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**Adoption of Environmental Management Systems in
Queensland Small and Medium Enterprises**

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Adoption of Environmental Management Systems in Queensland Small and Medium Enterprises

Abstract

This study offers some insight into the environmental attitudes and awareness of owners/managers of Small and Medium Enterprises (SMEs) in Queensland, together with perceived benefits and factors involved in implementing an Environmental Management System (EMS). The results show that owner/managers of SMEs appear to have a reasonable level of awareness coupled with strong positive environmental attitudes. The owners/managers' perceived benefits of implementing an EMS include a cleaner working environment, improved local environment, increased efficiencies, recycling, a safer working environment, waste minimisation, cost reductions and complying with legislation. It was found that various factors may influence the implementation of an environmental management system within SMEs including size, customers, local community concerns, legislation, awareness, perceived benefits, time, financial resources, owner's age and education level, and employees' concerns; with size and industry type suggested as the main drivers of the other factors. These results have implications for corporate environmental responsibility.

Keywords: Environmental Management Systems; Small and Medium Enterprises; Environmental Strategies

Adoption of Environmental Management Systems in Queensland Small and Medium Enterprises

Introduction

The contribution of Small and Medium Enterprises (SMEs) to Australia's Gross Domestic Product is approximately thirty-five percent (ABS 2002). Furthermore, SMEs account for approximately ninety-nine percent of Australian businesses (ABS 2002). These figures indicate the impact of SMEs on the economy; however, they also suggest a significant impact on the environment in terms of 'inputs and output requirements' (Gerrans & Hutchinson 2000, p. 75).

A review of the literature to date suggests that there have been very few studies in relation to the factors affecting the adoption of Environmental Management Systems (EMSs) by SMEs in Australia. A few Australian studies have examined specific industries¹ in an attempt to explain the adoption of environmental practices and performance by SMEs (Schaper 2002; Acutt & Geno 2000). However, as SMEs are by nature heterogeneous, the limiting of research to specific industries restricts the generalisability of research outcomes to other industries (Schaper 2002). Accordingly this study includes a broad range of SMEs throughout Queensland and encompasses the diversity of industry sectors in which SMEs operate.

Aims of the Research

The aims of this research are:

1. To determine the level of awareness of environmental issues by Queensland small and medium enterprises
2. To assess whether Queensland SMEs have high, moderate or low green attitudes toward environmental issues
3. To determine the main motivating factors for SMEs engaging in environmentally sustainable practices, in terms of perceived benefits
4. To determine the type of internal, external and moderating factors that influence the adoption of EMSs by Queensland SMEs

An Overview of Current Environmental Management Trends in SMEs

According to an Australian study conducted by Gerrans and Hutchinson (2000) the impact of business on the environment has become an issue for businesses and other relevant publics since the late 1980s. The increasing number of relevant publics includes customers, local communities, public authorities, legislators, environmental groups, suppliers, financial institutions, and employees (Deegan 2003; Bubna-Litic & De Leeuw 1999; Petts, Herd & O'hEocha 1998). These relevant publics are increasingly the source of pressure for SMEs to improve their environmental management, through the introduction of Environmental Management Systems² (EMSs) (Gerrans & Hutchinson 2000). A business is considered to have a formal EMS when the business engages in a formal certification process. The two main formal EMSs highlighted in the literature are the International Standard 14001 (ISO 2003) and the Eco-management and Audit Scheme (EMAS) (Biondi, Frey & Iraldo 2000).

Many companies within the United States have reaped the benefits of ISO 14001 implementation Perry (2001) states that cost savings through waste minimisation appears to be

¹ For example: the pharmaceutical and tourism sectors.

² Environmental Management Systems are a voluntary tool that may be used by any business, regardless of size, structure or industry and may be defined as 'what the organisation does to minimise harmful effects on the environment caused by its activities, and continually to improve its environmental performance' (ISO 2003).

the biggest reported benefit, with some SMEs also acknowledging a public relations boost from their certification. Other companies report intangible benefits³ like enhanced employee morale and relationships to regulators. Furthermore, major companies are taking steps to green the supply chain. For example, Ford Motor Company and General Motors have issued statements requiring their suppliers to conform to ISO 14001 (Perry 2001). Such requirements are a strong business motivation for SMEs to consider implementing an EMS.

However, it has been suggested that many businesses may be environmentally friendly without engaging in formal certification processes (Hillary 1999). Thus, a potentially large number of businesses could be engaging in a combination of environmental activities such as recycling, waste management or energy conservation, which may indicate whether an SME has an informal EMS in place. Accordingly, both formal and informal EMS's will be considered in this study. However, the level of EMS implementation may be affected by a number of factors that could be classified as 'internal influences', 'demographic influences', and 'external influences'.

Internal Influences on EMS Implementation

Internal influences on EMS implementation include owner/manager environmental attitudes, awareness of environmental impact, access to information, time, financial resources, awareness of the benefits of implementing an EMS, and employees' concerns.

In relation to environmental attitudes and awareness, Tilley (1999) examined the environmental strategies available to SMEs and being used in practice. The results show that SMEs were adopting one of four strategies - a *resistant*, a *reactive*, a *proactive* or a *sustainable/ecological strategy* in their response to environmental management⁴. The business that follows a resistant strategy tends to ignore the pressures to improve its environmental performance, and is not aware of its environmental impact. The second category that can be employed by an SME is a reactive strategy; which is in response to the pressures to improve its environmental performance. A proactive strategy reflects a more positive and deliberate effort to reduce environmental impacts; however, despite being generally permanent and ongoing, this strategy is not always integrated into the management of the business. The final strategy is a sustainable/ ecological one; that is an innovative strategy for an SME to implement due to the holistic integration of the environment into the structure and management of the business (Tilley 1999).

Gerrans and Hutchinson's (2000) study of 210 Western Australian businesses to determine the attitudes and perceptions of owners/managers toward environmental management, found that SMEs display a lack of awareness of the existence of local, industry or international standards. Furthermore, the majority of respondents did not view an environmental programme as important to customers, a potential source of competitive advantage, a marketing issue, or a factor when purchasing from suppliers. However, there appears to be an increase in the awareness of small firms in the United Kingdom, with more than half of the respondents of a national survey indicating that their business had an environmental impact and cited the environment as an important business issue, ranking higher than exchange and interest rates, finance or labour costs (envirowise 2000).

³ However, most companies don't know how to record those real benefits on the books in terms of dollars & cents.

⁴ Tilley (1999) found that twelve percent of respondents in the study had adopted a proactive strategy with five implementing a formal EMS; forty percent had failed to do anything (resistant strategy) to reduce environmental impacts; twenty-eight percent were classified as reactive; and the balance of respondents was found to be resistant as their environmental improvements were accidental or a by-product of other decisions. There was no evidence of a sustainable/ecological strategy being used by any of the firms in the study.

The literature shows that major factors in determining whether a business will implement an EMS include access to information (Zutshi & Sohal 2002), time and cost factors (Biondi, Frey & Iraldo 2000; Hillary 1999; Tilley 1999), employees' concerns (Petts, Herd & O'hEocha 1998) and benefits⁵ associated with the implementation of an EMS. The benefits of implementing an EMS include competitive advantage, increased organisational efficiency, community satisfaction, a better image among customers, cost reductions to the business, and, in some cases increased profits (Peters & Turner 2002; Taylor, Sulaiman & Sheahan 2001; Vercalsteren 2001; Biondi, Frey & Iraldo 2000; Gerrans & Hutchinson 2000; Smith, Kemp & Duff 2000; Hillary 1999; Petts, Herd & O'hEocha 1998; O'Laire & Welford 1998).

Demographic Influences on EMS Implementation

Owner/manager personal characteristics such as age, gender and education have been considered by some researchers as factors that may influence environmental attitudes (eg Petts Herd & O'hEocha, 1998; Acutt & Geno 2000; Schaper 2002). The type of industry and the size of individual SMEs are other demographic factors that may affect the implementation of an EMS (eg Gerstenfeld & Roberts 2000).

External Influences on EMS Implementation

External factors that may influence an SME to implement an EMS include consumers, customers, local communities, legislation, environmental groups, suppliers, and financial institutions (Deegan 2003; Biondi, Frey & Iraldo 2000; Gerstenfeld & Roberts 2000; Hillary 1999). Additionally, as the complex network of relationships between SMEs, their suppliers and customers and government legislation may not be understood by examining SMEs in isolation, it is suggested that the focus should shift from the 'factors' that influence individual businesses, to the 'relations and interaction between "actors" involved in the network' Verheul (1999, p. 218). Tilley (2000, p.47) asserts that although the economic system in terms of 'structures and institutions prevalent in society' acts as a dominant barrier to change small firms' environmental behaviour, small firms are ultimately responsible for their own behaviour, justified by their own values and ethics.

Theoretical Framework and Propositions

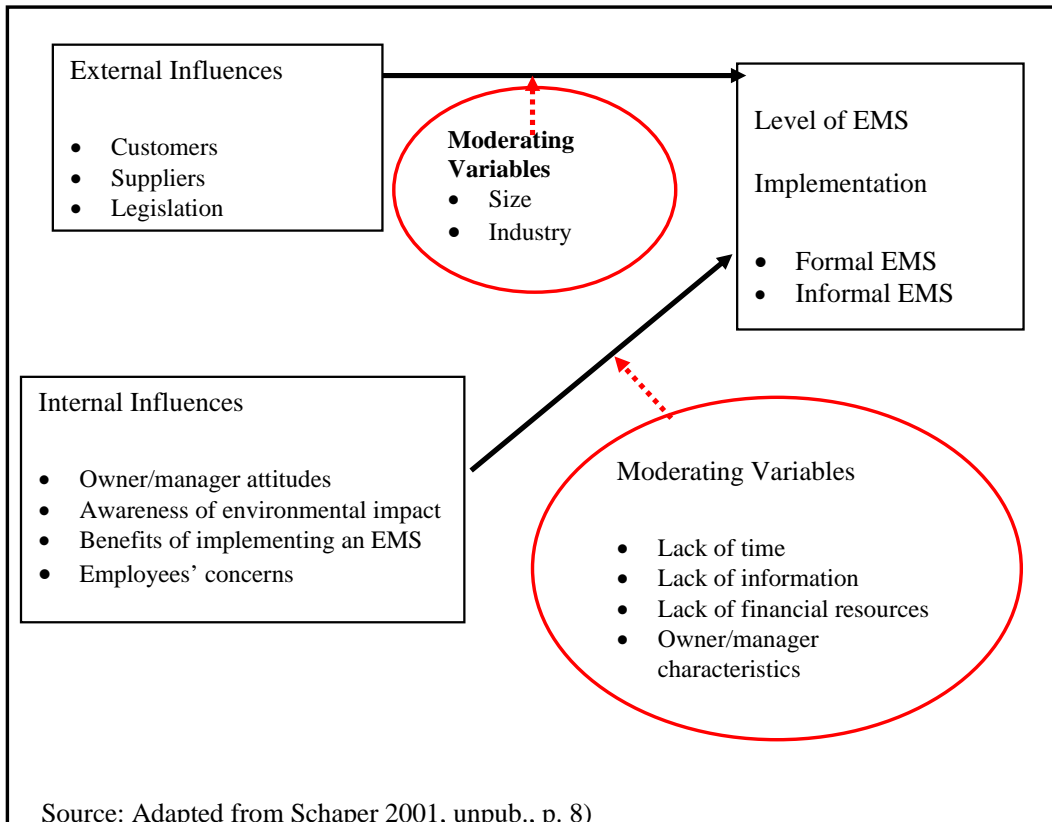
The following diagram illustrates the relationships between the theoretical constructs and variables under analysis. Figure 1 shows the four theoretical constructs *External Influences*, *Internal Influences*, *Moderating Variables* and *Level of EMS Implementation*. The level of EMS implementation includes measures of both formal EMS and informal EMS as the two dependent variables. In regard to the determination of the internal influences, external influences and moderating variables, consultation was sought with several small business owners to verify the classification of these variables.

Propositions

The relevant publics previously referred to include consumers, customers, local communities and public authorities (Biondi, Frey & Iraldo 2000). Suppliers, financial institutions, and other interest groups are also suggested by Deegan (2003) as being relevant publics. Due to the diversity of relevant publics that have been identified, this study will examine the most common external parties that have been highlighted by the literature, these being customers, suppliers, legislators and the local community. These four external parties have been grouped together to form the theoretical construct "external influences" (Figure 1). Therefore, the first four propositions are:

⁵ As discussed later, these benefits may also be regarded as motivating factors

Figure 1: A model of Internal and External Influences on Level of EMS Implementation



P1. Firms with owner/managers who believe that environmental issues affect the buying decisions of customers are more likely to have a high level of EMS implementation.

P2. Firms with owner/managers who believe that environmental issues are important to suppliers are more likely to have a high level of EMS implementation.

P3. Firms with owner/managers who believe that environmental legislation is relevant to their business are more likely to have a high level of EMS implementation.

P4. Firms with owner/managers who believe that environmental issues are of concern to the local community are more likely to have a high level of EMS implementation.

Internal factors that have been identified in the literature as affecting SMEs level of EMS implementation include *environmental attitudes*, *awareness of environmental management*, *benefits of environmental management*, and *employee concerns*. It has been suggested that the implementation of EMSs by SMEs is influenced by attitudinal barriers (Williamson & Lynch-Wood 2001; Tilley 1999). Hillary (1999) found that attitudes actually improved with the

adoption of EMSs by SMEs. Both the knowledge of the benefits and a lack of awareness of a SME's impact on the environment may hinder the implementation of an EMS (Gerrans & Hutchinson 2000; Hillary 1999). Furthermore, SMEs have been more inclined to implement an EMS as a result of *employees' concerns* for the environment (Bubna-Litic & De Leeuw 1999; Petts, Herd & O'hEocha 1998). Accordingly, the following propositions will be tested:

- P5.** Firms with owner/managers who have positive environmental attitudes are more likely to have a high level of EMS implementation.
- P6.** Firms with owner/managers who have a high awareness of environmental outcomes are more likely to have a high level of EMS implementation.
- P7.** Firms with owner/managers who believe that there are benefits associated with environmental management are more likely to have a high level of EMS implementation.
- P8.** Firms with owner/managers who believe that environmental issues are of concern to their employees are more likely to have a high level of EMS implementation.

The moderating factors that may prevent a SME implementing an EMS include *lack of time*, *lack of information* (Schaper 2002; Friedman, Miles & Adams 2000; Hillary 1999; Dilts & Prough 1989), *lack of financial resources* (Biondi, Frey & Iraldo 2000; Gerrans & Hutchinson 2000; Hillary 1999; Tilley 1999; Netherwood 1998), *owner/manager personal characteristics* (Schaper 2002; Olli, Grendstad & Wollebaek 2001; Acutt & Geno 2000; Petts, Herd & O'hEocha 1998; Steel 1996) *size* (Gerstenfeld & Roberts 2000; Hillary 1999; Palmer & Andrews 1997) and *industry* (Gerstenfeld & Roberts 2000). In relation to age, Schaper (2001, unpub.) found that younger Australian owner/managers were more likely to display a positive environmental attitude⁶. Steel (1996) found that both educational levels and gender were associated with proactive environmental behaviours. Finally, type of industry and the size of individual SMEs (Gerstenfeld & Roberts 2000) are suggested as moderating variables that have an impact on *External Influences*. Accordingly, the following propositions will be tested:

- P9.** Firms with owner/managers who believe they do not have the time to address environmental issues are more likely to have a low level of EMS implementation.
- P10.** Firms with owner/managers who believe they do not have enough information to address environmental issues are more likely to have a low level of EMS implementation.
- P11.** Firms with owner/managers who believe they do not have the financial resources to address environmental issues are more likely to have a low level of EMS implementation.
- P12.** Firms with younger owners/managers are more likely to have a higher level of EMS implementation.
- P13.** Firms with female owners/managers are more likely to have a higher level of EMS implementation.
- P14.** Firms with highly educated owners/managers are more likely to have a higher level of EMS implementation.

⁶ This contrasts with an English study by Petts, Herd and O'hEocha (1998) who reported a decline in environmental concern among younger people.

P15. Larger firms are more likely to have a high level of EMS implementation.

P16. The industry of the firm will affect the level of EMS implementation.

Results

Response Rate, Owner/manager Profiles and SME Profiles

Of the 1000 questionnaires distributed to owner/managers of SMEs⁷ in Queensland, the number of responses totalled 166, representing a disappointing response rate⁸ of 16.6%. The number (percentages) of male respondents to female respondents was male 122 (74.8%) and female 41 (25.2%). The age profile of the owners/managers showed that the forty-one to fifty group had the highest number of respondents (32.1%); followed by fifty-one to sixty (28.5%), thirty-one to forty (21.8%), sixty-one and over (15.2%) while the smallest group was the thirty and under age bracket (2.4%). The educational level of the owner/managers reveal a fairly even spread with secondary education (35.9%), post-secondary education (30.1%) university bachelor's degree (25.6%) and other⁹ (8.3%). The majority of SMEs (53.4%) have between zero and four employees; which represents the micro-sized group of SMEs. In relation to industry type, the service sector was the largest response group (47.9%), followed by manufacturing (21.2%), retail (18.2%) and other¹⁰ (12.7%).

Propositions on the effects of various factors on level of EMS Implementation

Tables 1 and 2 (see Appendices B and C) provide a summary of the bivariate tests used to evaluate the strength of direct relationships between different variables for both the formal and informal levels of EMSs, Cronbach's alpha was then used to verify that the aggregate scores of the eight items for each level were a reliable measure of each construct (that is, formal and informal level of EMS implementation). The results indicate a high level of reliability for both levels, with a Cronbach's alpha level of 0.88 for formal and 0.79 for informal level of EMS implementation.

External Influences (P1 – P4)

Propositions P1 to P4 form the theoretical construct *External Influences* and include the four variables labelled “customer”, “supplier”, “legislation” and “local community”. Table 1 – Appendix B (formal EMS) and Table 2 – Appendix C (informal EMS) both reveal that three of the four variables (customer, local community and legislation) are significant at $p < 0.01$.

Internal Influences (P5 – P8)

Propositions P5 to P8 form the theoretical construct *Internal Influences* and include the variables “owner/manager attitudes”, “awareness of environmental impact”, “benefits of implementing an EMS” and “employees' concerns”. “Owner/manager attitudes”, “awareness of environmental impact” and “benefits of implementing an EMS” were all recalculated to produce an aggregate score; thus enabling the correlation with the dependent variables to be performed. Consistent with Schaper (2002)¹¹, the respondents to the personal environmental

⁷ For the purposes of this study, a SME was regarded as bound by an upper limit of 200 employees, in accordance with the Australian Bureau of Statistics definition of a SME (ABS 2003).

⁸ A low response rate is a major limitation of any survey – for a full discussion of this and other limitations of this study see Appendix A

⁹ The category “other” consisted of diplomas, masters, PhDs and post-graduate qualifications.

¹⁰ The category “other” consisted of SMEs involved in building & construction, agriculture and the beef industry.

¹¹ Schaper (2002, p. 10) used 20 Likert-type statements and assigned values to individual respondents of between 20 (lowest possible score) to 100 (highest possible score); with the theoretical midpoint of the scale being 60.

attitude questions were categorised into three groups, “highly green”, “moderately green” and “low green”. Each respondent was assigned a value of between fourteen (lowest possible score) to seventy (highest possible score) with a proposed midpoint of the scale being forty-two (three times fourteen). Cronbach’s coefficient alpha, used to test inter-item consistency reliability was 0.76. The correlation analysis revealed a negative association with the variable formal EMS (Appendix B - Table 1); however, no statistical significant association with informal EMS (Appendix C - Table 2). Awareness consisted of eight questions and the reliability analysis revealed Alpha = 0.76. *Awareness* and *employees’ concerns* both proved to be highly significant for both dependent variables (see Appendix B- Table 1 and Appendix C –Table 2).

Moderating Variables (P9 – P16)

Two theoretical constructs were labelled as *Moderating Variables*¹² (see Figure 1). Lack of time and lack of financial resources proved to be significant for both dependent variables; however, there was no significant result for lack of information. In relation to demographics, significant associations were found between age and informal EMS; and between education and formal EMS. Size proved to be highly significant for both formal and informal EMSs. At first, industry type was not found to be significantly associated with level of EMS; however as the service industry represented approximately half of the respondents; retail, manufacturing and other were added together to form “non-service combined” (Zutshi & Sohal 2002, unpub.). The recoded industry variable showed a highly significant association with informal EMS.

Discussion

The disassociation between environmental attitudes and the level of EMS implementation causes the uptake of environmental management improvements (EMS adoption) to vacillate within the SME sector. This was evident in the gap between owners/managers’ strong, positive environmental attitudes and the low level of EMS implementation. Customers, legislation, local community, awareness, employees, lack of time, lack of financial resources, education and size were all significantly associated with the implementation of a formal EMS¹³. Customers, legislation, local community, awareness, benefits, employees, lack of time, lack of financial resources, age, size and industry were all significantly associated with an the implementation of an informal EMS.

Customers (P13), local communities (P16) and employee influences (P4) on the environmental performance of SMEs have been identified as three of the keys to SMEs taking action on the environment. Ignoring these influences and their subsequent concerns to SMEs performance or satisfaction with the existing level of environmental performance takes away key drivers, which stimulate SMEs to adopt an EMS and improve environmental performance (Hillary 1999). The results for these propositions support the views of many researchers (Biondi, Frey & Iraldo 2000; Bubna-Litic & de Leeuw 1999; Hillary 1999; Palmer & Andrews 1997). In many instances legislation (P15) is expected to rank high, when one considers that legislation is a mandatory requirement of business owner/managers, and may indicate that they react to, rather than anticipate, regulatory changes. In relation to the level of awareness (P2) of environmental issues, the factors that were ranked highest included “taking sufficient action to meet legislation”, “achieving cost savings through reduction of environmental impact” and “improving production efficiency through environmental performance”. This indicates that in general SMEs are not only conscious of mandatory compliance, but are also aware that certain

¹² Propositions P9 – P14 are the moderating variables influencing *Internal Influences*; and propositions P15 and P16 relate to *External Influences*.

¹³ Although attitudes were also significantly correlated with the level of formal EMS implementation, the correlation was negative and this was contrary to expectations. This may indicate that one of the main motivations for formal EMS implementation appears to be compliance with perceived costly¹³ environmental legislation, rather than strong positive environmental attitudes.

environmental practices may lead to benefits (P3) for their business in the future. This increase in awareness may indicate that industry believes that improving their environmental management systems has reduced the impact on the environment.

Size (P11) and industry type (P12) are suggested as drivers of these internal and/or external factors. The larger the business, the more resources available to it, particularly in relation to time, information and financial resources; the larger the business the more visible and, subsequently, the more accountable the business becomes. Although industry was not recognised as a significant influence on the implementation of a formal EMS, it is suggested that the results of this may have been skewed by the large number of respondents identified as being in the service industry. Only 5.3% of the firms in the service industry have implemented a formal EMSs, compared with 20% for the retail sector, 17.6% for the manufacturing sector, and 14.3% for the “other” sectors. Furthermore, the percentage of informal EMSs implemented by the service industry totalled 27.8% compared to the “combined industry types” with 40.7%.

In general, the movement towards a proactive model or a sustainable/ecological strategy of SME environmental practice will be severely diminished unless the relevant issues are addressed (Williamson & Lynch-Wood 2001). The decision to implement an EMS may have limited appeal to many SMEs, perhaps as suggested by Friedman, Miles and Adams (2000) because the need to focus on daily survival is the number one priority.

Summary and Conclusion

The main aims of this research project were to determine whether Queensland small and medium enterprises have an awareness of environmental issues; have high, moderate or low green attitudes; have motivations to engage in environmentally sustainable practices; and are influenced by various factors in adopting environmental management systems.

In relation to the level of awareness of environmental issues, the results of this study indicate that in general SMEs are not only conscious of mandatory compliance, but are also aware that certain environmental practices may lead to benefits for their business in the future. Coupled with a high level of awareness, the majority of owners/managers have a strong, positive environmental outlook. However, in contrast only a minority of businesses have committed to implementing either a formal EMS or an informal EMS. This highlights one of the major problems found in the literature review; that is strong, positive environmental attitudes may not necessarily translate into proactive behaviour. The main motivating factors for SMEs engaging in environmentally sustainable practices were *a cleaner working environment, improved local environment, recycling, safer working environment, waste minimisation, cost reductions and increased efficiencies*.

It was also found that firms with highly educated owners/managers are more likely to have a higher level of formal EMS implementation. This supports both Acutt and Geno (2000) and Steel’s (1996) findings; and makes intuitive sense in that highly educated respondents would be aware of the purported benefits associated with implementing a formal EMS. In addition the results show firms with younger owners/managers are more likely to have a higher level of EMS implementation, which supports the findings of Schaper (2002), and may be an indication of a growing awareness of the importance of EMSs amongst younger Australian SME owner/managers, possibly as a result of a trend towards including more courses on environmental issues in the education curriculum. Two influences that could be considered as barriers to the implementation of EMSs are lack of time and lack of financial resources (P5 & P7). Support for these two propositions is not surprising when considering that approximately fifty percent of owners/managers of Australian SMEs work between thirty-five and fifty hours (ABS 2003). Lack of management and/or staff time combined with inadequate skills and

knowledge are major factors cited in many studies as barriers for implementation of EMSs (Hillary 1999).

Implications of the Study

A large number of respondents in the current study appear to believe that their business does not impact on the environment. Furthermore, it would appear that in comparison to their overseas counterparts, Queensland SMEs may not be attuned to the importance of incorporating green principles in competing in overseas markets, and may therefore miss out on valuable export opportunities. In view of the publicity given to environmental business impacts, this may indicate that many of the firms surveyed could be described as “resistant” or “reactive”. Suggestions to overcome this obstacle include making small business aware of their environmental responsibility; increasing awareness of the commercial benefits of adopting environmental friendly practices and policies; offering user-friendly guidance on improving environmental practices; instigating a ‘green directory’ to publicise environmentally responsible SMEs; and investigating the possibility of forming SME collaboration networks to reduce costs of EMS implementation. It would seem that further research is warranted on the most suitable means of communication between small business and local/state government bodies involving state government liaison with media and local councils on these issues.

Four main issues have been highlighted in the literature review that should be addressed in future research. The first issue is the evaluation of the current impact of SMEs on the natural environment. It has been publicised that SMEs may collectively be responsible for as much as seventy percent of all global pollution, but this figure has not been supported by any substantial quantifiable studies (Hillary 2000). This raises the question regarding how to measure the collective impact of SMEs. The second issue is that future research should incorporate actual behavioural measurements, however, to limit the number of socially desirable responses to self-reported behaviours (Steel 1996). Such research would be difficult and expensive to conduct, but would yield invaluable insights into the attitude-behaviour controversy in the environmental policy arena. Thirdly, from the employee perspective, Petts, Herd and O’heocha (1998) recommend that as the environment is important to individuals but does not seem to be related directly to their work activities; the organisational context needs to support both positive attitudes and the empowerment of employees. In addition, these authors propose that the cultural and demographic influences on attitudes and behaviour require further study and there is considerable scope for a more direct comparison between health and safety and environmental culture dimensions and dynamics. The final issue is that whilst particular influences that have an impact on an owner/manager’s decision to implement an EMS have been analysed and discussed, what may be needed is to examine what other factors¹⁴ would influence the level of EMS implementation. Furthermore, as also suggested by (Hillary 1999), it may be worth exploring how customers and employees bring pressure to bear on SMEs and the threshold at which this pressure results in action in SMEs, as these aspects have not been fully investigated in this study.

¹⁴ Given that this study focused on the most common influences.

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Appendix A: Limitations

The usual caveats apply to the use of self-administered mail questionnaires for this survey: lack of in-depth information, social desirability bias, and non-response bias. These factors combined with a small sample size may limit the generalisability of the research findings to other settings. In addition, the lack of a universal definition of an SME hinders comparability.

Macpherson and Wilson (2003) acknowledge how difficult it is to engage SMEs in research. Low response rates are common in small and medium-sized business research, and it is impossible to generalise from some findings (Acutt & Geno 2000). The SMEs that participated in this study are likely to be more proactive in the environmental management area; and it could be implied that the willingness of these respondents to participate may indicate their tacit recognition of this factor. Furthermore, the SMEs are more likely to have considered the potential benefits of engaging with their relevant publics. Consequently, it is likely that the level of environmental attitudes and the activities/practices of SMEs may be overstated in the results of this study. A final limiting factor is that this research may be somewhat distorted as a result of treating SMEs as one homogeneous group which, effectively ignores the many sub-groups within the sector. Nevertheless, where possible, efforts were made to identify separate industry effects that may have impacted on the results.

Appendix B: Table 1 - Bivariate Test Results for Formal EMS

Propositions:	N	Test	Result	Sig.	Decision
P1. Firms with owner/managers who have positive environmental attitudes are more likely to have a high level of EMS implementation.	129	Pearson	-.185	.036	Reject*
P2. Firms with owner/managers who have a high awareness of environmental outcomes are more likely to have a high level of EMS implementation.	135	Pearson	.588	.000	Accept
P3. Firms with owner/managers who believe that there are benefits associated with environmental management are more likely to have a high level of EMS implementation.	124	Pearson	.306	.001	Accept
P4. Firms with owner/managers who believe that environmental issues are of concern to their employees are more likely to have a high level of EMS implementation.	129	Pearson	.349	.000	Accept
P5. Firms with owner/managers who believe they do not have the time to address environmental issues are more likely to have a low level of EMS implementation	131	Pearson	.322	.000	Accept
P6. Firms with owner/managers who believe they do not have enough information to address environmental issues are more likely to have a low level of EMS implementation.	131	Pearson	-.064	.466	Reject
P7. Firms with owner/managers who believe they do not have the financial resources to address environmental issues are more likely to have a low level of EMS implementation.	131	Pearson	.339	.000	Accept
P8. Firms with younger owners/managers are more likely to have a higher level of EMS implementation.	132	Spearman	-.178	.042	Accept
P9. Firms with female owners/managers are more likely to have a higher level of EMS implementation.	131	Spearman	-.070	.429	Reject
P10. Firms with highly educated owners/managers are more likely to have a higher level of EMS implementation.	121	Spearman	.076	.400	Reject
P11. Larger firms are more likely to have a high level of EMS implementation.	131	Pearson	.228	.009	Accept
P12. The industry of the firm will affect the level of EMS implementation.	131	Spearman	-.260	.003	Accept
P13 Firms with owner/managers who believe that environmental issues affect the buying decisions of customers are more likely to have a high level of EMS implementation.	131	Pearson	.293	.001	Accept
P14. Firms with owner/managers who believe that environmental issues are important to suppliers are more likely to have a high level of EMS implementation.	130	Pearson	.115	.192	Reject
P15. Firms with owner/managers who believe that environmental legislation is relevant to their business are more likely to have a high level of EMS implementation.	132	Pearson	.499	.000	Accept
P16. Firms with owner/managers who believe that environmental issues are of concern to the local community are more likely to have a high level of EMS implementation.	131	Pearson	.287	.001	Accept

* Although the result for this item was significant; it was in the opposite direction to the proposed direction

Appendix C: Table 2 - Bivariate Test Results for Informal EMS

Propositions:	N	Test	Result	Sig.	Decision
P1. Firms with owner/managers who have positive environmental attitudes are more likely to have a high level of EMS implementation.	125	Pearson	-.036	.691	Reject
P2. Firms with owner/managers who have a high awareness of environmental outcomes are more likely to have a high level of EMS implementation.	130	Pearson	.474	.000	Accept
P3. Firms with owner/managers who believe that there are benefits associated with environmental management are more likely to have a high level of EMS implementation.	119	Pearson	.244	.008	Accept
P4. Firms with owner/managers who believe that environmental issues are of concern to their employees are more likely to have a high level of EMS implementation.	125	Pearson	.450	.000	Accept
P5. Firms with owner/managers who believe they do not have the time to address environmental issues are more likely to have a low level of EMS implementation	127	Pearson	.301	.001	Accept
P6. Firms with owner/managers who believe they do not have enough information to address environmental issues are more likely to have a low level of EMS implementation.	127	Pearson	-.002	.982	Reject
P7. Firms with owner/managers who believe they do not have the financial resources to address environmental issues are more likely to have a low level of EMS implementation.	127	Pearson	.187	.035	Accept
P8. Firms with younger owners/managers are more likely to have a higher level of EMS implementation.	132	Spearman	-.178	.042	Accept
P9. Firms with female owners/managers are more likely to have a higher level of EMS implementation.	131	Spearman	-.070	.429	Reject
P10. Firms with highly educated owners/managers are more likely to have a higher level of EMS implementation.	121	Spearman	.076	.400	Reject
P11. Larger firms are more likely to have a high level of EMS implementation.	131	Pearson	.228	.009	Accept
P12. The industry of the firm will affect the level of EMS implementation.	131	Spearman	-.260	.003	Accept
P13. Firms with owner/managers who believe that environmental issues affect the buying decisions of customers are more likely to have a high level of EMS implementation.	127	Pearson	.304	.001	Accept
P14. Firms with owner/managers who believe that environmental issues are important to suppliers are more likely to have a high level of EMS implementation.	127	Pearson	.161	.071	Reject
P15. Firms with owner/managers who believe that environmental legislation is relevant to their business are more likely to have a high level of EMS implementation.	127	Pearson	.302	.001	Accept
P16. Firms with owner/managers who believe that environmental issues are of concern to the local community are more likely to have a high level of EMS implementation.	127	Pearson	.250	.005	Accept