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Elizabeth Walker  
*Edith Cowan University*

Janice Redmond  
*Edith Cowan University*

Margaret Giles  
*Edith Cowan University*

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# A PROPOSED METHODOLOGY TO PROMOTE ADOPTION OF ‘GREEN’ PRODUCTION BY SMALL FIRMS

Elizabeth A Walker<sup>\*</sup>, Janice Redmond<sup>\*\*</sup> and Margaret Giles<sup>\*\*\*</sup>

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*Small firms are critical to all economies but also have a significant negative impact on the environment. Their collective footprint equates to 60% of industrial pollution yet small firm owner-managers are not convinced of the necessity for behaviour change. This paper develops a proposed methodology to engage small firm owner-managers in ‘green’ production, in particular adoption of energy saving and waste recycling practices. This methodology includes a suggested approach to determining the ‘tipping point’ for the investment of time and resources by small firms. The paper argues that knowing the ‘tipping point’ and making a realistic business case should encourage small firm owner-managers to improve their participation in environmental impact management. The end result of this will be a reduction in the collective environmental footprint made by small firms, thereby making a positive contribution to Australia’s overall response to climate change.*

**Keywords:** SMEs, environment, small business, energy efficiency, ‘tipping point’

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## I. INTRODUCTION

Small firms are the ‘backbone’ of the Australian economy but also have a significant negative impact on the environment. The purpose of this paper is to develop a methodology to encourage behavioural change by small firm owner-managers, to move them from being inactive or reactive to active or proactive managers of their firm’s environmental practices. The paper focuses on the need for a business case to be made as well as the need to understand that decisions by small firm owner-managers about where to invest time and resources are critical to firm survival and growth. The methodology includes understanding and identifying the ‘tipping point’ (the value of cost savings at which a firm will implement a change to ‘green’ production, that is, improving their environmental impact management) for that investment. It is expected that once the ‘tipping point’ for investment in environmental activity is estimated, small firm owner-managers can be educated and supported to embrace change and actively reduce their firm’s environmental impact.

## II. LITERATURE REVIEW

Australia will experience some of the most severe consequences of climate change. According to the Garnaut Report (2008) strong, early and effective responses are

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<sup>\*</sup> Director Small & Medium Enterprise Research Centre, Edith Cowan University, Joondalup, Western Australia

<sup>\*\*</sup> Small & Medium Enterprise Research Centre, Edith Cowan University, Joondalup, Western Australia

<sup>\*\*\*</sup> Accounting Finance and Economics, Edith Cowan University, Joondalup, Western Australia

needed to reduce the threats resulting from human activity on water availability, ecosystem survival, food production and human health. How the country responds will have profound implications on how and where the people of Australia will live in the future (Australian Greenhouse Office, 2006; Stern, 2006). As Garnaut (2008, p. xix) says when discussing Australia's position "the structure of our economy means that our terms of trade would be damaged more by the effects of climate change than would those of any other developed country." Human activity is the principal driver of climate change (The Marshall Report, 1998) and some 40% of all human activity can be attributed to the business sector. It is therefore critical to manage the environmental impact of both large and small firms, especially their consumption of natural resources and their production of emissions which cause air, land and water pollution (Parliamentary Office of Science and Technology, 2004).

All firms leave an ecological footprint. Larger firms attract attention as their footprint can be readily seen (Luetkenhorst, 2004). Moreover, they usually have sufficient profits to channel into environmental initiatives to ameliorate damage or reduce energy use. In addition, large public companies are prompted into these endeavours by adoption of shareholder-friendly 'triple bottom line' (Bonilla *et al.*, 2010) or corporate social responsibility (Lindgreen and Swaen, 2010) accounting and management practices. Unlike large firms, small firms (those employing less than 200 people) (ABS, 2007; Lundström and Stevenson, 2002), have thus far escaped scrutiny on this issue. So while internal policies to manage the environmental impact are appearing in major corporations, in the vast majority of small firms, whose operation structure is owner-manager, little or nothing is happening (Simpson, Taylor and Barker, 2004; Walker, Redmond, Sheridan, Wang and Goeft, 2008).

It is becoming increasingly critical that small firm owner-managers are engaged in developing strategies to address climate change. Of the 1,963,907 actively trading firms in Australia some 1,877,895 or nearly 96% employ less than 20 people (ABS, 2007). These firms employ some 3.7 million people or 46% of the private non-agricultural sector workforce (ABS, 2004 update from 2007) and generate an estimated 39% of Australia's economic production (Department of Industry Tourism and Resources, 2007). So while it is admirable that larger firms are 'doing something', they are a very small group (some 86,000 firms) in the economy. Thus, if any real change is to occur, small firms have to be engaged. Moreover, it is inequitable to accept that only large firms have responsibility to drive changes in resource use. All sectors and industries need to be engaged in addressing this global issue.

Research shows four key obstacles to getting small firm owner-managers engaged in environmental management practices. First, most small firm owner-managers do not perceive their business to have a substantial (negative) impact on the environment (Hillary, 2000; Redmond, Walker, and Wang, 2008; Revell and Blackburn, 2007; Tilley, 1999). This may be because the environmental impact of an individual firm tends to be small-scale and highly dispersed. Yet it has been shown that, especially in developing countries, small firms are more 'pollution-intensive' than larger ones (Blackman, 2006). Although the actual environmental impact is difficult to assess, estimates suggest that the aggregate contribution of this sector to total industrial pollution may be as high as 60% to 70% (Stokes, Chen and Revell, 2007). The Marshall Report (1998, p. 2) in the UK states that "taken together, [SMEs] account for around 60 per cent of total carbon dioxide emissions from business and may offer scope for significant improvements in energy efficiency and reductions in emissions".

A second obstacle to small firm engagement in 'green' production is that there is a lack of a convincing business case for change (Luetkenhorst, 2004; Revell, 2006). While proponents argue that resource allocation efficiencies and productivity gains can accrue from formal environmental management systems (Florida and Davison, 2001) small firm owner-managers have remained largely unconvinced of their ability to reap such potential benefits (Revell and Blackburn, 2004). Few have sufficient scale to achieve such gains, while many are unable to translate investment in environmental management practices into a sustainable long-term competitive advantage (Simpson, Taylor and Barker, 2004). The liability of smallness is such that small firm owner-managers are intensely aware of the need to maintain fine margins to compete with others in their industry (Revell, 2006) and maintain market share. These firms operate in a monopolistically competitive market which has no potential for long run abnormal profits. Hence attention to pricing is the key focus. There is little room for spending on seemingly extraneous activities. This is often compounded by a lack of capital and knowledge resources as well as infrastructure to implement and monitor new techniques (UNIDO, 2002). Because of these real (and perceived) barriers, environmental management is often seen as a peripheral function and is accorded less importance than core business activities which compete for time and resources (Condon, 2004).

A third obstacle to engaging small firm owner-managers is that, whilst the small business sector is heterogeneous, existing legislation around environmental management practice targets specific industries or types of firms rather than 'the sector' as a whole. While this is practical, it dilutes the response of all small firms (Blackman, 2006). Also, small firms are not 'scaled down' versions of larger firms (Beaver, 2002; Wynarczyk, Watson, Storey, Short and Keasey, 1993). Therefore, the tools used in larger firms to manage their environmental impact may not apply or be replicable in smaller firms (Cagliano, Blackmon and Voss, 2001; McKeiver and Gadenne, 2005). This can be seen by the marginal uptake by small firms of the two main environmental management certification programs – International Standard (ISO) 14001 and the Eco-management and Audit Scheme (EMAS) (Gerstenfeld and Roberts, 2000; Hillary, 2000; McKeiver and Gadenne, 2005). Less than 1% have ISO14001 certification and "miniscule proportions" of small firms in the UK and EU are EMAS qualified (Hillary, 2000, p. 23).

Finally, small firm owner-managers are usually loathe to change their behaviour. This is perhaps the most difficult of the obstacles to their engagement in environmental management practices. That is, even if owner-managers accept the global footprint of their business and the veracity of the business case and if they have available the appropriate tools, they might still choose 'business as usual'.

The acknowledgement that behaviour change will not occur without the engagement of the owner-manager of the small firms is also congruent with McKenzie-Mohr and Smith's (1999) assertion that "initiatives to promote behaviour change are most effective when they are carried out at the community level and involve direct contact with people". This suggests that it is the owner-manager's knowledge, attitudes and beliefs about the environment which are critical to the implementation of environmental impact management practices and measures (Petts, Herd and O'Heocha, 1998). Small firm owner-managers' are known to have poor knowledge, low environmental awareness and negative attitudes and this can create "a powerful series of resistant forces acting upon the small firm" (Tilley, 1999, p. 241). By

targeting the small firm owner-manager and identifying the 'tipping point' for their investment of time and resources of the firm, resistance may be minimised.

In the past, there have been two methods suggested to improve small firm engagement in environmental management. The two methods that have support in the literature are: education or legislation, or put more simply, the 'carrot' or the 'stick'. In terms of the 'carrot', education can be a powerful tool and can be used to create change in all levels of human activity, including business (Goldney, *et al.*, 2007). The social cognition approach, which is predicated on cognitions regulating behaviour, has a strong emphasis on increasing an individual's knowledge to change attitudes and beliefs, and ultimately behaviours (Conner and Norman, 2006). But small firm owner-managers face time and cost issues as well as the preference for applied, just-in-time and experiential learning (see Dawe and Nguyen, 2007; Kitching and Blackburn, 2003; Webster, Walker and Brown, 2005; Webster, Walker and Barrett, 2005). Moreover, environmental management education aimed at small firms has been criticised for lacking specificity, the use of inappropriate language and as being too difficult to access (The National Centre for Business and Sustainability, 2006; Tilbury, Adams and Keogh, 2005).

The alternative method for engaging small firms is legislation or the 'stick' (Masurel, 2007; Williamson, Lynch-Wood and Ramsay, 2006). However, compliance can be low if small firm owner-managers are unaware of its existence, are unable to interpret the effect on their business (Revell and Blackburn, 2007), governments do not enforce the operation of the legislation, or there are inconsequential penalties.

Although some effect may be achieved by using these two methods in combination as the carrot and stick could synergistically work to get small firm owner-managers engaged in environmental management practices, the added weight of argument that could be gained by understanding the business case and the 'tipping point' for investment should not be underestimated. This is especially so as increases in energy costs result in greater monitoring of the cost of energy use (Abrahames *et al.*, 2005; Stern, 1999). Once small firms are engaged, the benefits of 'green' production should be forthcoming. The difficulty is, however, that most small firms are just not engaged to any significant extent (Condon, 2004) nor do they have any apparent incentive to engage.

Therefore, the aim of this paper is to respond to the need for a business case to be made for their engagement and include within it a research methodology that can identify the 'tipping point' for greater investment in environmental impact management by small firms.

### **III. PROPOSED METHODOLOGY**

It is acknowledged that there are many factors that impact on small firm decision making such as the background, experience and risk profile of owner-managers, the type of market the firm is in, the availability of substitute products, the possibilities for product differentiation and brand loyalty, developments in the macro-economy, national government taxing and spending policies, and central bank interest rate and lending policies. However, as mentioned earlier, small firm owner-managers are most concerned about staying in business (Hillary, 2000; Walker *et al.*, 2008; Redmond, Walker and Wang, 2008). That is, they want to know two things – what is their

bottom line and how much leeway do they have in dropping prices or accepting higher costs. More specifically, investment in 'green' production will only be made if there is a business case to do so and this case will be affected by the rate of return on that investment.

Of particular importance in the methodology proposed in this paper is the role of the owner-manager, who 'is the business' (Stockdale, Rowe and Walker, 2004), especially in those significant numbers of small firms that have no employees. That is, the key to improving small firm environmental impact management (that is adopting 'green' production) requires targeting the individual owner-manager to take action and provide the leadership for behaviour change in their market. Note that there are many actions that could be included under the auspices of 'green' production. In this paper we refer only to energy savings although the methodology could be applied to complementary activities such as waste disposal and water recycling.

The proposed methodology to engage small firm owner-managers is as follows. First, a business case for the adoption of 'green' production based on the 2010 SME environmental management data collection (Walker and Redmond, 2010) is developed. Summarily, this business case will show that identifiable behaviours in small firms can lead to specific energy costs savings. For example, if all non-essential lighting remains off when not in use, then \$x dollars per day are saved. A multivariate approach that accommodates the heterogeneity of small firms could be used to individualise the business case across different groupings of firms or owner-managers. Using the previous example, for small firms with shop fronts only, this saving per day may be \$x<sub>1</sub> but for small firms with larger premises, this saving per day may be \$x<sub>2</sub>. Finer levels of disaggregation that take into account hours of business or type of product can also be estimated.

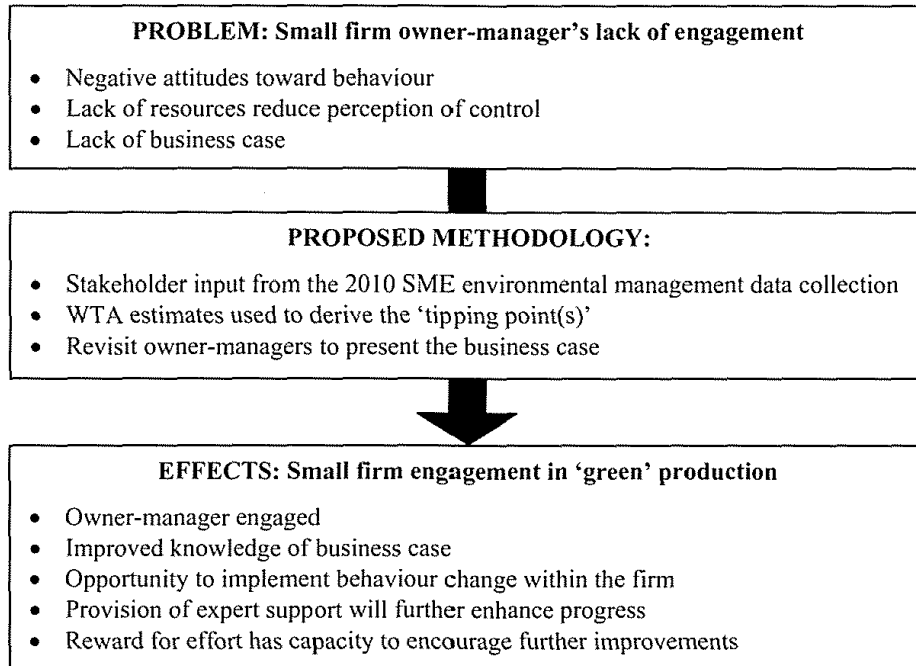
Next, surveys of small firm owner-managers using a contingent valuation (CV) or choice modelling (CM) technique will produce estimates of willingness to accept (WTA) in relation to the adoption of the behaviours that lead to energy cost savings. For example, one owner-manager may be willing to accept \$x<sub>3</sub> as the minimum amount of savings they would need in order to adopt the 'green' production idea. Another owner-manager may not be prepared to change their behaviour for anything less than \$x<sub>4</sub> in cost savings.

The difference between the CV and CM methods will depend on the funding of the research that pursues the methodology proposed in this paper. As stated by the UK Competition Commission (2010) in its review of stated and revealed preference techniques, the CV technique is quicker, cheaper and easier for respondents. On the other hand, preferences are more stable in CM which also allows valuing of individual attributes compared with CV which values the package of changes as a whole.

The final step in the proposed methodology is to derive one or a number of 'tipping points' from the WTA estimates. Averaging across the responses will provide one 'tipping point' but this assumes that small firms owner-managers are very alike. As mentioned earlier, small firms are heterogeneous as are their owner-managers. A multivariate approach where the WTA estimates are modelled on owner-manager and firm factors could be used. In either case, the 'tipping points' can be interpreted as the cost saving threshold above which small firm owner-managers are most likely to change their behaviour.

This methodology is summarised in Figure 1. It shows the process of using the 2010 SME environmental management data collection (Walker and Redmond, 2010) to make the business case, discovering the 'tipping point' and subsequently engaging and supporting the small firm owner-manager in 'green' production.

**FIGURE 1:  
PROBLEM, METHODOLOGY AND EFFECTS**



The bottom box in Figure 1 includes the provision of information and support for the owner-manager to ensure the process achieves its desired outcomes. Assimilation of information requires small firm owner-managers to first be interested or engaged (Condon, 2004; Tilley, 1999). But impetus for action can be lost if there is no education or support provided to the owner-manager to make any changes and maintain their motivation to bring about change (Condon, 2004). Rewarding changed behaviour can reinforce it and it is important that small firm owner-managers realise 'bottom-line' gains or rewards for their effort (Luetkenhorst, 2004).

#### **IV. CONCLUSIONS**

In summary, this paper identifies five components which are integral to encouraging the owner-manager of a small firm to engage in environmental impact management behaviour change. These are that the owner-manager be directly engaged, be provided with information detailing the business case and the likely 'tipping point' for their small firm, be informed of and understand environmental impacts and relevant legislative requirements, receive some education and support in making the changes, and be rewarded for their overall efforts. These five components work together. For example, it is the small firm owner-manager that will make the decisions about whether resources are allocated to environmental impact management so they must be directly engaged and convinced that this is an appropriate use of both time and resources.

The methodology proposed in this paper provides a link between current research findings, current and potential behaviours of small firms and their owner-managers, and the take-up of 'green' production by small firms which contribute some 60 to 70% of all emissions.

As stated by Garnaut (2008, p. xiv), the consequences of not engaging in good environmental impact management practices across all levels of business and society will "haunt humanity until the end of time". By proposing a methodology that seeks to engage with small firm owner-managers as well as give them feedback and support, Garnaut's dire prediction can be challenged. Hence, all small firm owner-managers can, collectively, make a significant contribution to Australia's need to respond to global climate change.

## REFERENCES

- Australian Bureau of Statistics. (2004). *Characteristics of small business*. Catalogue No. 8127.0. Canberra: Commonwealth Government of Australia.
- Australian Bureau of Statistics. (2007). *Counts of Australian businesses, including entries and exits*. Catalogue No. 8165.0. Canberra: Commonwealth Government of Australia.
- Australian Greenhouse Office. (2006). *Climate change impacts and risk management: A guide for business and Government*. Report commissioned by the Australian Greenhouse Office, Department of Environment and Heritage. Available at: [www.greenhouseoffice.gov.au](http://www.greenhouseoffice.gov.au).
- Beaver, G. (2002). *Small Business, Entrepreneurship and Enterprise Development*. Harlow: Financial Times Prentice Hall.
- Blackman, A. (2006). Introduction: Small firms and the environment. In A. Blackman (Ed.), *Small Firms and the Environment in Developing Countries: Collective Impacts, Collective Action* (p.1-19). Washington DC: Resources for the Future.
- Bonilla, S.H., Almeida, C.M.V.B., Giannetti, B.F., and Huisingh, D. (2010). The roles of cleaner production in the sustainable development of modern societies: an introduction to this special issue. *Cleaner Production*, 18, 1-5.
- Cagliano, R., Blackmon, K., and Voss, C. (2001). Small firm under MICROSCOPE: International differences in production/operations management practices and performance. *Integrated Manufacturing Systems*, 12(7), 469-482.
- Condon, L. (2004). Sustainability and small to medium sized enterprises – How to engage them. *Australian Journal of Environmental Education*, 20 (1), 57-67.
- Dawe, S., and Nguyen, N. (2007). Education and training that meets the needs of small business: A systematic review of research. NCVET: Australia. Available at <http://www.ncver.edu.au/publications/1737.html>.



Department of Industry Tourism and Resources [DoITR] (2007). Encouraging enterprise: Growing business. A report on small business 2006-07. Available at: [www.business.gov.au](http://www.business.gov.au).

Florida, R., and Davison, D. (2001). Gaining from green management: Environmental management systems inside and outside the factory. *California Management Review*, 43(3), 64-84.

Garnaut, R. (2008). The Garnaut climate change review. Final report. Available at: [www.garnautreview.org.au](http://www.garnautreview.org.au)

Gerstenfeld, A., and Roberts, H. (2000). Size matters: barriers and prospects for environmental management in small and medium enterprises. In Ruth Hillary (Ed). *Small and medium enterprises and the environment*. (pp. 106-118). Sheffield: Greenleaf.

Goldney, D., Murphy, T., Fien, J., and Kent, J. (2007). Finding the common ground: Is there a place for sustainability education in VET? NCVET: Australia.

Hillary, R. (2000). *Small and medium sized enterprises and environmental management systems: Experience from Europe*. St. Galler Umweltmanagement Forum. London: Network for Environmental Management and Auditing.

Kitching, J., and Blackburn, R. (2003). The nature of training and motivation to train in small firms. DfES Research Report RR330. London: HMSO.

Lindgreen, A., and Swaen, V. (2010). Corporate Social Responsibility. *International Journal of Management Reviews*, 12 (1), 1.

Luetkenhorst, W. (2004). Corporate social responsibility and the development agenda. *Intereconomics*, 39(3), 157-166.

Lundström, A., and Stevenson, L. (2002). *On the road to entrepreneurship policy: Volume 1 in the Entrepreneurship Policy for the Future Series*, Swedish Foundation for Small Business Research.

Masurel, E. (2007). Why SMEs invest in environmental measures: sustainability evidence from SME sized printing firms. *Business Strategy and the Environment*, 16, 190-201.

McKenzie-Mohr, D., and Smith, W. (1999). *Fostering sustainable behaviour: An introduction to community-based social marketing*. New Society: Canada.

McKeiver, C., and Gadenne, D. (2005). Environmental management systems in small and medium businesses. *International Small Business Journal*, 23(5), 513-537.

Parliamentary Office of Science and Technology [POoST] (2004, January). *Climate change and business*. UK Parliament, No.213.

Petts, J., Herd, A., and O'Heocha, M. (1998). Environmental responsiveness, individuals and organizational learning: SME experience. *Journal of Environmental Planning and Management*, 41(6), 711-731.

- Redmond, J., and Walker, E.A. (2010). Final report. Small and medium enterprises and environmental management. City of Stirling. Perth: Small & Medium Enterprise Research Centre, Edith Cowan University.
- Redmond, J., Walker, E.A., and Wang, C. (2008). Issues for small businesses with waste management: Resources or attitudes? *Journal of Environmental Management*, 88(2), 275-285.
- Revell, A. (2006). The ecological modernisation of SMEs in the UK's construction industry, *Geoforum*, 38(1), 114-126.
- Revell, A., and Blackburn, R. (2004). UK SMEs and their response to environmental issues: Executive Summary. Surrey: Small Business Research Centre, Kingston University.
- Revell, A., and Blackburn, R.A. (2007). The business case for sustainability? An examination of small firms in the UK's construction and restaurant sectors. *Business Strategy and the Environment*, 16(6), 404-420.
- Simpson, M., Taylor, N., and Barker, K. (2004). Environmental responsibility in SMEs: Does it deliver competitive advantage? *Business Strategy and the Environment*, 13(3), 156-171.
- Stern, P. (1999). Information, incentives, and proenvironmental consumer behaviour. *Journal of Consumer Policy*, 22(4), 461-478.
- Stern, N. (2006). The economics of climate change: The Stern Review. London: Cambridge University Press.
- Stockdale, R., Rowe, M., and Walker, E.A. (2004). Is the owner the business? Internal influences on e-commerce adoption in small businesses. Proceedings of the 5th Webcentre Conference 25-26 November. Perth: Edith Cowan University.
- Stokes, S., Chen, H., and Revell, A. (2007). Small businesses and the environment: Turning over a new leaf? A Report for the Workspace Group PLC. Kingston University.
- The Marshall Report. (1998). Economic instruments and the business use of energy. A Report to the Chancellor of the Exchequer, November 1998. Retrieved March 26 2008 from [http://www.hm.treasury.gov.uk/media/F/7/Economic Instruments.pdf](http://www.hm.treasury.gov.uk/media/F/7/Economic_Instruments.pdf).
- Tilbury, D., Adams, K., and Keogh, A. (2005). A national review of environmental education and its contribution to sustainability in Australia: Business & industry education. Report No. 4 in a series of 5; 2005; Canberra: Australian Government Department of the Environment and Water Resources and the Australian Research Institute in Education for Sustainability (ARIES). Available at: [www.aries.mq.edu.au/project.htm](http://www.aries.mq.edu.au/project.htm).
- Tilley, F. (1999). The gap between the environmental attitudes and the environmental behaviour of small firms. *Business Strategy and the Environment*, 8, 238-248.

UK Competition Commission. (2010). Review of stated preference and willingness to pay methods. Available at: [http://www.competition-commission.org.uk/our\\_role/analysis/summary\\_and\\_report\\_combined.pdf](http://www.competition-commission.org.uk/our_role/analysis/summary_and_report_combined.pdf).

UNIDO and the World Summit on Sustainable Development. (2002). Corporate social responsibility: Implications for small and medium enterprises in developing countries. Available at: <http://unido.org/userfiles/BethkeK/csr.pdf>.

Walker, B., Redmond, J., Sheridan, L., Wang, C., and Goeft, U. (2008). Small and medium enterprises and the environment: Barriers, drivers, innovation and best practice. A review of the literature. A Report to Swan Catchment Council. Available on [www.ecu.edu.au](http://www.ecu.edu.au).

Webster, B.J., Walker, E.A., and Brown, A. (2005) Small business participation in training activities. *Education + Training*, 47(8/9), 552-561

Webster, B.J., Walker, E.A., and Barrett, R. (2005). Small business and on-line training: who is willing to participate? *New Technologies Work and Employment*, 20(3), 248-258.

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(3), 317-330.

Wynarczyk, P., Watson, R., Storey, D. J., Short, H., and Keasey, K. (1993). The managerial labour market in small and medium enterprises. London: Routledge.

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