Human and ecological health: The case of a UK small business

Hall, NA and Velez-Colby, F

Humand and Ecological Health: -The case of a UK Small Business ~~BusinessTitle of Paper Not More than 2 Lines, Capitalize the First Letter of a Word Except for Preposition and Conjunction~~

Nicholas A. Hall~~Name of Each Author~~[1], Fiona Velez-Colby~~Underline Name of Presenting Author~~[2], ~~Name of Each Author~~[1,3]

1 University of Salford ~~Name of Organization~~, ~~and Address~~Dept of Art and Design Centenary Building, Peru Street, Salford, UK.
~~2 Name of Organization, and Address~~
2 University of Salford ,Dept of Art and Design Centenary Building, Peru Street, Salford, UK.

~~3 Name of Organization, and Address~~

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ABSTRACT

The principles of Universal Design consider many user needs within design development such as equitable and intuitive use (The Centre for Universal Design 1997). Whilst these principles are important to any design thinking, this paper considers the wider context of human ecology. Any user interacts with the environment in which they live and has an impact upon it; especially when it comes to the increasingly rapid consumption and disposal of products. This paper suggests that any agenda for Universal Design for a sustainable future must consider the ethics and social fairness of the globalised supply chain. Integrating sustainable approaches to design and development processes that are ecologically sound will be vital for our future. SMEs (Small and Medium-size Enterprises) constitute 98% of 2.15 million businesses in the UK (Office of National Statistics 2009). The adoption of sustainable practice is vital in the small business sector to affect positive ecological approaches to design and ultimately the end-user. This paper will discuss a case study of an environmentally-considerate UK SME. It will investigate its existing systems for product development and investigate to what extent it considers the impact on human and ecological health throughout the product lifecycle. Cradle to Cradle (C2C) (WIlliam McDonough & Michael Braungart 2002) principles will be used as an example of best practice to evaluate the businesses understanding of sustainability. In conclusion the paper will discuss key findings and implications of the research and how we might begin to define guidelines and principles that SMEs may adopt to develop sustainable practices that can become part Universal Design approaches and principles.
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Keywords

Universal Design; Sustainability; Ecological Health~~Three~~; Small Business~~, to a maximum of five keywords; separated by semicolons; like this.~~

INTRODUCTION

Quality and supply of food, sanitation and improved health are among the many reasons for the unprecedented population growth in the last sixty years. The most significant growth can be seen around in the 1960s and 70s when the standard of living for many developed nations increased; this

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was supported by the development of the materials economy and its generation of vast wealth. For the first time in human history the majority of consumers in the Westernised world/developed nations could afford a high standard of healthcare and purchase goods that improved their standard of living. This increased demand for goods led to improvements in mass-manufacture. New production technologies and new materials drastically reduced costs and time to market, so not only were the goods demanded, but they also became increasingly affordable. The population increase continues to result in unprecedented globalised consumer demand as more and more people strive to improve their standard of living through convenience and luxury. It has generated a global trend in over-consumption.

The materials economy is a linear system that creates goods from raw materials through production and sells those goods to the consumer. These goods are then disposed of at the end of their 'life' by the end-user. The materials economy is an economic system of wealth creation that, when conceived, was based on limitless resources of energy and raw materials. It is only since its beginning that we have discovered that the resources which it consumes at an ever-increasing rate are finite. This system is unsustainable, and one which has never considered people, or more importantly, ecology.

For the purposes of this paper, ecology is defined as the relationship between humans and their environment and the degree of impact that they have upon this relationship depending on consumption and productivity.

Whilst the principles of Universal Design (The Centre for Universal Design 1997) provide a guide for designers in a wide range of disciplines that consider equitable approaches, flexibility and simple, intuitive use within design development they do not address the emerging demand of sustainability and the wider context of consumer's impact upon the environment. This paper suggests that any agenda for Universal Design for a sustainable future must consider the ethics and social fairness of the globalised supply chain and industrial ecology. Integrating sustainable approaches to design and development processes that are ecologically sound will be vital for our future.

But how can we balance this with wealth creation and an improved standard of living for all? How can the system be universal? It becomes a *design* problem. An alternative approach must be applied to the existing commercial framework in which the materials economy currently operates. Part of any user-centred approach to design for a sustainable society must of necessity prioritise human beings and their relationship with the environment. All industries should now consider the true impact of complete life-cycle of manufacturing processes involved in producing their products and services, concerning both human and ecological health. The consideration of multiple factors involving the natural and synthetic raw materials utilised within the entire manufacturing cycle should be investigated. Consideration must also be given to both the energy expended and water consumed during the manufacturing, distribution and disposal of products and services, as these resources are also constrained by their finite availability. When taking into account the impact of the materials economy on human and ecological health, consideration of the treatment of the labour force must be made. Factors relating to working conditions, earnings, health and safety, and discrimination should be of major concern to all connected by chains of supply, manufacture and demand.

This paper will investigate an alternative paradigm which considers the impact of products and services throughout the entire lifecycle, from cradle to cradle, rather than the usual limited cradle to grave considerations traditionally applied. The concept of Cradle to Cradle design (C2C) (Braungart. 2008) considers the impact of products and services on human and ecological health throughout a product's entire lifecycle. This paper will focus solely on the practical application of this method on a small to medium-sized enterprise (SME) within the UK, and seeks to analyse the limitations faced during implementation.

SMEs - The UK and Global Economy

In the entire UK private sector, some 4.8 million enterprises with an annual turnover of just under £3000 billion, only 0.1% had more than 250 employees and 0.6% had between 49-250 employees.

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This means that in the private sector in the UK, SMEs with 1-49 employees constitute 99.3% of the entire private sector, a staggering figure. SMEs contributed 59.4% of all private sector employment and 50.1% of all private sector turn-over (BIS. 2009). These statistics can be shown to be representative for industrialised nations. SMEs constitute 99.8% of all companies in the EU (Ilomaki. 2009), and at least 80% of all global enterprises are considered to be SMEs with less than 250 employees. The figure rises to 85%+ in the US and, globally, SMEs account for 70% of the world's production (Manring. 2009). With such a significant proportion of the UK, and wider global economy and ecology dependent on the products and services they provide, on the processes they implement, the energy consumed and the waste produced, it is evident, that the adoption of sustainable practice is vital in the small business sector to effect positive change. Implementation of changes in their processes towards sustainable practice and consideration of their impact on ecology remains a difficult transition for many SMEs. This can be attributed to a range of factors, from a lack of investment to a lack of understanding of how even to begin to tackle the problem.

The Impact of Products and Services Manufacture and Process on Human Ecological Health

Traditionally the industrialised nations have manufactured, distributed and disposed of their products without considering much more that the economic benefit of such actions. The synthetic chemical industry alone produces billions of tonnes of up to 70,000 commercial substances and generates millions of tonnes of waste and by-products per year (Thornton. 2001). These are generated without considering the long-term ecological effect they may have, past the basic regulations placed on them by governments and international agreements. There is a growing body of evidence that indicates that even the smallest exposure to some of these by-products can be extremely damaging to human health and ecology, and that many of these pollutants are stable and/or oil-soluble, which causes them to persist in the environment (Thornton. 2001). The system currently established to evaluate the possible danger or toxicity of materials and the chemicals they contain considers only each material in isolation. It does not consider the build up of these chemicals and how these affect us over time. Statistics over the last few decades indicate substantial increases in various allergies and health problems, and 'the increasingly ubiquitous application of certain chemicals in everyday products is highly suspect as a contributing factor' (Braungart. et al 2007). The consumer has little power to affect the raw materials that are consumed, unwanted by-products and potentially harmful waste that are generated by the manufacture and consumption of their everyday household goods.

The linear materials economy has many other flaws quite apart from its more direct impact on human and ecological health. Consider also the volume and value of resources consumed and ultimately disposed of with no attempt made by the manufacturer, to re-capture the valuable and finite materials used in production and lost at the end of a products life to land-fill. In the US in 2000 4.7 pounds per person per day or 0.8 tonnes per person per year of refuse waste was either sent to landfill or incinerated. This compares to 2.7 pounds per person per day in 1960 (US Environmental Protection Agency 2002. cited in Kumar. 2006). This dramatic increase in waste displays not only the consumer's insatiable and growing appetite for consumption, but also the wasteful attitudes of the manufacturer who misses the opportunity to increase their potential profitability through waste management and product and resource reutilisation. In 2004 the UK commercial and industrial sectors produced 83000 thousand tonnes of waste constituting 25% of all UK waste. This figure disregards the waste passed on to the consumer who must deal with the end-of-life disposal of products, domestic waste constituting a further 9% (DEFRA 2004). Indeed the efficient use of raw materials in itself reduces waste output whilst making financial sense for SMEs competing in highly competitive national and global economies. Research has indicated that for SMEs the increase in materials efficiency is a natural aim and not viewed as an environmental activity, but rather a process necessary for sustainability (Ilomaki. 2001). But this is only one facet of a complex problem.

Consider also the consumption of energy on a global scale. This complex and ever-urgent problem is one now at the forefront of international environmental discussion. Improvements in energy efficiency combined with the dire need for greener energy sources forms the basis of the debate. Energy production and consumption are directly linked to man-made greenhouse gasses (GHGs), which include carbon dioxide (CO_2), and arguably, accelerated climate change. In 2001 global CO_2

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emissions were approximately 28,000 million tonnes (International Energy Agency. 2004). This figure is expected to increase by a further 43 billion tonnes by 2030 (US Department of Energy. 2009). Further segmentation into developed and developing nations and comparative sectors is common. Statistics indicate that the manufacturing sector is the largest single consumer of energy at 37% of global energy consumption (Park. 2009). Manufacturing's close link with the world's finite energy resources, the pressure of rising energy prices and ecological damage, should accelerate industry recognition into the need for greater development of and research into energy efficiency.
Efforts to develop standardised frameworks that enable SMEs and larger organisations to increase their energy and resource efficiency are the focus of much research, both within the private and public sector. The International Organisation for Standardisation (ISO) has been developing an international framework to enable manufacturing companies to manage all aspects of energy procurement and use. ISO50001 is to be made available at the end of 2010 and "provides a method for integrating energy efficiency into existing industrial management systems for continuous improvement. It is compatible with ISO9001, ISO14001. Implementation of an energy management system assists a company to develop a baseline of energy use, actively managing energy uses and costs, reduce emissions without negative effect on operations." (Mustrays. 2010). The Eco-Design Directive legislated in 2005 by the European Parliament and revised in 2009 has the more specific aim of providing manufacturers with a framework that enables them to lower their energy consumption and other environmental impacts, without affecting the quality and performance of their products by focusing on the design phase of a product (www.eceee.org, 2010). Consideration should be given to the different perspectives these two frameworks bring to tackling the issue of environmental impact on the manufacturing process.

Social fairness can be placed in a variety of contexts, but for the purposes of this paper is described in the context of unsustainable development and the impact this has on different social groups. The relentless rise in energy prices which directly affects the cost of food and other commodities, coupled with the market demands for cheaper products and services all have an adverse effect on vulnerable groups of people. Our supply chain affects the lives of those in developing countries that produce such goods under appalling conditions. (Horinbrook. et al 2009) Any agenda for Universal Design for a sustainable future must consider the ethics and social fairness of the globalised supply chain. Cradle to Cradle certification (MDBC. 2008), for example, requires that a business meets the Social Accountability 8000 international standard (Social Accountabiliy International 2008). This includes adherence to fair labour practices, corporate ethics and integrity, businesses supplier relationships and competitive behaviour.

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Case Study: UK Small Business based in Manchester, UK.

The small business (SME) investigated operates in the North-West of England and provides food products in the form of spices and glazes for meat and poultry. The SME was noted to have numerous awards for environmental, manufacturing and business excellence which instigated our approach to ask if they might take part in this case study. Initial interviews with the business's production manager highlighted their increasing focus on the development of sustainable and environmental practice. The initiative began as a cost-saving exercise in waste management. However, as the business recognised the benefits and rewards of continuing the development of sustainable practice, it became a core strategy, part of the businesses identity and a key success factor within its market place.

Current Strategy and Environmental Successes

Employing only thirty people, the SME manufactures and distributes its products on-site, using spices and flavours supplied to them as raw materials from around the world. Its product range is split into three distinct areas of sale, all of which are to business-to-business clients. It sells to commercial supermarkets, wholesalers that distribute to butchers and food merchants and finally, on an industrial scale, selling flavours to manufacturers in large plastic barrels. All the products in the three areas differ in packaging, size and weight and in some cases product range. For example, the commercial range which sells to supermarket customers has twenty one products.

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We questioned senior management on the environmental processes that the business undertook using questioning based on the Cradle to Cradle certification standards documentation as a benchmark. The investigation examined the current practice of the business, potential for improvement, and barriers facing the business in the adoption or progression of their environmental strategy to the standard that Cradle to Cradle certification would require. It was also important to discuss whether they felt these ideas were reasonably practicable. In the first instance we identified the process by which the company had adopted and developed its environmental practice using the Cradle to Cradle standard. We then analysed these findings to examine potential for development and asked the business to identify barriers to these recommendations.

As Van de Ven quotes "a business often innovates when it reaches a threshold of opportunity or dissatisfaction" (Van de Ven 1989). In this case the SME in question noted the enormous packaging waste it was inheriting from its suppliers and the annual disposal cost of around £10,000. During a cost-saving exercise they identified all recyclable and re-usable packaging materials and designed a system in both the manufacturing and administrative sections of the business to sort plastics, paper and other useful materials into relevant bins. Rather than pay for the disposal of this waste into landfill, it now generates annual revenues of £2000 from a recycling company that collects the waste weekly. Profiting from a previous cost in such a dramatic way prompted investigation into further strategies to reduce the company's waste such as paper reduction and initiatives for re-using existing packaging. By this stage the business had achieved 92% of a zero-waste operation. The final problem was actually the cleaning of the food machines of the waste spices, termed 'wash-out'. Research by the company found a bio-fuel production plant that could utilise the wash-out to feed the bacteria used to generate methane for electrical power production. This moved the company to nearly 100% zero waste and meant they also had a reduced carbon energy source for running production obtained from the bio-fuel plant. They now have a fully defined materials recovery plan.

The business then examined its energy usage and implemented a number of steps to reduce consumption and reclaim and re-use energies expended during manufacture. Its machines were re-tuned to operate at only the optimal speed for the process being undertaken rather than the factory settings, which are commonly over-specified (Park. 2009). In addition a new heat reclamation system was installed to gather heat energy from the machines which is used to warm hand-washing water.

Working toward closing the loop in terms of manufacture the business has also developed a packaging solution for its products that is made from a biodegradable plastic that becomes a nutrient as it degrades. This was specially developed for the business but it was highlighted to us that a lot of work went into its creation. The bio-plastic currently available for packaging is not recyclable as a plastic that customers were accustomed to 'sorting' as it contaminates whole containers of recyclable plastics. So the business demanded a bio plastic that could be both recycled and degrade in landfill without any harmful effects. At the time of the research with the business, the senior management were continuing their work toward the environmental strategy by using the bio-plastics developed to produce a new range of re-fill packs for the commercial, wholesale and industrial packaging so that the 'containers' that were currently supplied as thermo-plastic tubs could be continuously re-used.

What began as a cost-saving exercise had now become a core business activity that, although unplanned, complied with many of the environmental standards required to become Cradle to Cradle certified, the process of which was our benchmark. The business had:

- defined an appropriate production cycle, identifying energy-saving methods, minimising waste and maximising recycling and re-use of materials
- defined a materials recovery plan that recycles 100% of all the industrial waste the business produces
- actively closed the loop in manufacture by re-using materials using energy that was generated by a bio-plan from their own industrial wash-out
- nutrient re-utilisation came in the form of using the wash-out from daily manufacturing as fuel for energy generation.

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The business had also received a number of awards that illustrated the meeting of UK-based environmental standards. The Cradle to Cradle certification is based on standards in the USA, such as the water stewardship and the Environmental Protection Agency (EPA) standards which are not applicable in the UK. We researched the standards of the awards the SME had received to detail its compliance with the Cradle to Cradle principles.

Particularly fascinating is that the business's innovative process strategy has allowed it to save large amounts of capital within its production system by reducing operational outgoings. This has allowed it to generate increased profits which have stabilised the business and allowed it to invest in further innovation, to continue to make capital gains and return on investment. It has established and continues to build a strong, ethical brand around its commercial products, which have seen sustained growth in the last two years and has seen added value from an innovative and environmentally considerate reputation. Indeed the generation of value from 'green marketing' is a widely recognised outcome for companies that undertake the optimisation of their services, costs and environmental performance of products over their full life-cycle (Kumar. 2006) They have also obtained a number of 'blue chip' clients and their efficiency in production has allowed them to meet this new demand without an increase in production capabilities. In short the business is seeing the ideal amount of year-on-year growth. Product, process and organisational innovation have long been discussed as a cornerstone for developing forward-thinking, financially stable small businesses (Cereda. 2005). These businesses are characterised by an increased level of productivity and, therefore, contribute to a prosperous national economy (Tether. 2003). In this case, the demands of compliance with environmental standards has initiated has provided a platform for such innovation.

Awards and Required Standards: Drivers for process and organisational innovation?

The business has sought to comply with further standards that have built their reputation for environmental thinking and continued strategic development toward an ecologically considerate business. Compliance with these standards has resulted in awards for its environmental practice, promoting the business's brand through PR and its use of the awards in its advertising. Adherence to these standards has demanded fresh thinking and innovative practice to find new solutions to old problems. For Example:

The Environmental pledge award

This award from Manchester City Council provides an environmental audit of the business and has three stages of recognition, bronze, silver and gold. The business achieved the bronze and silver awards (see Appendix 1 for award detail) which requires implementation of the following standards:

Bronze Award	Silver Award
1. Designate Responsibility 2. Report Incidents 3. Proactive Approach 4. Environmental Policy 5. Identify Waste 6. Recycling 7. Carbon Footprint 8. Monitor Waste Consumption 9. Pledge to Support Local Initiatives 10. Clean Premises Plan	1. Energy Management 2. Water Saving 3. Energy Efficiency 4. Waste Minimisation 5. Continual Recycling 6. Travel Plan 7. Green Champions Scheme (Manchester.gov.uk 2010)

Further to this the gold award includes a number of standards that the business has addressed but some it cannot achieve due to its lack of capabilities to demand change in its supply chain and to maintain sufficient profit when purchasing raw materials for manufacture. It has achieved the following but, highlighted, are the standards where barriers to success are preventing further progress.

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1. **Carbon Neutral**
2. **Renewable Energy**
3. Investment
4. Community
5. Environmental Awards
6. Employee Training
7. Green Travel Plan
8. **Green Supply Chain and Sustainable Purchasing**
9. Environmental Management
10. Green Roof (Manchester.gov.uk 2010)

The highlighted standards will be discussed in the 'barriers to developing further environmental and social standard within the Small Business' section.

Findings

It can be suggested that these awards, should a business choose to participate in them, are a key driver in developing small businesses strategy towards environmental issues. Complying with the standards set by these awards demands innovation on an organisational level.

In summary – the key drivers for initiating and developing an environmental strategy in the SME indicated in this case study can be viewed as an incremental process where each achievement acts as a motivational factor for the next step:

1. Cost analysis – where can the business save money?
2. Development of initiative - this is based around 'simple' environmental issues such as identifying waste, clean premises and recycling policy.
3. Preliminary savings initiate analysis – the SME is motivated by initial savings, towards analysis of organisational and production processes, toward further cost reductions through better waste management, use of new technology, development energy management and travel plans.
4. Reputation builds – this begins to stimulate organisation-wide environmental process innovation, driven by cost savings, improved sales and potential for awards.
5. Achievements in awards – this initiates more advanced environmental policies and activities such as supply chain analysis and eco-sourcing, use of renewable energies, carbon neutrality and significant investment in eco-technologies for production and services.
6. Further cost-savings lead to innovative processes – this leads to increased production capacity, improved investment and a brand and product reputation that adds value, increases the business's competitiveness and capabilities, thus attracting new clients, increasing productivity and stabilising the business.

As previously mentioned, the Cradle to Cradle standard we used as a benchmark is also an award or status that a business can aspire to. It operates as one of many possible international standards, environmental management systems and awards that a business can choose to consider as part of a universal design approach to a more sustainable society.

Barriers to developing further environmental and social standards within the Small Business.

The case study indicates that the business reviewed for this paper is at the fifth & sixth stage of the above, driven by 'Achievements in awards'. The research has identified that, for SMEs, this is where there begins to be limitations due to the infrastructure of the supply chain and other issues. The evidence from the case study identified the following key barriers as highlighted in the award requirements:

Carbon Neutrality

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'Provide evidence that your company is carbon neutral. ' (Manchester.gov.uk 2010)

The business found it difficult to become carbon neutral as it relies on other businesses for logistics, such as transportation. It cannot manage the delivery of the spices it requires as raw materials as they are sent internationally by businesses in its supply chain, nor can it affect the distribution of its products, due to cost implications.

Renewable Energy

'Install a microgeneration technology (wind, solar, photovoltaic, ground source heat pump etc...) or an 'energy match' green energy tariff source.' (Manchester.gov.uk 2010)

For a small business, this requires a large amount of investment and the business argues that it is not cost-effective due to the inefficiency of such technology. The yield from these energy sources is not sufficient for a return on the investment in a reasonable amount of time. The business is pleased with the bio-energy it receives from the bio-power plant they supply with its wash-out.

Green Supply Chain and Sustainable Purchasing

'Change purchasing patterns to procure environmentally sustainable products and favour environmentally responsible companies.' (Manchester.gov.uk 2010)

This was the key issue for the small business. The production manager indicated that it was very difficult to demand change in its international supply chain. As many of the spices it imports are from foreign countries it was difficult to ensure ethical and environmental standards of production and transport. It had invested in an initiative for fair trade sourcing, but this was in its infancy at the time of the research. Further to this, its local supply chain was also difficult to manage, as there is no requirement for a business in the UK to be environmentally sound. In some cases it had no choice but to use certain businesses. It was also explained that it was vital to competitiveness and financial stability to source its supplies at the best price. Indeed, evidence suggests that although SMEs recognise the environmental impact of their businesses, they typically focus their sustainability and corporate social responsibility (CSR) behaviours towards their internal stakeholders rather than external stakeholders in the supply chain as this can place unmanageable demand on their finances and resources (Moore. 2009).

CONCLUSION

The findings of this investigation have highlighted the many ways our enormous and escalating population is placing unprecedented demands on the world's finite resources, through consumption that is driven by huge commercial demand on the materials economy. Our unsustainable attitude towards the world's finite and depleting resources must be addressed by a multitude of governments, industries, organisations and companies, not least of which are the SMEs which form a significant and valuable percentage of the global economy. There is no one environmental management system, international standard or method of energy and resource efficiency that will provide a solution to the ecological impact SMEs have on the global environment.

It can be concluded that environmental issues are an emerging driver for product, process and organisational innovation in SMEs that can add value to a business and save money through energy, waste and production efficiency. The savings can then be invested in numerous ways to develop the business. The evidence provided by this case study indicates that the development of an environmental management system by an SME emerges from initial and continued cost-saving activities and increases in efficiency, which stimulate improved productivity. The small business in question has been able to increase production capacity without investment in additional capital equipment or staff which has enabled it business to thrive.

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The case study indicates that awards, as well as cost-savings, are key drivers for developing more advanced environmental strategies in SMEs. Using Cradle to Cradle practices as a benchmark, it is advisable that the barriers highlighted in the case study, which prevent the business from progressing further, are addressed. For example, if socially fair and environmentally considerate businesses could both form horizontal alliances that share best practice as well as develop a supply chain that could be described as a 'closed loop community', it could be possible, at least on a national scale, to create sustainable communities of small businesses that are highly productive, organisationally innovative and socially fair.

Further research should consider the drivers for environmental development in SMEs and research and discuss the potential for developing horizontal alliances within award schemes that qualify businesses for mutually beneficial sustainable community membership.

The principles of integrating environmental and sustainable practice within SME's should be developed as additional principles that can be included in Universal Design approaches and methods. Further research will identify key attributes that can be applied by businesses and designers alike to create universally considerate products and services that move toward new models of consumption that create a sustainable, equitable and ecologically sound marketplace.

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~~INTRODUCTION~~

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~~Paragraph headings~~

~~You can add as many paragraphs as are needed for your paper here. Each paper must include all text, graphs, photographs, diagrams and tables etc. within a single file. Maximum paper length, including abstract, is 10 pages. References should use Harvard notation, including using an alphabetical character to distinguish references by the same author in the same year: for example, "using the methods of electron spectroscopy (Duncan, 2000a), ellipsometry (Oliver, 1998) or FTIR (Duncan 2000b)."~~

~~Sub-paragraph headings~~
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~~Table 1. Table caption is above the table, centered.~~

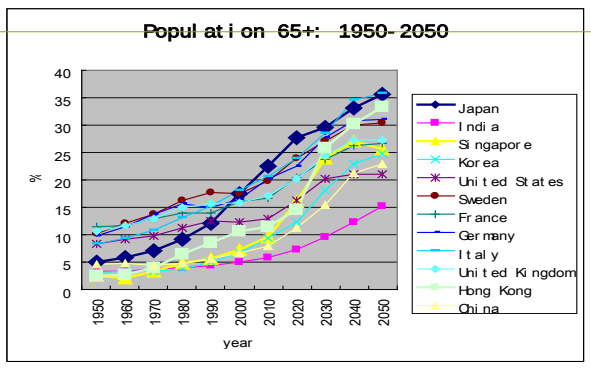

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Figure 1. Figure caption is below the figure, centered.

CONCLUSION

Your paper must have a conclusion paragraph.

ACKNOWLEDGEMENTS

Any acknowledgements may be added here. If your paper does not require any acknowledgements, you may delete this paragraph and heading.

REFERENCES

References should be added at the end of the paper, when required. The list should be ordered alphabetically by first author[1], and include using an alphabetical character to distinguish references by the same author in the same year[2]. For example:

Ex. 1 :

Duff, R.A., Jaselskis, E. J. and Smith, G. (eds). 1997. "Safety and Health on construction sites". CIB Publication 209. CIB, Rotterdam.

Duncan, J. R. 1998. "Changes in national building research organisations". Building Research and Information 26(4) 256-258.

Leicester, R.H. 1997. "Development of international timber standards for structural purposes". *In* "Proceedings, 1997 International Building Construction Standards Conference/Workshop". DIST, Canberra.

Ex. 2 :

Kreith, F., Bohn, M. S., 1986. Principals of Heat Transfer, Fourth Edition, Harper & Row, New York.

Leicester, R.H. 1997a. "Development of international timber standards for structural purposes". In "Proceedings, 1997 International Building Construction Standards Conference/Workshop". DIST, Canberra.

Leicester, R. H., 1997b. "Effect of Cyclic Humidity Exposure on Moisture Diffusion in Wood," Wood and Fiber Science, 29(1), pp 68-74.

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Moiser, R. C., 1994. “An Experimental Apparatus for the Measurement of Moisture Permeability of Building Materials,” M.S. Thesis, Virginia Polytechnic Institute and State University, Blacksburg, Virginia.

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1) Title/Author’s Name/Headings:
Each word should be in boldface.
2) Affiliation/Address: Italics
3) Font: Times New Roman
4) Size: Title (14); Author’s Name (12); Body (11)
5) Style: Left alignment/Right unjustified
6) Margins:
Top: 25mm;
Bottom: 20mm
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7) Paper should not exceed 10 pages (A4), inclusive of all images, references, and acknowledgements.

Table caption is above the table, centered.
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