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Title	Design and manufacture for sustainable development in Wales
Authors	Thomas, A
Type	Conference or Workshop Item
URL	This version is available at: http://usir.salford.ac.uk/1435/
Published Date	2007

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Design and manufacture for Sustainable Development in Wales

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ABSTRACT

This paper examines issues of design and manufacture for sustainable development in Wales. The Welsh Assembly Government is one of only three governments in the world with a constitutional remit to promote sustainable development. This paper reports on work exploring the contribution that design can make to sustainable development in the particular context of small and micro scale craft textile production in West Wales. It addresses several themes including environmentally benign design / manufacture and dematerialisation as well as the relationship of design to the economic and social dimensions of sustainable development. The research is the exploratory stage of doctoral study and it focuses on social and cultural aspects of production.

Many aspects of the producers' activities are examined – their understanding and use of design, their products and the process of designing them, the market for the products, the environmental impact of their activity and their economic viability.

The data has been collected using a case study approach and mixed methods of data collection including collection of documents in the broadest sense, field visits, interviews and observation.

Emerging issues from results obtained to date include:

The producers' relationship to design is varied. The majority do not have any design training or education and do not employ a designer. They do however acknowledge the potential importance of design, and almost certainly do 'design' in an informal sense.

The producers as manufacturers and tourist attractions. Although the producers see themselves as being primarily manufacturing units, they are all visitor attractions and as such, contributors to the tourist economy of West Wales, with a consequent environmental impact. The experience of visiting a site of manufacture is cited as a major reason for visits to be made. Some of the producers also provide services such as recreational courses.

The cultural significance of the products and the reason for purchase has a bearing on issues of sustainable consumption as the relationship between the producer, the purchaser and the goods themselves is a close one.

The paper concludes with suggestions for further work.

DESIGN AND SUSTAINABLE DEVELOPMENT

Design in this context is taken to mean the process that determines the appearance of goods and other artefacts including electronic media although it has to be noted that definitions of design have been contested by many (Jones 1992, Design Council 2005a).

Sustainable development is considered in its broadest sense which includes economic, environmental or ecological and social elements (Ekins 2000). Sustainable development can

be defined in many different ways: 'There has been much ink spilt over definitions of sustainable development and over 100 definitions can be found in the literature' (Moffat, 2001, P4). It can be argued that it is this very openness that has allowed commitment to it by the Welsh Assembly Government who use the Brundtland definition i.e. development that meet the needs of the present without compromising the ability of future generations to meet their own needs (Welsh Assembly Government 2006b).

What is the contribution that design can make to sustainable development? As a driver of consumption of goods and services, much design activity can be considered to be a direct contributor to unsustainability, for example in the increased speed of the production of fashion clothing for the mass market in developed countries: so called 'fast fashion' (Ghemawat and Nueno 2003). Conversely, if designers enable the development of products that reduce environmental impact they could be seen to be contributing to sustainable development by reducing resource use, environmental impact or changing behaviours (Datchefski 2001).

Masera identifies the use of 'sustainable product development' (SPD) in micro and small enterprises in developing countries (Masera 2001) as a tool that can enable sustainable development. He notes a lack of design input in his discussion of training for producers. 'It is surprising to notice that many training projects around the world that tackle product development are carried out by general trainers or professionals who do not have a design background' (Masera 2001, p211). He goes on to note that 'design schools tend to focus on the formation of designers who will suit the needs of large industries' (Masera 2001, p211). The culture of university design education in the West is about design for industry, not for design in rural micro enterprises in poor areas of the world; he also notes that there is a lack of design awareness in developing countries. These remarks are applicable to Wales in part; however, Masera's work and models of resource flow are not applicable to the situation in the current work; Masera's case study documents production of furniture and other products from local wood in Mexico. Wales, although not without relative poverty, (28% of children living in low income households 2003 – 5, WAG 2006a) is not a developing country in the sense used by Masera, although the terms developing and developed are used without definition. The use of resources in the textile producing enterprises in this study is not comparable to that in his work. However, arguing the importance of introducing the use of sustainable product design as an enabler of sustainable development for micro and small enterprises is highly relevant: he shows that following the introduction of SPD, improvements can be seen in access to markets, product price, and profit margins with consequent improvements in quality of life including health and access to education (Masera 2001, p212). Differences in the type of product, (furniture / textile, essential / discretionary purchase and margin for price increase) mean that the model cannot be applied completely to the current study. There are however enough similarities, (size of enterprise, rural location, product made from natural resources) to argue that design could be suggested to have a similarly beneficial effect in the Welsh context.

THE CONTEXT FOR THE RESEARCH

The research examines the relationship between design and sustainable development in the context of small and micro scale craft textile production in Pembrokeshire, West Wales. It is part of the exploratory stage of doctoral study. Other sectors of the Welsh textile industry, including large scale factory production, Welsh woollen production from rural mills and urban craft textile producers will form further areas of study in order to gain insights into similarities and differences between the contexts. The research is informed by a grounded

theory approach in which findings will have a relevance to those involved (Denscombe 2003).

Pembrokeshire has been selected as the location for the research, having an active and well documented craft sector within a bounded area. This small scale rural activity would seem to contribute to a ‘Sustainable Wales’ as outlined in the Sustainable Development Action Plan 2004 – 2007 ‘promoting a ... high added-value economy with high skills and education ... enhances pride in the local community... promotes local employment’ (Welsh Assembly Government 2004, p5) and so contributing to sustainable development.

Pembrokeshire County Council produces an annual art and craft guide listing, in 2006, 60 small scale art and craft producers, shops and galleries (Pembrokeshire County Council 2006). The textile sector was chosen for study as the researcher is a textile designer by profession and has first hand experience of many of the activities being studied. Textiles of all techniques are represented in nearly a third of the entries, as producers, or in shops or galleries. Textile ventures without a manufacturing function are not included in the study. The two mills in the area fall into the category of the Welsh woollen production and will be studied separately. Six were identified as being small scale producers having 10 employees or fewer (AIMS team 2001); however one had not opened for business as planned. The five textile producers from whom data were collected for this exploratory study are producers of goods and all can be classified as micro enterprises having only one person involved in the business; however, spouses are sometimes involved too and other casual labour is used in the production of goods. Two of the enterprises produce a range of woven goods; two keep angora goats and produce yarn and garments and domestic textiles from their fibre, mohair. The fifth has rare breed sheep and produces yarn and goods from their fleece. Some of the producers also have on site workshops and / or shops and provide bed and breakfast accommodation. The table below summarises their activities.

Table 1, The producers in the study and their activities

Producer	Textile Production	Textile tution	Workshop	Shop/showroom	Farming	B&B
1	Weaving	Yes	Yes	No	No	No
2	Yarn/knitwear	No	No	Yes	Yes	Yes
3	Yarn/knitwear	Yes	Yes	Yes	Yes	No
4	Weaving	Yes	Yes	No	No	Yes
5	Yarn/knitwear	No	No	Yes	Yes	No

Data collection

The research approach is a qualitative one, focusing on a real world situation, using multiple methods of data collection, looking at social worlds holistically and in a reflexive manner, constantly refining and reviewing the processes undertaken (Rossman and Rallis 1998, pp5 – 10). This is an appropriate strategy given the nature of the problems being studied. Data include documents in the broadest sense, materials collected on field visits, semi-structured interviews and observation. The interviews were conducted on the producers’ own premises.

Many aspects of the producers’ activities are examined – their understanding and use of design, their products and the process of designing them, or making decisions about their appearance, the market for the products, the environmental impact of their activity, their economic viability and their social contribution.

FINDINGS

The organisation of the findings broadly reflects that of the interview schedule; questions were asked about the business and its customers, design inputs, and economic, environmental and social aspects of activity that contribute to sustainable development. The findings are presented under headings which, although reflecting the main areas for discussion, also reflect issues arising from the interviews themselves. Issues of design understanding and competence form the first section; sustainable development forms the second section of the findings.

Design

In this section all aspects of design and its use are considered including the design education or training of the producers, design for the production of goods by the enterprise itself, design of goods bought in to be sold on site. Other types of design such as web sites, leaflets, brochures and sales literature, and signage, are then discussed.

Design training

Only one out of five of the producers has formal textile design training; a degree in textile design from a European university (interview 1). None of the others has any formal design qualification although this, as an indicator of design knowledge is challenged by one producer who maintains that 30 years of being a weaver is evidence of design expertise. This respondent has a first degree in an unrelated subject but as a weaver he is self taught (interview 4). There is an issue here of defining 'design training' and whether the benefits of design education are quantifiable for the producer and in what way they can be shown to be beneficial. For three of the producers, the production of goods is driven by the need to convert fleece from sheep or angora goats into sellable fibre, yarn or garments. None of these has any design expertise or background and this design of goods by non-designers has been called silent design (Gorb and Dumas 1987), poor design, non-professional design or informal design (Thomas 2005).

Use of design

Both weavers acknowledge that their design input is central to their product and to the product range they offer, some of which could be considered 'art' rather than 'craft' with a subsequently higher price (interviews 1 and 4).

One of the five had employed a textile designer to produce a range of garments for her organic, farm produced wool. The designer was briefed by her to design a small range of garments that 'would suit most ages, shapes and sizes, which would enhance the attractiveness of the Jacob wool, which would bring out its best qualities ... A show case for the wool' (Interview 5). She said that sales had been enhanced by the use of the designer for the garment range.

Attitudes to design

Attitudes to the design of products are mixed. Two of the producers acknowledged that the design element is what makes their work unique and more personal; the fact that the work is theirs exclusively is a key part of its appeal. Both of them make and sell functional woven items, rugs and household linen as well as hangings or pictures that are purely decorative. Another producer knows that design can make a difference to her business although she was not actually in business at the time of the interview (interview 5). Others were more casual; asked about design one response was 'I do all that off the top of my head' (interview 2), and another, 'I make it up as I go along' (interview 3). Despite this, both make design decisions when making or commissioning garments and other goods for their saleable ranges and can articulate the sort of colours and shapes that they will use.

Design of other textiles and goods sold

Of the five producers interviewed, two sell only their own products in their workshops. The other three select and stock a range of other goods, both textile and non-textile to add variety. These include mohair socks, lace scarves and pottery. They are selected by the producer as being appropriate to complement their own ranges. Most is locally produced if at all possible and made of natural fibres or materials. Some are made to the producer's specification but there is little or no recognition of a design process, more a selection process. Some goods are made in manufacturing units locally such as a small scale spinning facility in Brecon and a weaving mill that is part of the Welsh Museum of the Woollen Industry. All the producers emphasised the importance of the on site and local production as it is seen as a major selling point of the goods offered.

Understanding of markets and customers

An understanding of the market being designed for is an integral part of the design function. As the Design Council says: 'Design is the thread that connects ideas and discovery to people and markets' (Design Council 2005b). The respondents were asked about their understanding of the markets for their various activities. The producers have a mix of products and services and consequently a mixture of visitors, some of whom buy goods, some of whom attend courses, usually tuition in textile techniques such as spinning or weaving, and some of whom visit for the experience.

Customers for products were identified as: 'middle aged and above, people who have the money for luxuries' (interview 1), 'looking for quality' (interview 3); 'those who can afford to pay my prices' (interview 4); and those 'who appreciate the fact that everything's a one off' (interview 1). The product ranges offered reflected these perceptions. One producer justified her range of knitted garments thus: 'most of my customers are quite middle aged, large, and they want to cover all their lumps and bumps ... the last two years there's been a trend towards shorter, fitted knitwear, I've gone for that a lot more. I try to follow the trends as far as possible' (interview 3). Both weavers produce decorative pieces such as 'woven landscape pictures, those I can sell quite well, because they are landscapes, almost like the paintings market' (interview 1).

Customers also bought goods because the product was local and this justified the effort that the producers made to have local products on sale. One producer says 'Most of the people who buy are looking for something that's locally produced, they're on holiday, they want to have something from the area' (interview 3). Selling via telephone orders (interview 2) is also done but on an ad hoc basis and one producer would like to develop on-line sales as she knows that her product cannot be bought out of the area (interview 5). However, the local is not necessarily apparent in the look of the goods but is embedded in the fact that it is made from local raw materials from animals that will have been seen on a visit.

The customers for services such as courses, are identified as being 'people who are retired, mainly women' (interview 1). The customers for bed and breakfast '... come for the views, the animals the whole thing ... they're people who are interested in mohair, in what I do' (interview 2). Another emphasised the variety of people who come to her for courses, saying they vary 'from hippies to the London set' (interview 3). The people who visit are identified as tourists largely but one respondent estimated about 25% of her customers to be local (interview 3).

Two of the respondents sell their goods off site through a variety of formal and informal groups and cooperatives. For one of them their major outlet was a Cardiff shop; 'That's really the main outlet in terms of turnover, things turnover regularly there because it's in an area where there are people with disposable income' (interview 4).

Use of design support services: Design Wales

In the course of the interviews the use of several support organisations was mentioned for design input and business advice as well as training for skills such as making a web site. For design, the principal one of these is Design Wales. This is an organisation funded by the Welsh Assembly Government with the remit to support and provide design advice to Welsh firms.

‘Design Wales provides design support for individual Welsh businesses and undertakes a wide range of activities to encourage and develop the use of design in Welsh industry and education.

This site is intended to be used as a resource for industry, education and individuals interested in finding out more about design’ (Design Wales 2007).

All of the interviewees know about Design Wales and the services it offers, in particular the colour advice workshops that are put on twice a year. None go to them giving a variety of reasons; ‘I’m much too busy to go on workshops. I probably know as much about colour as any of them’ (interview 3); ‘I’m too small, too old, I can source information as I want it, I’ve got the information to do what I want’, (interview 2); ‘If I could get to it, I’m not sure it’s of any use’ (interview 4). Two of the interviewees cited that they would lose a day’s work by going to one of the colour advice workshops and the distance and cost of the travel involved. One had her daughter go to it, herself a fashion graduate, and she reported back relevant information to the respondent (interview 1).

One respondent did use the design service of Design Wales but found it too expensive. She had some contact with their advisors and had designs for ball bands for the wool and a flyer done. She was positive about their input:

‘I liked their ideas, I felt the ideas they had, like corrugated card for the ball bands of the yarn, would have done well in the London shops, that they’d really take off... but there’s no guarantee ... I couldn’t afford the risk’ (interview 5).

The pricing structure, in which a cost was charged for each element of the design package was a deterrent. It was

‘£600 for the design, about £600 to translate it into a ball band, then another few hundred pounds to translate that idea into a carrier bag ... each time, instead of just paying for the design’ (interview 5).

The respondent can see the potential of an informed use of design in her business but is not in a position to act on it at the time of writing (January 2007).

Other designed elements of the producers’ activity

This section looks at the design of other parts of the producers activities including print and electronic publicity material and signage.

Leaflets and brochures are often printed and produced by local printers without any special design expertise. Two of the producers have been selected for a European funded scheme encouraging more effective marketing for textile producers and now have professionally designed leaflets giving product information and information about themselves. These were seen as being ‘special’ and are used for international activities or for customers likely to make significant purchases (interviews 1 and 4).

Four of the five producers have a web site. The source of the design for the web sites was varied: the producers themselves, family members, friends, and professional input were all used. One of the producers did not have a web site and acknowledged that she has been ‘putting it off’ (interview 3). The web sites themselves vary from a single home page, to several pages with images and links to other sites. Selling via the web is a definite aim of one producer (interview 5).

Signage is of two sorts: the brown tourist sign put up by the County Council and the individual sign used at the entrance to the site. Producers who have more than 1000 visitors per annum are entitled to have a brown tourist sign in the standard UK format. The signs provided by the producers themselves are varied though, and come from sources including an artistic neighbour and a local commercial sign company (interviews 3 and 5). They range in style from hand written and hand painted to utilitarian.

Consistency of design across the different formats

None of the respondents used design in a consistent way; typefaces, colours and logos varied from print to signage to web page. There is considerable scope here to use a consistent approach to build a brand for the activities of each producer. One producer uses a symbol as an informal trademark but this is not applied in a consistent way.

Sustainable development

Sustainable development can be separated into economic, environmental and social elements for the purpose of this discussion. However, it must be emphasised that these are inextricably linked in the concept of sustainable development and have to be seen as interdependent elements of it. These subjects formed sections of the interviews with producers in examining their contribution to sustainable development. The role played by design is commented on at the end of each section.

Economic sustainability

Four of the producers have been in business as textile producers in their current location for times ranging from 17 years, 19 years, 20 years and 32 years (interviews 2, 3, 1 and 4 respectively). The fifth producer was working externally from the business after about 8 years in business although the business is 'ticking along' (interview 5). The majority of producers are therefore economically sustainable but this is as a result of three main factors:

Firstly, they do not aim to earn large amounts of money. The fact that craft producers make an economic sacrifice to follow their craft is well documented (Crafts Council 2004) and is reiterated by one producer who says 'It's never going to make me rich, you know ...it's very much a way of life. At the same time I don't feel I'm working, I just love what I'm doing and I make enough money that it makes me a living' (interview 1). ... 'We've almost always been a low income family... crafts people don't have high incomes' (interview 5).

Secondly, all offer a range of textile goods from small affordable pieces to larger more costly items as well as a range of other goods in some cases. There is therefore a wide range of possible purchases thus maximising potential sales.

Thirdly, they run a mix of activities contributing to overall business viability. All of them produce goods for sale but have other, complementary activities: these include teaching workshops and running courses, (three respondents); bed and breakfast accommodation, (two respondents); a small caravan site (one respondent); farming, (three respondents). One currently works for a salary outside of the craft business.

The role of design in contributing to economic sustainability of the producers is mixed. For two of the producers it is central to their product and what makes their products unique to them (interviews 1 and 4); for two others it is incidental and done in an 'invisible' way (interviews 2 and 3). For the final producer it is a tool to enhance sales and economic viability; however that producer's enterprise is currently 'ticking over' and not economically viable. Her business has been affected by external circumstances and the need to maintain a large farm house and buildings. The textile business was previously complemented by an organic meat business on the same site and visitors often bought from both. Currently this is not the case and the textile business is not viable by itself although the premises are still there (interview 5).

Economic contribution to the local area

This is seen to be important by all the interviewees. Three of them provide employment for outworkers who make knitted and crocheted garments for them (interviews 2, 3 and 5). Those that run courses and attract visitors point out that these visitors make a contribution to the local economy too as they come in and spend money locally.

Environmental impact

The producers live in the Pembrokeshire National Park and operate at a domestic scale. They all stated a commitment to minimise their environmental impact and claim to re-cycle and compost waste. In one case the farm is certified organic by the Soil Association meaning that all inputs have to be closely monitored and controlled (interview 5).

All five of the textile producers dye yarn, either for use in their own work (interviews 1 and 4), to colour yarn for sale or as part of running courses (interviews 2, 3 and 5). All are conscious of the potential impact of dyestuff waste into water courses or onto their land and all cope with it by using a technique in which the dye bath is exhausted leaving no surplus dye after the dyeing process, i.e. the dye is all taken onto the yarn leaving clear water as the only waste. As one says; ‘ You couldn’t put anything toxic on the land and therefore we are careful’ (interview 3). They choose to use this type of dye as other types generate toxic waste; it is ironic that natural dyestuffs usually require the use of harmful mordants. Making the decision to use a dyeing process that leaves no residue is a design decision, although not necessarily recognised as such.

Four of the five have land of their own and have taken deliberate measures to encourage and or conserve wildlife (interviews 2, 3, 4 and 5). This is integral to their enterprises as visitor attractions and therefore has an economic impact.

Social impact

All the respondents are involved in some sort of social activity. Two have run, or currently, run leisure workshops for local adults and school children on both a paid and voluntary basis. Others are active in organisations relevant to their production, including agricultural societies. All will give demonstrations of work in progress to individual visitors or those in organised groups. Design is not present in these activities, or only in a secondary way, for instance workshops and demonstrations may have a design element. There are examples outside this study in which textiles are designed for construction by a group or community for display locally, often in conjunction with an anniversary or celebration.

Design and Sustainable Development for the textile producers

The respondents are, in many senses of the word, sustainable. They have constructed for themselves, livelihoods and lifestyles that are economically sustainable, although at a low level, with a very low environmental impact and a positive social contribution. Can they then be said to be contributing to sustainable development? The contribution of design within this activity is mixed; some producers use it as a tool while others, apparently functioning in a satisfactory way and able to sell all of their output, do not use it consciously. Both design and sustainable development have been considered as ‘wicked’. ‘Many design problems are so ill-defined that they can only be called wicked problems ... problems without a definitive formulation’ (Rowe 1987, p41). Sustainable development has also been identified as a ‘wicked’ concept, i.e. it is complex, multi part, systemic, has multiple stakeholders and is difficult to measure and evaluate (Williams 2006). The relationship between them is likely to be complex and difficult to identify and analyse. The relationship between them in the current study is variable: the supposed beneficial effect of design on economic viability is not borne out as the producer who has used design most consciously is not currently in business while those who do not consciously use design have sustained their enterprises over more

than a decade. This again raises the question ‘Can design be done unconsciously or informally? Is it still designing if it’s not recognised as such?’

EMERGING ISSUES AND FURTHER WORK

Defining design as an activity. Can design only be done by a designer with formal training in design or does any activity relating to making decisions about the appearance of goods count? In which case, can those producers who make garments and other products without a conscious design input be identified as designers?

Relationship to design. The producers’ relationship to formally recognised design is ambivalent. The use and level of understanding about what design is and can do varies between it being an integral part of the production to being something marginal. The level of design training or education varies also from degree level to no formal design education at all.

Development of brand identity A more consistent approach to the visual aspects of the businesses would immediately give a more coherent message and start to build a brand identity for each producer. Elements of this can be seen with the producers who had the professional work done on their publicity leaflets and one does use a particular symbol as a ‘trademark’ but not in a consistent way. Design could be put to use as a marketing tool.

The producers as manufacturers and tourist attractions. Although the producers see themselves as being primarily producers of textile goods, usually alongside other complementary activities, they are all visitor attractions and as such, contributors to the tourist economy of West Wales, with a consequent environmental impact. The experience of visiting a site of manufacture is cited as a major reason for visits to be made. Some of the producers also provide services such as recreational courses some of which contribute to local social life or to that of visitors from further afield.

The cultural significance of the products and the reason for purchase. This has a bearing on issues of sustainable consumption as the relationship between the producer, the purchaser and the goods themselves is a close one. If consumers have a strong attachment to goods they own they are likely to use them for longer (Chapman 2006). In the case of the goods bought from the producers studied there is likely to be an emotional element in the reason to buy.

Sustainability of the production through time.

The producers in this study are all in their 50s and 60s. None have any obvious successor and when they retire it seems likely the business will not exist. However, one producer does envisage the business providing a supplement to her income in retirement. The producers were not asked about this directly so further work is needed to clarify this aspect of sustainability. They constitute a model of a certain type of activity which others may be tempted to follow to take their place.

CONCLUSION

Much of the information collected is contradictory; one producer who understands the potential of design to enhance sales of goods is currently forced to work outside the textile business for a regular income. Although the environmental impact of the producers themselves is very small that of their visitors, which number thousands annually, is probably considerable. The producers see themselves as manufacturers whereas their role is probably more significant as visitor attractions. With one exception, they are involved in the design of

goods but have little or no design education or training. A tentative conclusion could be drawn that the producers do contribute to sustainable development in West Wales with the role of design being unclear or negligible at present.

REFERENCES

- AIMS team, (2001) Conceptual Framework for Assessing the Impacts of Microenterprise Services. Washington DC. Management Systems International
Available online at:
http://scholar.google.com/scholar?hl=en&lr=&scoring=r&q=defining+micro+enterprise+s&as_ylo=2002&btnG= (accessed 9 March 2007).
- Chapman, Jonathan. (2006) *Emotionally Durable Design. Objects, Experiences and Empathy*. London, Sterling VA, Earthscan
- Crafts Council. (2004) *Making it in the 21st Century. A socio-economic survey of crafts activity in England and Wales, 2002-03*, London, Crafts Council
- Datchefski, E (2001) *The Total Beauty of Sustainable Products* Hove Rotovison
- Denscombe, M, (2003) *The Good Research Guide for Small-scale Social Research Projects. Second Edition*. Maidenhead, Philadelphia. Open University Press
- Design Council (2005a) What is Design?
Available online at: <http://www.design-council.org.uk/> (accessed 9th September 2005)
- Design Council (2005b) *The business of design. Design industry research 2005*. London, Design Council
- Design Wales, Available online at: <http://www.designwales.org.uk> (accessed 28th Feb 2006)
- Ekins, P (2000) *Economic Growth and Environmental Sustainability: the Prospects for Green Growth*. London, Routledge
- Ghemawat, P and Nueno L (2003) Zara: Fast Fashion. Harvard, Harvard Business Online
Available online at:
<http://harvardbusinessonline.hbsp.harvard.edu/b02/en/search/searchResults.jhtml?Ntx=mode+matchallpartial&Ntk=Author%20Name&N=0&Ntt=Pankaj+Ghemawat>
(accessed 2 March 2007)
- Gorb, P. and Dumas, A, 'Silent Design', *Design Studies*, 1987, vol. 8, no. 3, pp. 150-156
- Interview 1, 9 November 2006,
Interview 2, 9 November 2006
Interview 3, 10 November 2006
Interview 4, 10 November 2006
Interview 5, 11 November 2006
- Jones, JC. (1992) *Design Methods*, Second Edition, New York, Van Nostrand Reinhold
- Masera, D (2001) Sustainable Product Development. A strategy for developing countries in Charter, M and Tischner, (2001) *Sustainable Solutions; Developing Products and Services for the Future*, Sheffield, Greenleaf
- Moffat, Ian, Hanley, Nick, Wilson Mike D, (2001) *Measuring and Modelling Sustainable Development*. Carnforth, Parthenon Publishing
- Pembrokeshire County Council *Pembrokeshire Arts and Crafts Guide 2006*, Haverfordwest, PCC
- Rossmann, GB and Rallis, SF (1998) *Learning in the Field. An Introduction to Qualitative Research*. Thousand Oaks, London, New Delhi, Sage
- Rowe, PG (1987) *Design Thinking*. Third printing 1991, Cambridge Mass, MIT Press.
- Thomas A (2005) Private communication with James Fathers.
- Welsh Assembly Government (2004) *The Sustainable Development Action Plan 2004 – 2007*, Cardiff, Welsh Assembly Government
- Welsh Assembly Government, (2006a) *Sustainable Development Annual Report 2006*, Cardiff, Welsh Assembly Government

Welsh Assembly Government (2006b) *Sustainable Development* Available online at:
<http://www.wales.gov.uk/themessustainabledev/> (accessed 17th Feb 06)
Williams, P (2006) 'The Governance of Sustainable Development in Wales' in *Local Environment*, Vol 11, no 3, pp 253-267, June 2006