

The social challenge in small business environmental management and innovation diffusion

Paul Lock¹ and Catherine Baudains¹

¹Murdoch University, Western Australia

Paul is an environmental consultant to local and state government and NGOs in natural resource management. Paul is currently a PhD candidate in Environmental Science at Murdoch University, Western Australia, conducting social science research to improve light industrial small and medium enterprise environmental management, particularly amongst the poorest performers. Research is focused on developing policy maker and practitioner tool kits incorporating innovation diffusion models with psychological models to encourage the cost effective and cooperative development of sustainability programs. Email paullock@me.com

Dr Catherine Baudains is a lecturer in Environmental Management and Environmental Education at Murdoch University. Her research interests focus on improving the effectiveness of environmental education as an environmental management tool, or more specifically, changing human behaviour in order to achieve a sustainable environmental outcome. Catherine completed her doctoral research in this area, examining various education strategies in the context of transport use and developing the TravelSmart Workplace programme. Her more recent research includes work in the fields of urban biodiversity, environmental and lifestyle education programs, evaluation of environmental education, and the West Australian Sustainable Schools Initiative. Email: c.baudains@murdoch.edu.au

Abstract

Key words: SME, environmental management, social science, psychology, innovation.

Small and Medium Enterprises (SMEs) worldwide are an integral part of their local social and economic fabric. However, they also represent significant environmental risks, and public costs, from the loss of Ecosystem Services. These characteristics have made SMEs critical for engagement in the sustainability process. How the initiatives are targeted has a significant bearing on their likelihood of success, and their cost effectiveness. A multitude of factors influence the extent and degree of environmental management being practiced amongst SMEs, and are strongly interconnected and dynamic, presenting immense challenges to translating policy into meaningful sustainability outcomes. There is a significant role for the application of the social sciences in SME environmental management. However, the designers of behaviour change programs often assume, and focus, on the 'problem' being the failure of the target audience to adopt the advocated practices. Closer examination can reveal significant systemic failures, and unreasonable expectations from educators and regulators regarding the capacity of individuals, and businesses, to adopt new innovations. The models discussed examine systemic failures contributing to the poor adoption of environmental management innovations, and their interaction with the individual barriers, individual psychological factors, and regulatory, market and social influences.

Introduction

This paper reviews small business light industrial environmental management and discusses the importance of social influences in the adoption of new behaviours and effective environmental protection. Environmental management is considered a component of sustainability, in an approach described in Barrow (2006) as broadly concerned with the political, social and natural environments and questions of value, distribution, regulation and intergenerational equality.

Micro (0-5 employees), Small (6-20 employees) and Medium (21-200 employees) Enterprises collectively known as SMEs are globally significant for their contribution to economic development and employment (Walker et al, 2008; Vives, 2006; Gerstenfeld and Roberts, 2000). SMEs are generally very close to their community, often an integral part of the social and economic fabric in the communities in which they are located (Murillo and Loranzo, 2006; Vives, 2006). This close connection and integration with their community identifies them as a focal point, and a key part of the sustainability debate (Mir, 2008; Schaper, 2002).

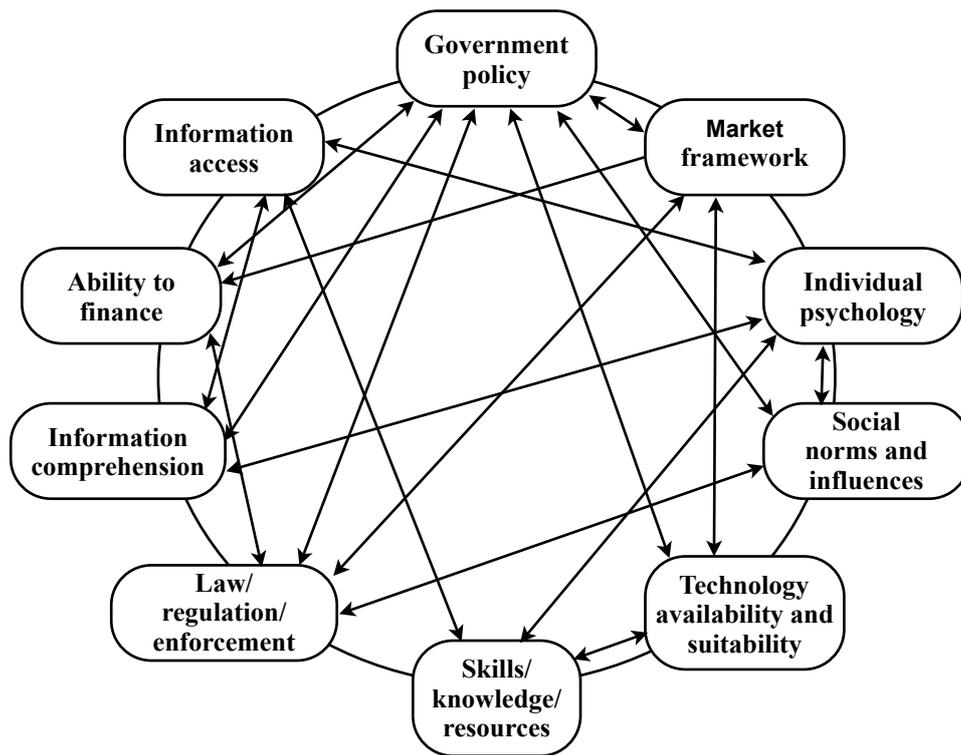
SMEs are readily distinguishable from large corporations by their less formal structures and closer personal relationships with staff and customers (Vives, 2006). SMEs demonstrate a great variation within and amongst industry types, and business sizes, and in their adoption of environmental management practices (O'Regan and Ghobadian, 2004). Many have difficulty in recognising environmental hazards and risks present in their business activities (Williamson et al., 2006a; McKeiver and Gadenne 2005; Tilley, 1999) and the direct environmental impacts of SMEs are often diffuse and difficult to measure (Perez-Sanchez et al., 2003; Hillary, 2000). SME impacts tend to be incidental and cumulative, and become significant through the sheer number of businesses making small contributions to overall pollution loads in any given area (Mir, 2008; Williamson et al., 2006). SME environmental management is generally acknowledged to be problematic worldwide (Alemagi *et al*, 2006; Studer *et al*, 2006; Hillary, 2004; Williams *et al*, 2000). The SME group are also acknowledged as a difficult group to engage in research (Condon, 2004; Peters and Turner, 2004; Friedman and Miles, 2001) the micro businesses in particular (Petts *et al.*, 1999), however, the micro enterprises are typically the most numerous of the SMEs (Gunningham and Sinclair, 2002).

In Australia, light industrial SMEs are commonly found in areas specifically zoned for light industrial activities, although they can be found within predominantly commercial and residential areas. Typical activities of micro SMEs that are the subject of this research are mechanical repair, vehicle smash repair, engineering and metal fabrication, metal finishing, machinery hire, chemical manufacture and blending, transport depots, concrete products, landscape supplies and printing.

SME environmental management factors and approaches

There are a multitude of factors influencing the extent and degree of environmental management being practiced amongst SMEs. A large range of factors are identified in the literature including cost, time, lack of knowledge and skills, information access, policy and regulation, market framework (Parker et al , 2009) Figure 1 illustrates that these factors are strongly interconnected, and dynamic, presenting immense challenges to translating policy into meaningful sustainability outcomes.

Figure 1 : Flow diagram illustrating the complexity of interactions between factors influencing SME decision making for environmental management.



Although the factors influencing SME environmental management adoption are highly interconnected they can be discussed in three main categories:

- Technical expertise;
- Market and Regulatory forces; and
- Social influence.

Firstly the reason why poor SME technical expertise is predominantly a secondary influence in environmental management is discussed. Secondly, the constraints of market and regulatory forces on the adoption of environmental management measures are examined. Thirdly, the role of social influences in the effectiveness of regulatory forces and adoption of new behaviors is discussed. Social influence is defined here as individual behaviour resulting from individual values, beliefs, attitudes and motivations, interacting with, and influenced by their perception of the behaviour of others (Aronson, 2008). The paper argues that understanding the social influences and predictable responses to new innovations should be a key element in the design of strategic policy initiatives aimed to improve environmental outcomes and cost effectiveness in light industrial SME environmental management.

Technical expertise

Lack of SME environmental management technical skills is well documented in the literature (Parker et al, 2009), but may arise from the inability of SME operators to adequately identify environmental hazards and risks leading to a lowered perception of need for such technical skills (Vives, 2006). SMEs are unlikely to address environmental management issues that they are unaware they have. This obscures their need for further research, and therefore development of the skills listed below. In order to improve environmental management using process and/or technology

changes, SME business operators require technical skills to;

- recognise an environmental hazard or risk, and assess treatment options.
- research suitable technology or processes.
- assess the availability and accessibility of suitable technology or processes.
- engage in the installation, training, monitoring and maintenance of a new technology or process.

The reported 'lack of time' barrier (Pimenova and van der Vorst, 2003) may also be connected to inadequate SME technical skills, as the SME perception that time would be wasted on environmental management appears legitimate where technical skills are inadequate and deemed unnecessary. Further, in circumstances where SME business operators undertake environmental management research, although the technology to improve basic pollution prevention is often widely available, the economic case may not be sufficient to warrant further investigation. This situation arises from a complex mix of market forces, regulation and consumer purchasing preferences (discussed below). While the barriers to technical expertise in environmental management are real and significant, it is considered that in most instances a combination of social, economic and regulatory barriers precede the SME experience of the technical barriers.

The market

The economic system, or market, provides a means to trade and exchange goods and services. Government regulation of the market is used to protect a society's social and environmental values, and to maintain the economic competitiveness of legally compliant businesses (Gunningham and Sinclair, 2002). There are three questions fundamental to the use of the market and regulatory framework in SME environmental management:

- Is the economic system effective for supporting sustainability?
- Are regulatory standards sufficient to warrant the use of resources for compliance?
- Does the regulatory system ensure the competitiveness of legally compliant businesses?

The current market-based framework of Sustainable Development (Brundtland, 1987) is required to address significant market failures in environmental management (i.e. over-fishing, loss of arable land, destruction of forests, depletion of oil and phosphorus, atmospheric carbon pollution, bioaccumulating toxins, etc.). However, the current system focus on infinite growth, consumerism and monetary gain as the measure of success is facilitating vast and growing inequities in conservation and access to resources (Costanza et al, 1997; Hawkin, 1993; Schumacher, 1973). Such disparity in spending power and resource and information access has negative impacts on intergenerational equity (Arrow et al, 1995), but how does this effect SME environmental management?

Williamson et al (2006) state that businesses do not generally perform environmental management beyond legal requirements due to the constraints of the market framework they operate in. As Figure 1 illustrates when operating as a barrier rather than motivator, the market framework can adversely influence a range of environmental management factors, and the effectiveness of policy measures implemented to improve SME environmental management. Therefore when government measures of market effectiveness and associated market regulation do not adequately reflect protection of social and environmental values, the market framework for investment in high quality

environmental management can make a small business uncompetitive (Gunningham and Sinclair, 2002). This is particularly the case when consumers (and government tenders and supply chains) prioritise lowest cost goods and services over the costs of incorporating protection of social and environmental values. Measures of market success, market regulation and consumer purchasing preferences are instrumental in setting the terms of trade and the priorities driving innovation and determining educational, training and purchasing priorities (Schumacher, 1973).

This situation is reflected in the poor SME adoption of environmental management systems (Hillary, 2004). Without the preferential purchasing by customers there is little incentive for businesses to adopt environmental management systems or accreditations when it does not present a clear competitive advantage (Gerrans and Hutchison, 2000). However, Hillary, (2004 p568) observed that although “customers are a key driver for the adoption of [Environmental Management Systems] EMSs and have influence far beyond any of the other stakeholders ... Paradoxically, customers also show a lack of interest in, or are satisfied with SMEs current environmental performance”. This suggests that the environmental management awareness and action, or lack thereof, amongst SMEs is a reflection of society in general.

Government regulation

Government regulation of the market is used to protect agreed social and environmental values, and maintain economic competitiveness of legally compliant businesses (Gunningham and Sinclair, 2002). Legislation is driven by policy, and the type of policy and regulation mix has a substantial effect on the achievement of the desired outcome (Gunningham et al., 1998). It is important to use a broad range of policy tools so that a combination of policy instruments builds on the strengths of some, and compensates for the weaknesses of others (Gunningham et al., 1998). Table 1 presents a summary of the some of the strengths and weaknesses of government regulation models.

Table 1: Summary of the strengths and weaknesses of four different types of government regulatory models.

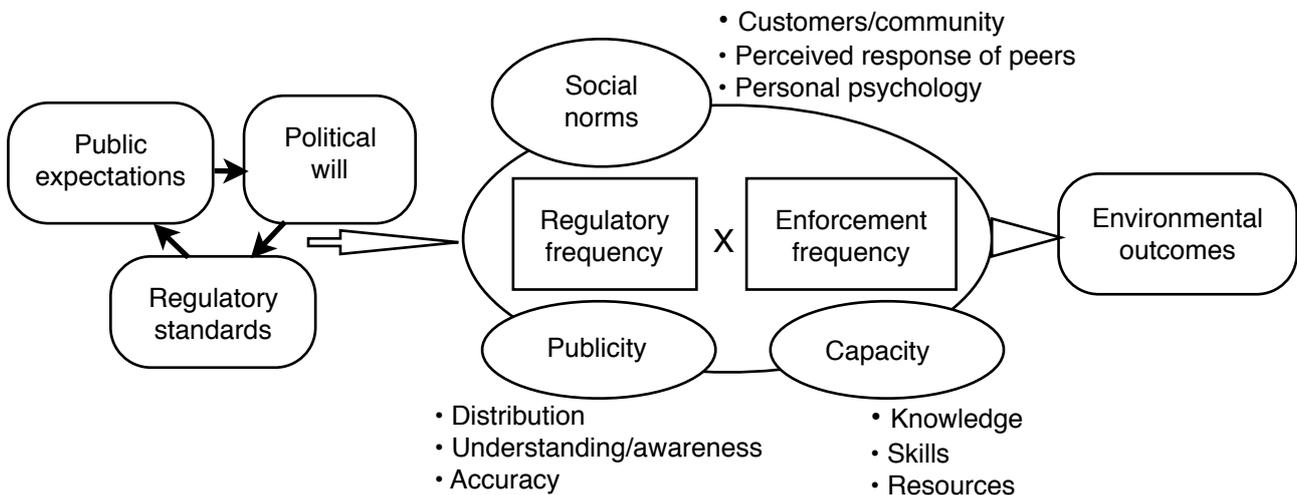
| Regulation type | Advantages | Disadvantages |
|------------------------|--|---|
| Command and Control | <ul style="list-style-type: none"> • Expectations are clearly stated • Provides enforceable minimum standards | <ul style="list-style-type: none"> • Can be too prescriptive and inflexible • Can stifle innovation • Does not encourage continuous improvement • Achieving compliance can be costly for modest environmental outcomes |
| Voluntary | <ul style="list-style-type: none"> • Allows for a flexible approach to preparing for future improved standards • Builds trust amongst stakeholders • Encourages practices beyond legislated standards | <ul style="list-style-type: none"> • Can attract free riders involved for public relations only • Can be ignored • Participation may be limited if businesses are unsure if they meet the current legal requirements • No minimum standards • No enforcement |

| | | |
|-----------------|--|---|
| Self regulation | <ul style="list-style-type: none"> • Industry driven responsibility • Can be tailor made to suit industry types • Lower compliance costs | <ul style="list-style-type: none"> • Can be ignored • Misleading reporting can go unnoticed • No minimum standards • No enforcement |
| Co-regulation | <ul style="list-style-type: none"> • Minimum standards and recognition for achieving higher voluntary standards • Cooperative government regulations and industry standards to encourage continuous improvement • Transparency and accountability of government and industry stakeholders • Flexible approach to specific industry types | <ul style="list-style-type: none"> • Higher degree of stakeholder engagement and program evaluation • Requires a whole of system commitment for effective operation |

Sources: von der Heidt, 2008; Peters and Turner, 2004; Gunningham and Grabosky, 1998; Gunningham and Sinclair, 2002; Van berkel, 2004

A common response to the need to improve SME environmental management is to propose tougher regulation and enforcement using the Command and Control philosophy. At first the Command and Control approach may appear a relatively simple law making and enforcement solution. However, as Figure 2 illustrates the implementation and enforcement of regulations is actually a very socially driven process.

Figure 2 : An illustration of the social influences on the formation and enforcement of regulations in SME environmental management.



At its most simple the likelihood of compliance with regulations is related to the frequency of inspection and likelihood and severity of enforcement (Gunningham and Sinclair, 2002). However, as Figure 2 illustrates that the strength of the initial regulations is a socially driven process, balancing community expectations and political will. Conformity is also a significant social driver in compliance, when decisions are influenced by perceptions of what others are thinking and doing (Aronson, 2008). Peer pressure and an individual's own psychology are at work here, and publicity is also influential. How and to whom information is distributed, the type of that information, and it's accuracy, have degrees of influence on decisions to adopt new behaviours (Rogers, 2003).

Technical expertise discussed earlier is also important in the capacity to comply. Therefore tougher regulations are simply the first stage of many factors influential in gaining effective SME environmental management compliance, many of which are social influences. This highlights that although legal compliance is identified as a primary SME motivator in environmental management (Williamson et al., 2006; Revell and Blackburn, 2004; Hitchens et al., 2003), gaining effective compliance with regulations requires a complex mix of social, technical, regulatory and economic factors. Petts *et al.* (1999) question if either the market or regulations alone are likely to deliver adequate environmental protection to achieve sustainability.

Market based self-regulation and voluntary participation in environmental management (Table 1) are considered insufficient for proper protection of social and environmental values, due to the predominantly monetary focus of the economic system. However, coregulation offers potential balance between the flexibility advantages of voluntary and self-regulatory systems whilst maintaining the minimum standards inherent in Command and Control regulation (Gunningham and Sinclair, 2002). Coregulation does, however, require a significantly greater focus on regulator, business and consumer cooperation (Balleisen and Eisner, 2009) and the sharing of responsibility for landscape scale environmental management.

Why is a cooperative approach potentially more cost effective for environmental management? There are situations where enforcement is necessary to protect social and environmental values and maintain the competitiveness of compliant businesses. However, enforcing compliance through the legal system can require the collection of evidence, researching and presentation of a legal case, and a favourable ruling from the judiciary, sufficient to act as a future deterrent to non compliant activity. There is a very significant cost in regulator time and resources used in the legal system, particularly when enforcing a minimum standard representing only modest environmental outcomes (Mir, 2008). If an adversarial relationship develops between the business and regulator, future cooperation and engagement in beyond compliance environmental management is less likely. Further, the prosecuted business will continue to use regulatory resources because they require vigilant monitoring for basic compliance as they are not complying of their own free will. Therefore, while it is very important to maintain business compliance with regulations, it is also highly desirable to develop constructive relationships based on trust, cooperation and free will to encourage self regulating continuous improvement, rather than basic compliance. This requires an emphasis on positive social relationships, with enforcement as a last resort. Stakeholders in SME environmental management require a better understanding of how social and psychological factors influence businesses and consumer behaviours and responses to regulation, to improve environmental management compliance and regulatory cost effectiveness.

Social influences

Social influences are integral in the distribution and acceptance of information and adoption of new behaviours (Rogers, 2003). Social factors are important in reputation and image (Graafland and Smid, 2004), legislating community expectations (Gunningham and Sinclair, 2002), trust in environmental accreditations and certifications (Ottman, 2011), and participation in voluntary initiatives (Peters and Turner, 2004). Stone (2006) suggests that environmental management guides and advice have been technically driven and too simplistic, ignoring the role of human relationships and politics that effect an organisations ability to change. Williamson et al. (2006a), Peters and Turner (2004) and Petts et al. (1999) also report SMEs as having a paternal or 'hand holding' attitude to environmental management, the expectation being that they will be individually guided

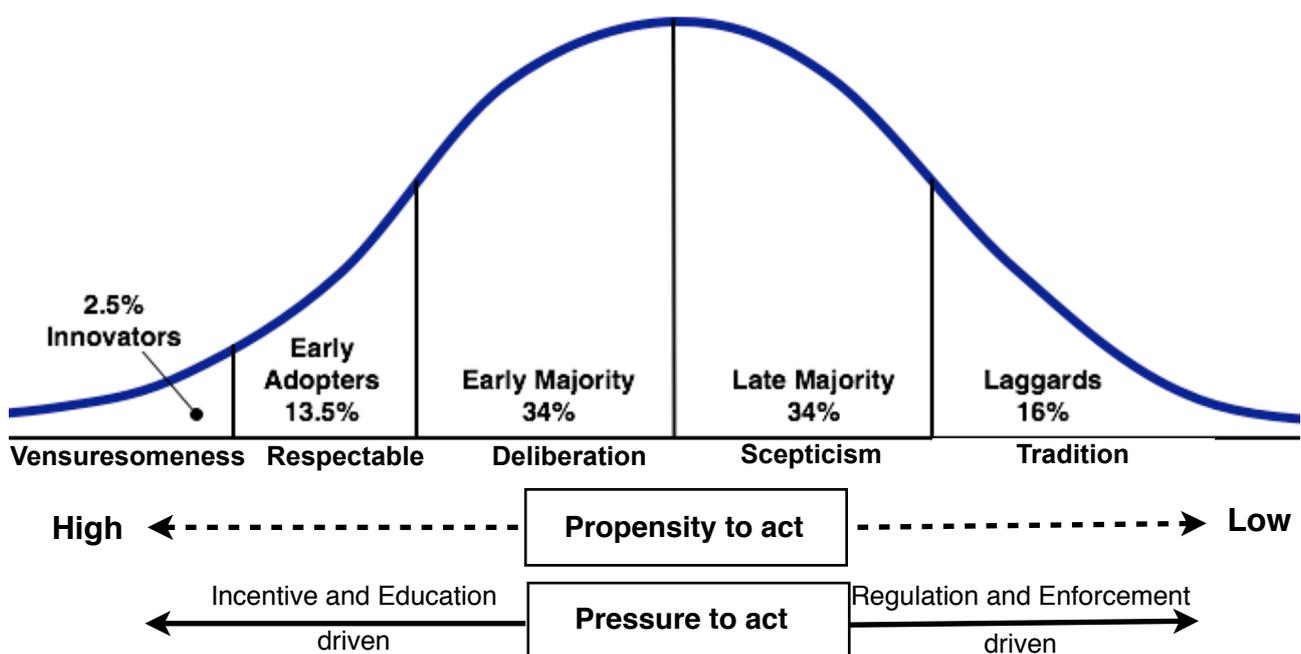
and instructed on how to perform their environmental management or corporate social responsibilities. Stone (2006) advocates a customised approach be taken according to the specific needs and culture of individual businesses. This individualised approach is particularly relevant to micro businesses whom often reflect the culture of an individual, because the smaller the business, the more likely business practices will be driven by the personality of an individual (Burns, 2007).

Therefore we have SMEs, a very important but disparate group, often perilously unable to recognise environmental hazards and risks, and difficult to reach and communicate with. As a group they are seeking, and requiring, a personalised and site-specific approach. However, they are usually subject to an ad hoc policy mix of regulation, market forces and voluntary participation that are often at odds with the signals of the market, consumers and government.

Segmenting the SME ‘group’ to strategically target initiatives

Given the constraints outlined, how is environmental management best facilitated with the immensely diverse and disparate light industrial SME group? Everett Rogers’ (1962) seminal work on the Diffusions of Innovations model provides insight for predicting SME reaction to environmental management innovation. Rogers (2003) describes the speed of the diffusion of a new innovation occurring within a social system, being influenced by factors such as the perceived usefulness and risks of adoption, social norms, and the capacity to adopt. The theory identifies general characteristics of five adopter groups, the influence of opinion leaders in each group, and the importance of interpersonal communication in the speed of innovation diffusion. Diffusion speed can vary, but adoption is considered to follow a predictable bell shaped standard deviation curve (Figure 3). Each adopter group has its own predictable characteristics and influences allowing for a tailored approach to all, or specific groups.

Figure 3: The Diffusions of Innovations model adapted to represent the predicted adoption rate of environmental management behaviours amongst light industrial SMEs. Relative percentage and dominant values of adopter groups are shown.



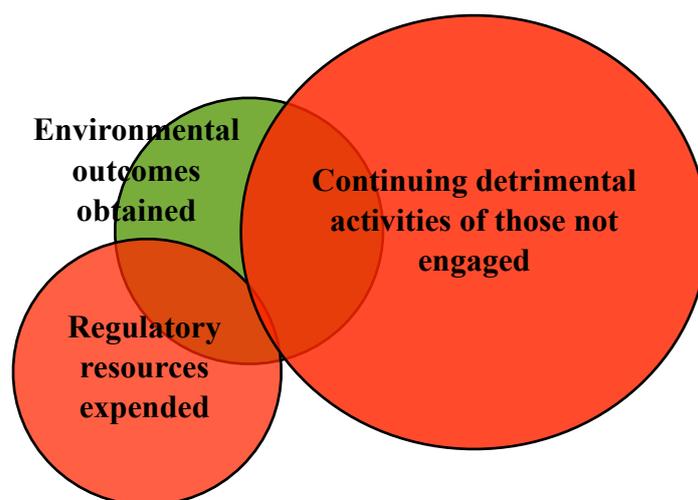
Sources: Rogers, 2003; Robinson, 2004; Gunningham and Sinclair, 2002

It is important to note that the Diffusions of Innovations model is presented here as a generalisation. Comprehensive environmental management encapsulates a range of different activities including risk management and pollution prevention as well as water, energy and materials efficiency and conservation, waste and toxics minimisation and policies and procedures (Hobbs, 2000). Therefore a business operator may be a Laggard in relation to the adoption of water conservation measures, but an Innovator regarding pollution prevention. So we are discussing an overall attitude and propensity for action towards environmental management self-regulation and continuous improvement, rather than the relative convenience of adopting any single activity.

Prioritising adopter groups using Cost Benefit Analysis

The Diffusions of Innovations model is a first stage in understanding of social influences for cost effective SME environmental regulation. Whilst the Diffusion of Innovations model provides a means to conceptually segment the diverse SME group, a theoretical Cost Benefit Analysis provides a means to prioritise adopter groups for attention. However, a simple comparison of resources expended versus environmental outcomes returns gained is not sufficient. Consideration must be given to the continuation of the status quo i.e. the cost of continued detrimental activities from adopter groups not engaged in improved environmental management. For example, Figure 4 illustrates that environmental management program gains made by targeting the willing Innovator and Early Adopter groups (whose initial impact may have already been relatively minor) may gain high business participation and attractive public relations opportunities, but the scale of the environmental outcomes could become greatly diminished against the continued detrimental activities of the Late Majority and Laggard groups. Further, the social norms created in the Innovator group may be viewed as irrelevant to the Late Majority and Laggard groups negating a ‘pull’ effect on the diffusion rate (Rogers, 2003).

Figure 4: A comparison of environmental outcomes obtained and regulatory resources used with Innovators and Early Adopters, and the potential negating effect of non participation from other adopter groups.



In order to model these scenarios some measures of cost and benefit are required. Costs arising from inadequate pollution prevention, waste management and resource conservation represent a

significant public burden, particularly where prevention is more cost effective than cure (Larson, 2009). Proving causal links and direct costs from the diffuse sources of environmental contamination common from light industrial areas can be very difficult (Perez-Sanchez *et al.*, 2003, Gunningham and Sinclair, 2002; Williamson and Lynchwood, 2001; Hillary, 2000).

The public cost of managing light industrial waste in Australian waterways and wetlands is given as an example here. Rivers provide Ecosystem Services including the economic benefits of clean water, air, foods, amenity and recreation opportunities (Brearly, 2005). Australian waterways and wetlands are considered to have some assimilative capacity for some substances (ANZECC and ARMCANZ, 2000). However, when that assimilative capacity is divided by each of the tens of thousands of light industrial premises, the acceptable values for release of some substances per premise are virtually zero, owing to the sheer number of businesses and the toxicity of the substances involved. The cost of rehabilitating the Ecosystem Services in the river is very prohibitive (Cairns, 2000). Therefore we can conceptually understand that the public cost of managing the diffuse environmental impacts of light industrial SMEs is prohibitive and undesirable, and pollution prevention rather than pollution control is required in the light industrial areas. Deferring the cost of pollution prevention adversely affects intergenerational equity (Barrow, 2006), and the ability of future generations to maintain a viable and sustainable economy and society. This is a challenge for political and regulatory leadership to protect social and environmental values and ensure the competitiveness of legally compliant business.

Engaging the Laggards

Returning to the Diffusions of Innovations and Cost Benefit model, the Laggard adopter group represent the most cost effective to target for the protection and improvement of Ecosystem Services. The Diffusion of Innovations model describes the Laggard group as the last in a social group to adopt a new innovation (i.e. environmental management), very conservative, generally suspicious of science, and having little contact with authority or representative associations (Rogers, 2003). Whilst described as a relatively small group (Figure 3), their activities are likely to account for a disproportionately large percentage of Environmental Harm due to the lowest adoption of pollution prevention practices (Lock and Olman, 2008). Laggards as a group are less influenced by societal norms and suspicious of scientific and regulatory advice, and can be particularly difficult to locate and communicate with. However, Rogers (2003) cites Röling *et al* (1976) who suggest that direct contact with Laggards where assistance was provided gave encouraging results. Engaging the Laggards may also have a push effect, challenging other adopter groups to improve practices in order to be perceived as more progressive than the Laggards.

It is very important that we understand the term Laggards to represent that group who are last to adopt a new innovation in a population, and not simply as irresponsible or recalcitrant people. To attach an inherently negative connotation to the Laggard group would be to misunderstand the nature of innovation diffusion and adopter groups. If one were a health researcher studying the uptake of cigarette smoking amongst adolescents, the Laggard group would represent the model of the most desired behaviour. So the value of the term Laggard is contextual to managing a behaviour, according to our own values. The challenge becomes how to reach and engage the Laggard group.

The problem is three fold;

- establishing appropriate evidence based regulations and guidelines,
- locating, communicating with, and assisting the Laggard business operators, and,
- the cost of ensuring compliance and facilitating continuous improvement.

We have previously discussed the social influences and challenges associated with establishing regulations, monitoring, and enforcing compliance in environmental management. Now we will look at the roles of responsibility and capacity.

The perception of responsibility and capacity

Why does the perception of responsibility for environmental management vary amongst SME operators? What are the individual and system responsibilities and how do these factors interact? What role does the perception of responsibility play in the motivation to act? It is commonly reported that SME business operators consider themselves to be majority responsible for environmental management in their business, and positive about environmental management generally (Vives, 2006; Williamson et al, 2006a; Castka et al., 2004), although many do not take sufficient action (Hillary, 2004). However, seeking to influence SME environmental management outcomes is not simply about changing SME beliefs and behaviour. Rogers (2003) describes the variables used in innovation diffusion models as indicators of the success or failure of the individual *within the system* rather than as indications of success or failure *of the system*. Not considering System Failure can obscure the need for systemic evaluation and change. Rogers (2003) explains that Late adopters and Laggards (Figure 3) are often blamed for not following the advice of change agents (regulators), when a more careful analysis may show that the Laggards tried and rejected the innovation as inappropriate to their needs, and that not adopting was rational from their perspective. Not considering System Blame can lead to unhelpful stereotyping of adopter groups, and the avoidance or neglect by regulators to provide the information or assistance that can lead to innovation adoption, thus becoming a self-fulfilling prophecy (Rogers, 2003).

Consideration of the system-individual blame concept leads us to ask wider questions regarding the nature of poor environmental management adoption and the perception of responsibility for improvement. Are the issues realistically under the control of the individual, a business, consumers, a representative body or government authorities? System and individual blame can be a matter of perspective. It is important to understand where the best capacity for change lies, rather than whose responsibility it is perceived to be.

A practical West Australian example of environmental management responsibility is the installation of washdown bays and oil separators used to catch and clean water from washing vehicles and machines. The washdown bay system isolates hydrocarbons and solids from direct transmission to the stormwater system, as required by law. Washdown bays are a very expensive infrastructure investment for a small mechanical workshop or machine detailing micro enterprise and many businesses are unable to easily finance a washdown facility in the short term. Aside from the difficulty in financing the washdown facility, many businesses lease their premises, and few premises are available with washdown facilities installed. Most landlords are also reluctant to finance a washdown facility, and the leasing business is reluctant to install a facility that cannot be substantially removed when they vacate (Lock and Olman, 2008). Therefore, we can blame the individual for not installing the infrastructure required to meet regulatory standards, or move toward

a more systemic blame perspective and fault the landlord for not providing such facilities, or the regulating authorities for implementing laws that cannot be reasonably met without accompanying assistance. System blame can also be attributed to consumers whose spending patterns do not favour paying the full environmental costs of goods and services, preventing a reasonable return on the investment for those businesses installing the washdown infrastructure (Petts, 2000).

The system-individual blame concept suggests a need for the comprehensive collection of data regarding the barriers to innovation adoption, not simply as an individual failure to adopt, but the constraints of the regulatory and market framework. This suggests a regulatory system that is less forceful and more understanding, and less dictatorial and more sophisticated and cooperative in approach. However, this does not mean that individuals will necessarily respond in a logical, rational or cooperative way. Understanding how people reach their apparently irrational or contradictory positions is key to effectively using social influences in regulatory compliance, and engaging in a cooperative rather than adversarial relationships.

Getting more personalised using psychological models

Where there are no identifiable systemic reasons for why innovation adoption should not occur, the unit of analysis becomes more individual, and the smaller the business the more likely it will be influenced by the personality of an individual (Burns, 2007). Why don't people do the 'right thing' once it has been explained to them? There could be a number of reasons, all requiring very different responses.

Some possible reasons for SMEs not acting on the advice of regulators could be:

- An SME does not believe the regulator;
- An SME lacks the ability to comprehend the explanation, or the explanation is poorly conveyed;
- The regulators advice is incorrect or impractical;
- An SME lacks the skills or resources to follow through an intent; and/or
- An SME's environmental protection values are in conflict with other values important to them.

Each reason is quite different and requires a specific response to develop a cooperative relationship. A more thorough understanding of psychology and sociology models allows for a broader set of communication and engagement options. It increases the likelihood of cooperation and the possibility of beyond compliance environmental management, making regulation more cost effective. Two examples of the use of psychological theory for planning to improve light industrial SME environmental management outcomes in are given below. The first example examines an approach to behaviour change planning, the second, how we might approach belief change planning, more likely with Laggards.

Gibson's (1979) Notion of Affordances can develop our understanding of how the assistance, directives to act, or incentives that regulators offer to SMEs are being viewed by those we are trying influence. There are three concepts that particularly assist questioning to reach a mutual understanding:

- Affordances – positive or negative utility of an object (i.e. the subjective perception of the

- usefulness of the innovation)
- Attunement – habitual association with particular affordances of an object (i.e. the convenience of habits regarding current practices).
- Effectiveness – knowledge or skill required to utilise an object’s affordances.

Gibson’s (1979) Notion of Affordances can guide the questions that we ask to evaluate another’s understanding of an offer, or request made to an SME operator:

- Do they perceive the value of an offer, or an object, in the way that we are intending it? Do they have a positive or negative view of the affordance (value) we would like to ascribe to the new equipment or behaviour?
- How do they regularly associate with, and use particular objects, including those involved in the undesirable behaviours? Do we need to encourage a new attunement (create new habits) or propose equipment or processes that can be used successfully with old habits?
- If they are prepared to make the requested changes, what new infrastructure, skills or knowledge would be required to use and maintain the objects in the way we intend them to be used?

The social environment will both influence, and be influenced by, the affordances that individuals are attuned to, and the effectivities that they are equipped with (Kurz, 2003). As the scope of observation widens again to incorporate social influences, the unit of analysis is no longer individuals, but groups, and the Diffusion of Innovations model (Rogers, 2003) becomes relevant in the planning and design of both strategic and dynamic behaviour change programs. The process is sophisticated, iterative and necessitates a whole of system approach to avoid unreasonably placing the responsibility of environmental management on individual businesses where the capacity to comply is not present.

On occasion an SME shows a general reticence to comply with environmental regulations and the business operator arguments for not doing so appear irrational and inconsistent. In this scenario a clearer understanding of psychology is required to explain why some people hold seemingly irrational or contradictory positions in a discussion or situation. Cognitive dissonance (Festinger, 1957) describes the discomfort that arises from holding two or more contradictory ideas simultaneously. The theory of cognitive dissonance describes the motivational drive to alleviate dissonance by altering one’s values, beliefs and behaviours to rationalise or justify them (Festinger, 1957). The conflicting values of environmental protection and financial security can result in a cognitive dissonance that may be resolved a number of ways by the individual:

- live with the dissonance (discomfort)
- rationalise the behaviour (externalise the barriers as someone else’s responsibility)
- change behaviour (so the new behaviour matches beliefs in environmental protection)
- change beliefs (so behaviour for environmental protection is no longer necessary)

Each position requires a different response to facilitate cooperation, the descriptions of which are beyond the scope of this paper. It is however, important to note that seemingly recalcitrant attitudes to environmental management can originate from relatively central or conformist views. Aronson (2008) describes how militant positions can arise from a central position following the great difficulty in choosing one of alternate positions i.e. financial security or environmental protection where they cannot be reconciled as complimentary. In order to justify the new position chosen,

given the difficulty in accepting the opportunity cost, a person is more likely to vigorously advocate their new position despite originating from a very central position. The Diffusions of Innovations theory (Rogers, 2003) suggests that within the adopter group peer influence is a particularly powerful motivating force amongst Laggards given their minimal association and respect for the practices of other adopter groups. In this scenario resolving the Laggard reticence for environmental management could be attempted by the regulator arranging contact for Laggards with former environmental management Laggards allowing them to explain why they have changed their position, and steps taken to engage constructively with regulators in continuously improving environmental management. The approach acknowledges that an understanding of underlying SME operator values and conflicts is necessary to address 'perceived' as well as 'real' barriers to change.

Applying the theory for effective use in light industrial SME regulation

We have discussed several systemic factors that frame the approach to light industrial SME environmental management regulation including inconsistent government and community expectations, leadership and purchasing patterns, and the absence of strong social norms, and supportive market drivers. Challenges with engaging individual SMEs include;

- SME operator difficulty in identifying environmental hazards and risks, and a low perceived need for change in environmental management approach;
- Site-specific and individual needs for the identification of appropriate solutions;
- Paternal expectation of assistance;
- Difficulty locating poor environmental managers, and,
- Competitive advantage obtained by avoiding environmental management costs.

We have discussed the complex interactions of market and regulatory factors, technical skills, social influences, and individual psychology in the adoption and continued use of new environmental management practices. A cooperative co-regulatory approach is advocated as the most cost effective regulation for high level environmental outcomes. Individualised inspections, advice and assistance requires door-to-door contact with SMEs at their premise. Individual site visits and consults with businesses represents a significant regulatory cost, however, not acting also involves prohibitive costs in the loss of Ecosystem Services. Typically a major cost involved in regulation is delivering the regulator to the premises (renumeration, office space, vehicle and equipment, training). The traditional Command and Control approach represents relatively high potential costs of enforcing legal compliance for relatively low environmental outcomes. Whereas, training regulators in basic and relevant communication, education, sociology and psychology principles that facilitate a cooperative continuous improvement approach, appears a relatively low cost addition to basic SME environmental auditing for potentially high value returns. The approach does however, require 'whole of system' support to, at a minimum, evaluate and remove systemic barriers to SME environmental management adoption.

Auditors and regulators of SME environmental management do not need to be psychologists to use the concepts discussed in this paper to improve their communication and targeting of interventions with SME business owner/managers to improve environmental outcomes. Workshops facilitating an understanding of the basic principles, and guidance from purpose-designed checklists could be offered as professional development training. Rather than being prescriptive, the checklists are intended to inform decision-making and enhance an officer's own professional judgement and help to identify and record instances of systemic barriers.

The principle is regulators as support officers, initially collectors of information, rather than simply providers of enforcement. Information collected provides invaluable data for program evaluation and adaptive management. Inevitably some enforcement will be required with truly recalcitrant SME operators. It is therefore proposed that the roles of support and compliance officers be largely separated so they are not confused. The role of support officer ending with an SME business operator when there exists no option other than enforcement, and being reinstated when compliance is achieved.

Social influences play a critical role in the priorities and operation of the market and regulatory system (Schumacher, 1973), and information and resource access and innovation adoption (Rogers, 2003). The personal relationship between a regulator and SME operator and the networking and sharing of information within and between businesses is highly influential in innovation adoption (Rogers, 2003). Policy and regulatory initiatives need to be tailored to support these critical relationships in a whole of system approach. Good governance is required to produce suitable regulations and market framework, and the development of social norms for paying for the full environmental protection costs in the supply of goods and services.

The sophisticated use of social science in SME environmental management planning presents unique opportunities to integrate governance, economics, environmental management, information technology, innovation diffusion, sociology and psychology for high quality environmental management outcomes. Whilst significant systemic failures are currently obstacles to achieving light industrial SME environmental management it is important to openly acknowledge the challenges to all stakeholders, gradually building consensus until the policy path to government is clear.

References

Alemagi D, Oben M, Ertel J (2006) Implementing environmental management systems in industries along the Atlantic Coast of Cameroon: Drivers, benefits and barriers. *Corporate Social Responsibility and Environmental management*. 13 p. 221-232

ANZECC and ARMCANZ (2000). *National Water Quality Management Strategy: Australia and New Zealand Water Quality Guidelines for Fresh and Marine Water Quality*. Australian and New Zealand Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand.

Aronson (2008) *The social animal* 10th ed. Worth Publishers, New York USA

Arrow K, Bolin B, Costanza R, Dasgupta P, Folke C, Holling C, Jansson B, Levin S, Maler K, Perrings C, Pimentel D (1995) Economic growth, carrying capacity, and the environment. *Science* 268 p. 147

Balleisen E & Eisner M (2009) The promise and pitfalls of co-regulation: How governments can draw on private governance for public purpose (Chapt. 6) in Moss D and John Cisternino J (eds.) *New Perspectives on Regulation*. The Tobin Project. Cambridge, Massachusetts USA

Barrow C (2006) *Environmental management for sustainable development*. Routledge, London UK

- Brearily A (2005) *Ernest Hodgkin's Swanland – Estuaries and coastal lagoons of south-western Australia*. University of Western Australia Press, Australia
- Brundtland G (ed)(1997) *Our common future*. The world commission on environment and development. Oxford University Press, Oxford UK
- Burns P (2007) *Entrepreneurship and small business* 2nd ed. Palgrave MacMillian, New York USA
- Cairns J (2000) *Setting ecological restoration goals for technical feasibility and scientific validity*. *Ecological Engineering*, 15:3-4, p. 171-180
- Castka P, Balzarova M & Bamber C (2004) How can SMEs effectively implement the CSR agenda? A UK case study perspective. *Corporate Social Responsibility and Environmental Management* 11 p. 140-149
- Condon L (2004) Sustainability and small and medium sized enterprises – How to engage them. *Australian Journal of Environmental Education* 20 (1) p. 57-67
- Costanza R, Cumberland J, Daly H, Goodland R, Norgaard R (1997) *An introduction to ecological economics*. St Lucie Press, Florida USA
- Festinger L (1957). *A theory of cognitive dissonance*. Stanford, CA: Stanford University Press.
- Friedman A and Miles S (2001) *SMEs and the environment: Two case studies*. *Eco-Management and Auditing* 8 p. 200-209
- Gerrans P and Hutchinson B (2000) Sustainable development and small and medium-sized enterprises: a long way to go in Hillary R (ed) (2000) *Small and medium enterprises and the environment – Business imperatives*. Greenleaf Publishing limited, Sheffield, UK
- Gerstenfeld A and Roberts H (2000) Size matters: barriers and prospects for environmental management in small and medium-enterprises in Hillary R (ed) (2000) *Small and medium enterprises and the environment – Business imperatives*. Greenleaf Publishing limited, Sheffield, UK
- Gibson J (1979) *The Ecological approach to visual perception*. Houghton Mifflin, Boston USA
- Graafland J and Smid H (2004) Reputation, corporate social responsibility and market regulation *Tijdschrift voor Economie en Management*, 49 (2) p. 271-308.
- Gunningham N and Sinclair D (2002) *Leaders and laggards: Next generation environmental regulation*. Greenleaf Publishing, Sheffield, UK
- Gunningham N, Grabosky P & Sinclair D (1998) *Smart regulation – Designing environmental policy*. Oxford University Press, Oxford, UK
- Hawken P (1993) *The ecology of commerce - a declaration of sustainability*. Phoenix, London UK

- Hillary R (2004) Environmental management systems and the smaller enterprise. *Journal of Cleaner Production* 12 p. 561-569
- Hillary R (2000) The Eco-Management and Audit Scheme, ISO 14000 and the smaller firm in Hillary R (ed) (2000) *Small and medium enterprises and the environment – Business imperatives*. Greenleaf Publishing limited, Sheffield, UK
- Hitchens D, Clausen J, Trainor M, Keil M & Thankappan S (2003) Competitiveness, environmental performance and management of SMEs. *Greener Management International* 44 p. 45-57
- Hobbs J (2000) Promoting cleaner production in small and medium sized enterprises in Hillary R (ed) (2000) *Small and medium enterprises and the environment – Business imperatives*. Greenleaf Publishing limited, Sheffield, UK
- Kurz, T (2003). *A psychology of environmentally sustainable behaviour*. Unpublished PhD, Murdoch University.
- Larson D (2009) Symposium summary: *19th Conference of the Society for Ecological Restoration International*. Title: Sustainability for Restoration/Restoration for Sustainability www.seri2009.com.au/pages/sessionLarson.doc accessed 28/2/10
- Lock P and Olman E (2008) *The Drain is Just for Rain*. South East Regional Centre for Urban Landcare, Western Australia.
- McKeiver C and Gadenne D (2005). Environmental management systems in small and medium businesses. *International Small Business Journal*, 23(5), 513-537.
- Mir D (2008). Environmental behaviour in Chicago automotive repair micro-enterprises (MEPs). *Business Strategy and the Environment*, 17(3), 194-207.
- Murillo D and Lozano J (2006) SMEs and CSR: An approach to CSR in their own words. *Journal of Business Ethics* 67 p. 227-240
- O'Regan N and Ghobadian A (2005) Innovation in SMEs: the impact of strategic orientation and environmental perceptions. *International Journal of Productivity and Performance Management* 1 (2) p. 81-97
- Ottman J (2011) *The new rules for green marketing - strategies, tools and inspiration for sustainable branding*. Greenleaf Publishing limited, Sheffield, UK
- Parker C, Redmond J, & Simpson M (2009). *A review of interventions to encourage SMEs to make environmental improvement*. *Environment and Planning C: Government and Policy*, 27(2), 279–301. (ERA Level A)
- Perez-Sanchez D, Barton J & Bower D (2003) Implementing environmental management in SMEs. *Corporate Social Responsibility and Environmental Management* 10 p. 67-77

- Peters M and Turner R (2004) SME environmental attitudes and participation in local-scale voluntary initiatives: Some practical applications. *Journal of Business Planning and Management* 47 (3) p. 449-473
- Petts J (2000) The regulator – regulated relationship and environmental protection: Perceptions in small and medium sized businesses. *Environment and Planning C: Government and Policy* 18 (2) p. 191-206
- Petts J, Herd A, Gerrard S & Horne C (1999) The climate and culture of environmental compliance within SMEs. *Business Strategy and the Environment* 8 p. 14-30
- Pimenova P and van der Vorst R (2004) The role of support programs and policies in improving SMEs environmental performance in developed and transitional economies. *Journal of Cleaner Production* 12 p. 549-559
- Revell A and Blackburn R (2004) *SMEs and their response to environmental issues in the UK*. Small Business Research Centre, Kingston University, UK
- Robinson L (2004) *Enabling change*. Environs Australia
- Rogers E (1962) *Diffusion of Innovations*. The Free Press of Glencoe, New York USA
- Rogers E (2003) *Diffusion of Innovations*. 5th ed. The Free Press, New York USA
- Schaper M (2002) The challenge of environmental responsibility and sustainable development: Implications for SME entrepreneurship academics, in Fuglistaller U, Pleitner H, Volery T and Weber W (eds.) *Radical changes in the world: Will SMEs soar or crash?*. Recontres de St. Gallen, Switzerland
- Schumacher E (1973) *Small is beautiful - a study of economics as if people mattered*. Vintage books, London UK
- Stone (2006) Limitations of cleaner production programmes as organizational change agents. I . Achieving commitment and on-going improvement. *Journal of Cleaner Production* 14 p. 1-14
- Studer S, Welford R and Hills P (2006) Engaging Hong Kong businesses in environmental change: Drivers and barriers. *Business Strategy and the Environment* 15 p. 416-431
- Tencati A, Perrini F and Pogutz S (2004) New tools to foster corporate socially responsible behaviour. *Journal of Business Ethics* 53 p. 173-190
- Tilley F (1999) The gap between the environmental attitudes and the environmental behaviour of small firms. *Business Strategy and the Environment* 8 p. 238-248
- Van Berkel R (2004) *Biting the Dust – Making Cleaner Production work for small business*. *business*. Paper presented for the Waste and Recycle Conference, Fremantle, Western Australia

Vives A (2006) Social and environmental responsibility in small and medium enterprises in Latin America. *The Journal of Corporate Citizenship* 21 p. 39-50

von der Heidt T, Charles M, Ryan R & Hughes B (2008) Managing environmental regulations for the 21st century: challenges and opportunities in an Australian industry context, *Managing in the Pacific century : program and abstracts 22nd Australian and New Zealand Academy of Management (ANZAM) Conference*, Auckland, NZ, 2-5 December

Walker B, Redmond J, Sheridan L, Wang C, & Ute G. (2008). *Small and medium enterprises and the environment: barriers, drivers, innovation and best practice - a review of the literature*: Small and Medium Enterprise Research Centre, Edith Cowan University, Western Australia

Williams H, van Hooydonk A, Dingle P & Annadale D (2000) Developing tailored environmental management systems for small business. *Eco-Management and Auditing* 7 p. 106-113

Williamson D, and Lynchwood G (2001). A new paradigm for SME environmental practice. *The TQM magazine*, 13(6), p. 424-432.

Williamson D, Lynch-Wood G and Ramsay J (2006) Drivers of environmental behaviour in manufacturing SMEs and the implications for CSR. *Journal of Business Ethics* 67 p. 317-330

Williamson D, Lynch-Wood G, Doikos P, Halvadakis C, Henry A, Dunphy N, Rais K & Korab V (2006a) *A blueprint to support environmental compliance among European SMEs*. Staffordshire University, UK