Gullifer, 1999) from its inter-related and inter-dependent stakeholders (such as the government, pressure groups, community, customers, employees, etc.) is further pressurizing companies to adopt EMS. Literature has documented numerous examples which demonstrate the organisations' changing perceptions towards addressing of environmental issues, from being reactive to proactive (Henriques and Sadorsky, 1999; Berry and Rondinelli, 1998).

ISO 14000 series of standards or the International Standard for Environment was released in September 1996, developed to provide a common ground for evaluating and benchmarking an organisation’s EMS (Standards Australia, 1996; Hale, 1997; Erickson and King, 1999; Lutz, 2000). The ISO 14001 standard involves implementation and continuous improvement of five key elements: environmental policy; planning; implementation and operation; checking and corrective action; and management review (Standards Australia, 1996; Krut and Gleckman, 1998; Erickson and King, 1999; Nattrass and Altmore, 1999). Adoption of ISO 14001 has also been shown to provide both tangible and intangible benefits to companies, such as: cost reductions and savings; improved communication; reduction in fines; improved corporate image; and improvement in operational processes, to name a few (see West and Manta, 1996; Maxwell et al., 1997; Chandrashekar et al., 1999; Nattrass and Altmore, 1999; Zingale and Himes, 1999; Darnall et al., 2000; Hanna et al., 2000; Lee-Mortimer, 2000; Schaarsmith, 2000; Daily and Huang, 2001). Maintenance of any EMS, and especially a certifiable standard such as ISO 14001, involves undertaking regular internal and external audits. Organisations use auditing as a main method to measure and monitor their performance and also to ensure their compliance with legislation.

It could be said that implementing EMS can assist organisations address their “soft” issues and their corporate image by standardizing their operations and reducing waste of resources including energy, gas, water, human and time. Additionally, it will also help in cost saving from fines and other liabilities. On the other hand, organisations need to keep in mind that ISO 14001 is a voluntary system and a tool and thus does not replace the existing regulations but provides guidance and flexibility in addressing both environmental and business issues. To assist the organisations in understanding this compatibility, one of the research objectives was to identify the critical success that can be adopted by the managers.
The rest of the paper is structured as follows: the next section presents the research methodology used to complete the project. Next, discussion of the critical success factors for EMS adoption and maintenance are presented. Finally, brief conclusions are presented.

**Research methodology**

This paper is based on the findings of a large research project that involved three phases of fieldwork. The project was aimed to achieve two main objectives:

1. To examine the role of employees and suppliers as organisational stakeholders during the EMS adoption process.
2. To develop a set of guidelines and a framework for EMS implementation within the organisations.

The three phases of fieldwork included a combination of a questionnaire survey mailed to 286 Australasian organisations (certified with ISO 14001) and interviews (nine preliminary interviews and 12 in-depth interviews) conducted with managers responsible for various management systems, primarily environmental; quality; and occupational health and safety. The critical success factors presented in this paper are based on the knowledge gained and experiences of the respondents and interviewees during the adoption of their EMS and other management systems. A brief summary of findings from each of the three phases of fieldwork is presented in Table I.

**Critical success factors for EMS adoption and maintenance**

The majority of the critical success factors identified are general in nature and accordingly can be used by any organisation, regardless of its size, sector or nature of the business. These are presented below under four broad headings, namely: Management leadership and support; Learning and training; Internal analysis; and Sustainability.

**Management leadership and support**

Top management leadership and support is vital in ensuring organisation-wide awareness and understanding of environmental issues and commitment to the implementation of the system/standard. This understanding and commitment is required for EMS adoption, its maintenance, and subsequently its certification.

*Top management commitment.* Time and again, the importance of top management leadership, commitment and involvement was emphasised during each stage of the EMS adoption process. This will only happen if top managers understand the significance of adopting an EMS for their organisation. Educating themselves about environmental issues is the first step. Listed below are the ways in which top managers can have a positive impact on their organisations' EMS implementation:

- providing leadership and motivation to employees at all levels;
- appointing a champion/manager for overseeing the implementation and progress of the environmental issues and programs;
- assisting the EMS implementation manager/team in finalising realistic and achievable objectives and targets;
- allocating time for communication, training, motivation, etc. during the EMS adoption stages; and
- providing adequate and timely resources for implementation of the changes required as part of the EMS implementation.

At the same time, the EMS implementation manager/team needs to be aware that this commitment from the top management will be achieved and maintained only when the:

- Top management is made aware of the positive returns (for instance costs savings) from the implementation of EMS, as this will also help in justifying the dollars, time and other resources spent when adopting the EMS. Managers responsible for environmental issues thus need to conduct a cost-benefit analysis before the top management can consider and approve the implementation of the EMS. Furthermore, this analysis will help these managers and top management in deciding whether or not EMS implementation and, more importantly, certification is required by their organisation.
- Top management has an awareness and understanding of the significance of the EMS itself and for the organisation’s operations. How the organisation and, more importantly, the internal and external stakeholders benefit from EMS adoption also needs to be specified.
- Top management is aware of the liabilities now placed both on themselves and the organisation in case of an environmental accident. Due diligence thus offered by implementing an EMS can act as a strong selling point.

Numerous examples of commitment from the top management in various areas of management, including EMS, have been cited in the literature – NSF (1996) Chandrashekar et al. (1999), Daellenbach et al. (1999), Knights and McCabe (1996), Nattrass and Altmere (1999), Taylor et al. (1994), Lutz (2000) and Fielding (1998). It is thus essential that top management commitment is achieved and maintained throughout the EMS process for it to be successful.

**Cultural change and organisational vision.** For the EMS to be successfully adopted and maintained it is essential that an organisation gives itself enough time and sets realistic and achievable objectives and targets. Time should be allocated to first understand the system in detail and then to communicate and spread the information and changes required from the implementation across the entire organisation. Time is also required for the “cultural change” to occur effectively throughout the organisation. Managers thus need to realise that there are no shortcuts for the system to be implemented and maintained successfully. Commitment, as one would expect, is required from across the organisation both for the cultural change and implementation of EMS to occur, as highlighted in the literature by Nattrass and Altmere (1999), Russo and Fouts (1997) and Wagner (2001a,b).

**Allocation of resources.** For the EMS to be implemented and maintained, regardless of whether or not the organisation then decides to certify it to a standard, resources (such as dollars, time, expertise, personnel; henceforth these collectively referred to as resources)
needs to be allocated and provided on a continual basis. Researchers such as Scrimshire (1996) and Hersey (1998) have supported the availability of resources for implementation of EMS. The results of the research show that resources were readily made available when top management was fully committed and supportive of EMS adoption. Without the availability of adequate resources organisations can experience delays in the adoption and completion of EMS. The lack of resources and delays can also lead to resistance from the employees if they are not fully involved and informed about the changes being introduced.

Appointment of a champion. Appointment of a champion has been identified as a key role for top management and an essential requirement for the smooth introduction, implementation and maintenance of an EMS. This person needs to have full support, adequate resources and authority from top management. Everyone in the organisation should be aware of the appointment/existence of this person, and it is the responsibility of the top management to ensure this happens. Ideally, the champion should be a representative from middle to top management level and should have communication (written and oral), negotiation and managing (people and procedures) skills. The person should be able to take on a range of responsibilities, have the authority to take appropriate actions, as required. Furthermore, the champion should be computer literate and have knowledge of company operations and procedures and be able to modify the existing systems and procedures as required in order to maintain and sustain the EMS. It should be noted that an increasing number of organisations, for instance as in the case of the Rover Group in the UK (Bramley, 1998, p. 29), the term “manager” is being replaced with “champion” as it denotes a person looking after issues of tomorrow. Examples of appointing a champion have also been highlighted in the literature by authors such as Petts et al. (1998).

Importance of communication. Two-way communication between the organisation and its internal and external stakeholders is the fundamental basis for the successful implementation and maintenance of the EMS. Highlighting the significance of communication, Cline (2000, p. 560) comments that “communication is ... necessary if one wants to successfully implement a policy”, in this case, for instance, an environmental policy. Organisations thus need to identify and ensure that effective communication is taking place and address the following:

- it is providing opportunity for organisations to identify its different internal and external stakeholder whose involvement and contribution is imperative when finalising and implementing EMS objectives and targets;
- it is acting as an information medium/channel for all stakeholders to learn about the potential changes and its impact on the stakeholders accompanied with the implementation and/or certification with EMS;
- it is opening avenues for exchanging feelings, ideas and suggestions about the changes and how they best could be adopted to encounter least resistance; and
- it is increasing the awareness within the stakeholders, for instance, the employees and suppliers, of the importance and objectives behind EMS implementation, accordingly reducing the resistance that may otherwise be encountered due to lack of understanding and knowledge.
Organisations will thus benefit by communicating and involving as many of their stakeholders as possible during the various EMS adoption stages. This communication and interaction can be initiated and enhanced by regularly talking, receiving feedback and exchanging ideas with the stakeholders. This will result in substantial benefits, as experienced by a number of the companies interviewed in third phase of the research and also reported in the literature by researchers such as Chandrashekar et al. (1999), Moore (1999), Nattrass and Altmore (1999) and Wilson (1997).

Avoidance of personality clashes. When implementing individual systems/standards or when integrating a number of different management systems it is crucial that personality clashes are avoided and people put their egos behind. This was highlighted by a number of companies interviewed during the third phase of the research. The interviewee from one company commented that, “if Australian manufacturing or Australian businesses wants to be competitive in the rest of the world, you have to look at smart ways of doing things and you can’t have people building empires and you can’t have big egos”. This requires the managers and the employees working together. To implement various management systems individually or to practice an integrated system it is also essential that the organisation has a “culture that's willing to embrace change” as commented by another interviewee. This culture, as recommended by the interviewee, starts from the top of the organisation and spreads throughout the organisation. Being “innovative” and “open-minded” about the changes taking place is also required by the organisation, for integrating the systems.

Learning and training

Learning and training of all employees is absolutely critical to successful adoption. This was emphasised again and again by all companies involved in the study and took many forms including the following:

Learning from other organisations’ experiences and benchmarking. Organisations contemplating adopting EMS should learn from other organisations’ experiences, both within the same and different industrial sectors, as this will assist the organisation in reducing the potential challenges/obstacles encountered. This view has also been highlighted and supported in the literature by researchers such as Delmas (2001) and Kirschner (1995). Benchmarking can help organisations to identify world best practices. The lessons learnt from this exercise should enable organisations to improve their operations and procedures and comply with the “continuous improvement” clause of the ISO 14001 standard. Improvements made within the organisation's operations from comparing and benchmarking has been shown empirically by Christmann (2000) in questionnaire survey findings of 512 chemical industry companies in the USA as well as in the case study research conducted by Weyerhaeuser (Karch, 1992/1993, p. 13).

Reference to industry guidelines/standards. Before and during EMS implementation organisations should, as a first information-point, refer to their respective industrial sector guidelines and requirements applicable to them. An example of sector-specific guidelines is the Civil Contractors Federation (CCF), CCF-EMS document for the construction sector, which is aligned approximately 80 per cent to the ISO 14001 standard. ISO 14004, the Annex
document, providing guidelines and a checklist for the ISO 14001 implementation, can also assist the organisations during EMS adoption. However, these guidelines may require modifications depending on the nature of the business and the organisational culture. Organisations should thus study and familiarise themselves with the system/standard they wish to implement (Boiral and Sala, 1998) before implementing the EMS.

**Employee induction and training.** In many instances changes resulting from EMS implementation are accompanied with some resistance from the employees. It is human nature to maintain the status quo. Employee resistance can be reduced or eliminated by developing awareness and understanding of the basics of the system, its significance and the detailed benefits derived from its implementation for the employees and for the organisation. This was emphasised repeatedly during the in-depth interviews and has also been highlighted in the literature by researchers such as Evenson (1997) and Bragg et al. (1993). This resistance can be further reduced by involving the employees in the decision-making process and in the EMS implementation process. This view has also been supported by Kinsella (1994). Employee involvement has been shown to have a “positive correlation with the improvement of business performance” (Sun, 1999, p. 588) and also shown to work within the manufacturing and municipality organisations (Darnall et al., 2000). In the view of Heller (1998), participative practices by management reduces resistance, increases employee involvement and loyalty and increases productivity.

Other researchers emphasising the importance of training, employee empowerment and employee involvement include Blacklow and Waddell (2001), Daily and Huang (2001), Delmas (2001), Imberman (1999), Marguglio (1991), Pawar and Rissetto (2001), Rezaee and Elam (2000) and Johnson (1997). It is essential that the organisation conducts training and induction programs for both its existing and new employees. These initiatives and programs once again require involvement, commitment and resources from the top management. These training/induction sessions, as a minimal, should include the following topics:

- impact of company operations and individuals' actions on the environment;
- importance of addressing environmental issues for the company's profitability and survival;
- contribution that the company's management and employees can make to reduce their impact on the environment; and
- legal implications for the company and the individual employees for impacting on the environment.

Organisations may also need to conduct general awareness training and skills training for their existing employees. General awareness training should be provided to all employees working within the organisation, irrespective of their department or position. The general environmental and company aspect/impact related awareness issues need to be incorporated in this training program. Depending on the size of the organisation and nature of its business, an organisation can choose to conduct this training either in short sessions over a period of time or as an intensive training program. To ensure that all the employees understand the environmental issues and the measures that can be taken to address them, it is essential to conduct some form of evaluation that can either be done in the form of completing short questionnaires or by conducting informal tests. These evaluation methods
can also act as a means of receiving feedback and suggestions from the employees themselves.

Skills training is more specialised and tailored for employees whose operations and activities have a direct and/or potential impact on the environment. These employees thus need to be made aware of the importance of their operations for the company and its impact on the environment, along with the contingency measures they should undertake in case of an emergency.

In addition to training their existing and new employees, organisations also need to conduct regular training for their contractual/project workers. This is especially applicable in companies with a mobile or project-based workforce such as within the construction or consulting sectors. In these organisations, innovation and creativity in conducting training along with communication plays a crucial role to educate the employees in the various aspects of EMS implementation. In some organisations, depending on the contract or term of the causal/temporary employees, this training may need to be conducted on a daily basis.

Empirical research conducted by Gee and Nystrom (1999) has shown a direct relationship between high levels of skills training provided to employees and high quality product levels. An example of this relationship can be seen in Shell, which spends about $2,400/employee annually on their “training that helps employees [to] advance in their fields, move into new endeavours and develop new skills” (Geus, 1997, p. 57). Various theories of participation (psychological, organisational, political, sociological, radical critique) are “used collectively [by organisations] to support [their] participation programs” (Webber, 1997, p. 2). In the view of Abarca (1999), a good starting point to train people internally is by training them to do internal audits. This internal-auditor training program should encompass issues and areas both within one's own and other departments, giving them cross-functional and cross-departmental experiences.

*General training and awareness for suppliers and other stakeholders.* Organisations should also conduct training programs for their external stakeholders such as their suppliers/contractors/customers before they could be involved and contribute towards the EMS adoption. This training will especially be applicable and required for their small-sized suppliers who may lack adequate resources to learn and implement the new systems and standards. These training programs should aim at both increasing the awareness and understanding of the environmental issues and simultaneously also providing/offering suppliers with an opportunity to be involved during their customer organisations' EMS adoption process.

It was found within the literature and during in-depth interviews that supplier awareness and knowledge in the environmental issues and EMS had been increased by the organisations in a number of ways. Questionnaire surveys of suppliers (both as an information and evaluation source) focus on a number of areas such as policy and procedures in place and how environmental issues are incorporated within these. As and when required, organisations undertake verification of the questionnaire responses by conducting on-site visits. Additionally, sending newsletters and other information highlighting the importance of EMS and showing videos was also being practised by some of
the organisations interviewed. One of the organisations interviewed had even assisted its suppliers in implementing and getting ready for ISO 14001 certification by sending its own personnel to their site. Other researchers supporting the involvement of suppliers and other external stakeholders during the EMS implementation process include Quazi (1999), Miles and Covin (2000), Slowinski et al. (1997), Florida and Davison (2001), Florida (1996), Handfield et al. (1999), Beamon (1999) and Noeke (2000).

**Internal analysis**

This section discusses a variety of activities and analysis that should be carried out to ensure successful implementation of EMS.

*Conducting cost-benefit analysis.* It was highlighted by a number of interviewees during the third phase of the research that for an environmental manager/champion to be able to communicate and sell the importance of EMS to top management, it is necessary to quantify both the costs and benefits resulting from EMS adoption. This cost-benefit analysis will assist in obtaining top management commitment and resources to implement the EMS. Furthermore, this analysis will help managers in deciding whether or not the organisation should obtain third-party certification of its internal EMS to a formal standard. Before any benefits can be realised from EMS implementation, all organisations will initially be required to make investment with respect to training its employees; upgrading equipment; and to even hire an external consultant. Hence it is essential that the organisation keep a record of the costs incurred and the savings obtained from EMS implementation. Hence a cost-benefit analysis will serve two main objectives, first it will assist the organisations in tracking progress in meeting their objectives and targets, and second, it will help them in calculating the pay-back period and the actual/real savings made from EMS implementation.

However, managers should recognise the fact that many of the benefits resulting from EMS adoption are long-term in nature and thus should be viewed as a long- rather than a short-term investment. Also not all benefits can be quantified into dollar terms, for instance the improved awareness amongst the employees and other stakeholders, or the improved or positive corporate image. Florida and Davison (2001, p. 79) have empirically shown that “EMS [is] an effective tool for managing environmental costs and risks inside and outside the factory in ways that add to – rather than detracts from – the bottom line”. However, in order to reduce EMS implementation costs, as commented by a number of interviewees in the third phase of the research and also indicated in the literature by Newson (1996) and Pawar and Rissetto (2001), organisations can choose to implement EMS by site/department basis rather than throughout the organisation simultaneously.

*IER/gap analysis.* It is imperative that a comprehensive initial environmental review (IER), also commonly referred to as the gap analysis, is conducted before the EMS adoption process is initiated. This has been recommended in the literature by researchers such as Bowern and Mortensen (1999), Hormozi (1997), Kloepper (1997), Pollution Engineering (2001) and Schiffman et al. (1997), especially when an organisation lacks an internal EMS. The results of the IER should form the basis for developing the organisation’s environmental policy, which should be extensively discussed amongst all stakeholders and agreed to by all the company employees. The majority of the organisations interviewed had integrated their
internal audit objectives with those required for an IER. This way they were able to identify the gaps in the existing system/procedures without wasting valuable resources to do so separately.

Identification of aspects and impacts and setting of objectives and targets. An important part of implementing the EMS and conducting an IER is to identify the activities and aspects of the company that have an impact (either positive or negative) on the ecological environment. Once identified, these aspects and impacts should then be prioritised using a standardised “risk assessment” method and progressively addressed. To avoid confusion and duplication of procedures, the majority of the organisations interviewed during the third phase had used their existing quality and OHS “risk assessment” methods for EMS with appropriate modifications made to accommodate environmental issues.

Identification and then prioritisation of the aspects and impacts assists organisations in finalising their objectives and targets to be achieved as part of the EMS implementation and continuous improvement program. If an organisation decides to certify its internal EMS to a formal standard, the external auditors will cross-check the identified aspect and impacts to their EMS implementation before granting them the (re)certification. The importance of employee involvement during the process of aspect/impact identification and prioritization has been highlighted by researchers, including Lawrence et al. (2002) and Wilson (2000).

Following the identification of the aspects/impacts, the next step is to finalise the objectives and targets to be achieved both by the individual departments and the organisation overall. These objectives and targets should be realistic and achievable, keeping in mind the available resources and other limitations (e.g. time pressure and external forces such as political and legal) of the organisation. Furthermore, the objectives/targets need to be reviewed and appropriately adjusted whenever significant changes are implemented. In setting these objectives/targets, those affected by them should be involved as much as possible. Hence effective communication is imperative, ensuring that all stakeholders understand the significance of achieving the objectives/targets, the associated timelines and resources required to achieve them. Progress made towards the achievement of the objectives and targets should be documented and reviewed regularly as part of the internal audits. The results of these internal audits can then be used for two main purposes, first to monitor the progress, and second to justify changes that need to be made to the objectives and targets.

Necessity and usage of audits. Conducting regular internal and external audits should be an important activity for all types of organisations. These audits (in particular internal audits) should incorporate the completion of gap analysis and the identification of potential improvement areas and the operational procedures. The results of these audits should be used to update the current procedures and processes, so that they fulfill the standard’s requirements. They can also act as a communication medium between management and employees and other stakeholders of their commitment and importance of addressing the environmental issues. Internal audits provide organisations the opportunity to learn from their previous mistakes and correct them before they become too large or serious or are discovered/unfolded during external audits.
Audits, when conducted regularly and with clear objectives, offer a number of advantages to organisations. Benefits of conducting third-party audits have been highlighted in the literature by Vinten (1996), Maltby (1995) and Hormozi (1997). However, many times the audits conducted by the organisations are not sufficiently exhaustive and comprehensive to ensure compliance with legal and other requirements. It is thus essential that the audits are “conducted within a structured management system and integrated with overall management activity” (Pollution Engineering, 2001, p. 56). This once again emphasises the importance of integration of different management systems within an organisation. Auditors also have a “key role to play in pointing to the future and guiding the auditee accordingly. To do this, auditors have to be up to date, constantly researching technological trends, economic development and realities of the business environment” (Sayle, 1995, p. 250).

**Document control system.** Keeping an up-to-date and complete documented system covering all operations and procedures is a major challenge faced by the majority of the organisations. Resulting from its daily pressures of achieving targets and deadlines, organisations either forget or are careless/irresponsible in regularly reviewing and updating their procedures and documenting them promptly. Accordingly they face problems and in some instances non-compliance during external audits. Organisations should thus review and update their documentation at least once annually, if not more periodically, irrespective of whether or not there have been changes made within the existing processes and procedures.

The ISO 14001 standard, for instance, does not give preference to either a hard (paper) or soft (electronic) version of a documentation system within an organisation. However, the standard does requires organisations to maintain an up-to-date documentation with appropriate labeling and numbering and a master copy of the obsolete documents for reference purposes. Organisations generally prefer to maintain both the paper and electronic versions of their documentation as one method maybe preferred over the other by the external auditors. However, the majority of the organisations are increasingly moving towards an electronic documentation system due to the advantages offered by it, including ability to promptly make the changes in the old versions; less usage and wastage of resources such as paper; and simultaneous wide accessibility by all the stakeholders. With the integration of systems now becoming a common trend, organisations are also integrating their documentation systems, generally by using the same template for all their management systems. Beath (2001) has summarised a number of benefits from having an electronic documentation system, which he termed as “Environmental management information system”.

**Integration of existing management systems.** Many organisations find it easier to implement the EMS on top of their already existing management systems such as QMS or OHS as the cultural change has usually taken place during their earlier system implementation. Accordingly, organisations generally find it easier to base the EMS procedures on the existing QMS/OHS. This point also reinforces the benefits from “integration” of various management systems discussed below. Numerous examples of companies integrating their business strategies and management systems with EMS are evident in the literature, one of them being “Plasticolours” in Ohio (Hasbach, 1998, p. 63). Plasticolours, when implementing
the EMS, took this as an opportunity to integrate the environmental standards into its existing business management systems. Clark (1999), Graff (1997), Hale (1997) and Scrimshire (1996) are examples of other researchers supporting the views of Hasbach (1998) of aligning EMS with existing systems.

As indicated in the previous paragraph, the recent trend within organisations is to integrate all the existing management systems into one combined system. This offers a number of advantages for the companies, including: saving of resources (time, procedures, dollars); learning from past mistakes of implementing individual management systems; and encouragement from upcoming standards, such as the ISO 14001 and ISO 9001:2000 to integrate systems. Numerous examples can be found in the literature where organisations have integrated their systems, one of them being Uniseal (Wagner, 2001a,b) that successfully achieved ISO 14001 certification within nine months. Dyna-Craft Industries Inc., Murrysville, PA (Wagner, 2001a,b), Depos Horni Sucha (Buckley, 1999), WJ and W Lang (Collins, 1999), Hoechst (Steger, 2000); and Volvo (Shrivastava, 1996) are other examples of companies supporting and practising the integration of their management systems. Other researchers also favouring integration of management systems and/or building new procedures on existing ones to avoid duplication and save resources include Sheldon (1997), Pawar and Rissetto (2001), Pojasek (1999), Reinhardt (1998), Lawrence et al. (2002), Hormozi (1997), Hale (1997) and Giampalmi (2000). Accordingly, organisations should integrate as many of their management systems as possible if they wish to remain competitive within the business world.

**Sustainability**

A number of definitions of “sustainable development” are documented in the literature, all directed towards the same objective of meeting the needs of the present generation without deteriorating the needs of the future generations (Sarkis, 2001; Berry, 1993; Beamon, 1999; Mohan, 1998; Nattrass and Altmore, 1999; Haddock, 1999; Roberts, 1995; Taylor et al., 1994; Zhang et al., 2000; Wilkinson et al., 2001; Jimenez and Lorente, 2001). In views of Zhang et al. (2000, p. 140), “sustainable development considers the simultaneous improvement of the economy, the environment, and the wellbeing of the people”.

Commitment of industries to becoming sustainable is evident from the formation of the World Business Council for Sustainable Development (WBCSD), with participants from more than 120 companies (Welford, 1995; Levy, 1997). In the view of Stephan Schmidheiny, Chairman of WBCSD, sustainability “requires that [organisations] pay attention to the entire life cycle of products and to the specific and changing needs of the customers” (Elkington, 1994, p. 91).

Similar views were expressed by a number of interviewees during the third phase of the research that “sustainability” needs to be built-in or become part of the long-term organisational benefit, if the organisations wish to remain competitive and survive in the business world. Wilkinson et al. (2001), citing Gollan (2000) research, presents the various factors influencing sustainability. The issues are inter-related and include: employee consultation and involvement; organisational change; work and life balance; workplace institutions and systems; and career development and organisational learning. Also embedded in this sphere of issues is HR policies; management style; leadership;
organisational culture and, last but not the least, the organisation itself. On similar lines, Hart (1997) outlines three stages for companies to move towards sustainability, which include: pollution prevention; product stewardship; and clean technology. As a minimal, these issues should address the aspects of environment; equity; and futurity (Welford, 1996). A practical illustration of the use of technology for the benefit of the ecological environment can be seen at the Tobyhanna Army Depot and Radford Army Ammunition Plants respectively (Barker et al., 1999).

**Life cycle analysis (LCA).** Life cycle analysis (LCA) can be defined as “a tool used for evaluating the environmental impacts of a product or service throughout its entire life” (Jackson, 1997, p. 20). LCA, also known as the “product stewardship” is a concept that is catching up fast in the industry and involves looking at the various stages of a product, from the supply of the raw materials to its manufacture, usage by the consumers and ultimately its disposal. In the views of Fussler and James (1996) and Welford (1995, 1996), LCA involves a number of stages, the main ones being:

- identification of areas of environmental impact in order to enable future assessment;
- quantification of energy and materials input, emissions, and waste outputs and any other potential area of environmental damage;
- assessment of the environmental impact and impact mechanisms; and
- establishment of options and strategies for improving each stage of the life cycle of the product.

In the view of Sarkis (2001), the success of LCA requires “significant internal cooperation, as it covers a range of functions across a company”. LCA offers a number of benefits to the organisations such as (Fussler and James, 1996, p. 141; Welford and Starkey, 1996, p. 214):

- clarification of environmental controversies;
- revelation of upstream or downstream impacts of a product or service which would otherwise remain hidden;
- generation of new ideas for providing the same function with reduced environmental impact; and
- concentration on product, rather then the production system, facilitates direct measurement of environmental impact.

A number of studies reported in the literature have supported the usage of LCA by organisations moving towards or becoming environmental-friendly and sustainable. These include Chandrashekar et al. (1999), Sharfman et al. (1997), Marcus and Willig (1997), Kinsella (1994), Lamming and Hampson (1995), Sheldon (1997) and Bragg et al. (1993). Successful usage of LCA has been reported in companies such as Chevron, 3M, and Procter & Gamble (Shrivastava, 1996, p. 210).

**Design for disassembly (DfD).** Design for disassembly (DfD), also sometimes known as design for environment (DfE), is another upcoming concept within the organisations whose main principle lies behind using “fewer parts and fewer materials” (Sarkis, 2001, p. 674) when manufacturing products. This concept, like that of the LCA, supports the basics of
“sustainability”, by making less usage and wastage of available resources. Researchers such as Chandrashekar et al. (1999), Ayres et al. (1997), Lawrence et al. (1998), Walton et al. (1998), Berry and Rondinelli (1998) and Anderson (1999) have supported usage of DfD/DfE.

**Industrial ecology.** Though being in existence from the early 1960s in Japan (Andrews, 1999), the term “industrial ecology” did not get recognition until the late 1980s when practised by the physicist, Robert Frosch (Andrews, 1999). Industrial ecology as a concept is now increasingly being used within organisations, though in views of some critics the two words of the term, “industrial” (bad, brown, artificial) and “ecology” (good, green, natural) cannot be rightly placed and be practised together (Andrews, 1999). Nonetheless, on the other side of the spectrum are the supporters and practitioners of industrial ecology, according to whom “industrial ecology will be a guiding principle for sustainable development in the 21st century” (Barnes, 1998, p. 21), as commented by Bob Laudise, adjunct chemical director of AT&T Bell Laboratories and chairman of AT&T Foundation’s Industrial Ecology Review Committee. Other supporters of industrial ecology cited in the literature include Beamon (1999).

In the view of Barnes (1998, p. 21), for industrial ecology to be adopted as a concept, organisations require:

... careful manufacturing and materials research, top management commitment, increased consumer awareness and support, production and design alliances, improved collection and recycling infrastructures, and above all, dedication, patience and creativity.

According to Andrews (1999), industrial ecology is:

... not managed from the top down, [but] from the bottom up by decentralised, interdependent, place-based decision makers in households, firms, municipalities, countries, states and nations.

**Conclusion**

This paper presented a summary of the key findings of the three phases of the research undertaken as part of a large project. Based on the findings and the literature review it then presented the critical success factors for managers currently either undertaking or contemplating implementing an EMS and subsequently certifying the internal EMS to a formal standard.

The critical success factors discussed above are applicable to all types of organisations, irrespective of the size, sector or ownership. Not being in any chronological order, following of these factors will make the EMS implementation process faster, smoother, effective and sustainable in organisations by reducing the number of impediments expected or experienced by them. Nonetheless, managers should be cautious of the existing organisational culture and accordingly should tailor the implementation of the EMS to their specific needs.
Table I Overview of the research methodology and findings

<table>
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<tr>
<th>Phase</th>
<th>Name of the phase</th>
<th>Target audience</th>
<th>Main issues explored</th>
<th>Main findings</th>
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<tr>
<td>I</td>
<td>Preliminary</td>
<td>Australian managers</td>
<td>The role of various org stakeholders during and after implementation of the EMS was briefly identified in addition to the various drivers and benefits of EMS adoption</td>
<td>The interviews revealed the increasing awareness within the Australian org. of the enviro issue and the importance of reducing their operations' impact on the environment. It was also found that for an org. to be successful in its effort to become &quot;environment-friendly&quot; and &quot;sustainable&quot;, input is required from all of its internal and external stakeholders to varying degrees with no exceptions. EMS implementation was also found to be a learning curve for majority of the org., with both the mgmt. and employees learning important lessons of commitment, involvement and motivation. Internal audit/scrutineering was also identified as the most common method used by org. to identify improvement areas</td>
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<td>II</td>
<td>Questionnaire</td>
<td>Australian managers</td>
<td>Further identified and explored the issues arising from the preliminary interview with respect to stakeholders involvement</td>
<td>The findings showed that generally the manufacturing sector was ahead of the non-manufacturing service sector in both implementation and subsequent certification of EMS. The results also provided a general picture as to the perceptions and experience of the org. with respect to EMS implementation. The findings also showed that the proactive role played by the org. top mgmt, in support of the EMS adoption process, for instance, by providing resources, commitment and time, is one of the major success factors. The significance of employee's involvement, especially during the implementation stage, also surfaced during the survey. Communication and training is thus required to increase employee awareness, knowledge and understanding of the process. This will also assist in reducing their resistance to the process. The contributions made by suppliers to an org. EMS process are still reserved and restricted. Org. must need to build trusting and long-term relationships with their suppliers before they can enjoy the benefits resulting from their suppliers' involvement during the implementation process</td>
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<tr>
<th>Phase</th>
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<td>III</td>
<td>In-depth interviews (17 conducted)</td>
<td>Australian managers</td>
<td>This phase further explored the issues identified from the survey results. This phase requested the interviewees to provide examples and evidence of their responses made during the earlier stage, i.e., survey of the research. Recommendations were also provided by the interviewees</td>
<td>In terms of stakeholders' involvement, similarity was found between the survey findings and those from the in-depth interviews. Involvement and commitment from all the stakeholders was found to be essential for initiating the implementation and subsequently the maintenance of the EMS. Org. when calculating the payback period from the EMS implementation need to identify and understand that not all the benefits from it are quantifiable in dollar terms. Also many benefits to be realised are long- rather than short-term. To reduce ambiguity, duplication and wastage of resources (for instance the dollars, human and time), org. if practicable should integrate their existing mgmt. systems and audits with EMS</td>
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</tbody>
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Notes: JAS-ANZ = Joint Accreditation System of Australia and New Zealand; Org. = organisation; Mgmt. = Management; Enviro. = environmental/ environment. The interviews and survey were not restricted to any industrial sector or business size.

References


Mohan, L.J. (1998), "Environmental concerns", *Chain Store Age*, pp.15A.


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