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THE PRACTICE OF ECODESIGN

A Study of Small Product Design Consultancies

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Abstract

This paper reports on an ongoing study that explores how UK based designers, in small design consultancies (SDCs), locate information and learn new skills. Semi-structured interviews were used to improve understanding of the context within which these designers operate and how their design process works. The interviews also helped to construct a clearer picture of what these designers understand by the term EcoDesign and how widely it is practiced.

Collectively small design consultancies play a very important role in the design and creation of consumer products. SDCs make up approximately half of all employed designers and generate as much turnover as in-house design teams in the UK. The research has investigated the absence of an EcoDesign agenda in many design briefs and how this might be changed in the future. This paper will outline the constraints that designers work under and in particular the barriers that SDCs face when acquiring reliable information and learning new techniques. The paper also aims to explore ways in which designers could be more engaged by EcoDesign.

Many important decisions are not taken by designers, but by their clients and managers who often control the general direction of design. However, in spite of these limitations designers can still be observed influencing outcomes, and inspiring others through their work. The paper will draw some conclusions on the reality of EcoDesign practice in UK based SDCs and outline the ways in which this could be changed in the near future.

Keywords

Sustainable Design, Product Design, Design Consultancy, SMEs

1. Introduction

There are many large businesses that produce consumer products, but the in the UK product and industrial design consultancies make up approximately half of all employed designers and generate as much turnover as in-house design teams (Design Council, 2005). Design consultancies are organisations that plan and carry out design work for clients, this can include generating new ideas, as well as developing and realising existing ones. Their activities can range from assessing the viability of an idea to designing market ready products, and involve all parts of the process from market research to developing concepts, engineering the final design and overseeing final manufacture. Design consultancies often also carry out speculative work based on their own ideas and can have employees with a very broad range of skills and interests. Given that these consultancies contribute so significantly to the overall business of design in the UK, it is important to consider them and the ecological impact of their activities.

Small and medium-sized enterprises (SMEs) are defined by the European Commission (2005) as those with fewer than 250 employees. However, this term is too wide in the context of design companies because it covers 94 percent of these types of businesses. In addition, 59 percent of design consultancies employ fewer than five people and a further 23 percent employ only five to ten (Design Council, 2005). It was decided that it would be useful to restrict the size of companies studied in order to moderate differences in their practice. Freelance designers were not considered because many of the issues under consideration were associated with group dynamics and communication. At the other end of the spectrum, in-house designers working in large companies are known to have limited control over some important aspects of the design process, such as the brief (Dewberry, 1996; Sherwin and Bhamra, 1999), so were also excluded. In this paper the phrase small design consultancy (SDC) refers to companies that have more than one, but fewer than 50 employees, which means that around 60 percent of UK based design businesses (Design Council, 2005) are still covered by this the term.

2. Background

The challenges that designers face, in the context of their impact on the environment, have been known for many years and research was being conducted in this area at least fifteen years ago. A clear description of some of the barriers and drivers of EcoDesign were brought together by Brezet and van Hemel (1997). However, recent research by the UK Design Council revealed that designers still do not consider that their ability to provide environmental advice is important to clients, with only 16 percent of design consultancies believing it is an important factor for winning work (Design Council, 2010). A wide ranging

study was made of the existing literature that examines businesses and their attitudes towards the environment. This revealed that companies were aware of more than thirty different stimuli or obstacles to implementing ecological thinking. The most prevalent of these are issues such as: lack of knowledge or skills (Chick and Micklethwaite, 2002; Gerstenfeld and Roberts, 2000; Hutchinson and Hutchinson, 1995; O'Rafferty et al., 2008; Scheer and Rubik, 2006; van Hemel, 1998); lack of time and the associated costs (van Hemel, 1998; Chick and Micklethwaite, 2002; Gerstenfeld and Roberts, 2000; Hutchinson and Hutchinson, 1995; O'Rafferty et al., 2008). However, matters such as company ethos (Baylis et al., 1998; Bhamra, 2004; Dewberry, 1996; Green et al., 1994; Merritt, 1998; van Hemel, 1998), government policy (Gerstenfeld and Roberts, 2000; O'Rafferty et al., 2008; Scheer and Rubik, 2006; Smith et al., 2000; van Hemel, 1998), market pressure (Merritt, 1998; Scheer and Rubik, 2006; van Hemel, 1998) and investment opportunities (Chick and Micklethwaite, 2002; Smith et al., 2000) have also been established as significant factors in the practice of EcoDesign.

In order to better understand this subject, and particularly in the context of SDCs, studies were conducted in to how these organisations conduct their business, what sort of restrictions they operate under, and how familiar they are with EcoDesign.

3. Methodology

EcoDesign research is a relatively new area (Bhamra and Lofthouse, 2007), so investigations in this field are inevitably quite exploratory. The uncertainty surrounding outcomes meant that the research questions were likely to be modified as information emerged from the study, so it was helpful to get a general overview of the field in order to refine the details of the research plan. Qualitative data was collected with a pilot study that used semi-structured interviews, the data being analysed using a coding and clustering approach (Corbin and Strauss, 2008). This initial study helped to clarify the research aims, which currently include: understanding the product design process (PDP) that designers in SDCs actually use; finding out how much influence designers have over their briefs; discovering how designers learn and share their knowledge within their company and what level of knowledge and experience SDCs have of EcoDesign principles. The main study is ongoing, and uses the same collection and analysis techniques as the pilot study.

The initial pilot study was carried out with six London based product designers. This has been followed by a larger investigation involving a further 15 designers working in SDCs based in Cardiff, London and the East Midlands. The age of the designers so far has been from 25 to 50 and on average the interviews have lasted for an hour. Most of the interviews were face-to-face, with one taking place over the phone, and they were recorded with the

permission of the interviewees. In order to anonymise the designers when quoting from their interviews, they have been designated codes starting with 'Des' followed by a letter from A-Z representing the order in which they were interviewed and a suffix of -p if they were part of the pilot study or -m for those who were involved in the main study.

4. Results

The results presented below have been clustered into the key themes that were identified by the analysis of the interviews.

4.1 Design Process

None of the designers interviewed followed a formal, product design process, but it was clear that their experience had led to an effective design model. The lack of a written PDP, that they actually adhered to, meant that the designers could only describe their process in very general terms. Despite the differences in the way designers described their PDPs, at a macro level they were quite consistent. The fundamental differences in projects seemed to stem from their design brief, or definition of the need that they were trying to address.

4.1.1 Design Brief

The brief is a very important part of the design process. It defines the scope of the project and the necessary elements it must contain. There was a surprisingly large range in the type and length of brief that designers received. These differences were largely due to the type of client, the market the final product was destined for and the maturity of the product or product range. In heavily regulated areas such as medicine or public transport there are tight restrictions on the materials and technologies that are acceptable, and this is usually reflected in a very specific and lengthy brief, or accompanying specification sheets. Similarly with products that have already been manufactured for many years, and the client is looking to update or add to the product range, detailed knowledge already exist about their market, pricing points and technologies. Briefs for these 'mature' products are more of an idea attached to a specification sheet, and include large amount of technical data. However, despite having so much information this type of client does not "necessarily know what they want in terms of design until they see or hear it" (DesG-m). Briefs can be equally well defined when an individual entrepreneur or inventor has developed a concept that is technically sound and well funded, but just needs an SDC to make the design market ready. The other end of the brief spectrum is the "ultra minimal, 'Italian style' brief, which can be as short as the word soft" (DesE-p) or just supplying the SDC with some "Lego as inspiration" (DesG-m) for a product. However, this type of brief generally forms part of a discussion

rather than just a briefing document. This is usually because the client company only has a very superficial idea of what they want to achieve, and the SCDs are there to distil this idea in order to define a need and translate this into a proposal or brief. In initial briefing meetings clients explain the problem they are trying to solve and the designers attempt to express this in a written form. This document is then passed backwards and forwards until the SDC and the client agree on what the essence of the problem is.

“Initially companies have ideas in space, which are digested into a proposal. You usually notice lots of nodding, smiles, or their eyes sparkle when the right ideas are being discussed.” (DesG-m)

Another reason for short briefs is that it takes a large amount of time and effort to put together a very detailed brief. Smaller clients might want to avoid this, particularly if they already have a relationship with an SDC, and trust their judgement. It is also easy to write a brief badly, which in this context means getting very detailed without properly establishing the need that the product is trying to address. Bad briefs tend to be written in isolation by lower level employees, managers, or by the marketing department rather than designers. They are often really written for line managers, to reflect the amount of work that has been done, and are likely to be long just to look impressive.

“We have rarely been given good briefs by clients. Our briefs can be ridiculously detailed, and you find when you unpick it that loads of stuff is quite arbitrary, but it has the veneer of technical detail. You make a few phone calls to the client and start realising the detail is based on really shaky foundations.” (DesG-m)

Even when a brief has been well specified there may be levels of importance attached to different aspects of the product, and ultimately a compromise between designer and client is found.

“There might be statements about the product, like it must contain XYZ with a column saying the level of that. So, is it ‘ideal’ or is it a ‘want’ or is it ‘must’? So there is a little bit of toing and froing, it’s about reaching a compromise.” (DesI-m)

The third type of brief is generate by the SDCs themselves, this kind of speculative work is much more free flowing and can develop informally over a long time period. There is no guarantee that any money will be made from these projects, but they can serve to extend the portfolio of an SDC and showcase their work.

“If we have an idea, about a quarter of the time we come up with something which a company wants to do and 75 percent of the time they say something like, ‘Ooh, that’s an interesting approach. Based on that approach, how about if you do this other product for us?’ It’s a way of getting work, it gives potential clients an insight into how you work.” (DesG-m)

4.1.2 EcoDesign Briefs

It was clear that most projects have tight cost limitations. However, this is not simply mean keeping the price as low as possible in order to maximise profit. Clients often have detailed business plans based on their market. They have to achieve a certain retail price in order to sell their products, and this dictates the manufacturing price.

“Clients are only interested in being green if it doesn’t cost them any more money. If the SDC is really into it that’s fine as long as the product still hits the price point. They probably wouldn’t publicise it, in case it’s a can of worms. If they didn’t commission a green product, hadn’t built a marketing story around it, their customers might ask difficult questions about other products.” (DesG-m)

Clearly there are some project where sustainability forms a major part of the brief, but these are generally created for a specific market where a premium is paid for the eco-credentials of the product. The ultimate aim would be to have sustainability considered alongside other design criteria and with a similar weight. Briefs rarely allow for this, but some designers do indulge in ‘eco-stealth’.

“Sustainability tends to be included in products either by stealth or to create some kind of sales leverage. It’s very rare for briefs to be altruistic.” (DesF-p).

Ultimately only a few of the briefs tackled by these designers had a strong EcoDesign element, though this did not stop some of them considering the environmental impact of their work. There was a tendency for the designers not to describe their work as EcoDesign, even if they considered sustainability as part of their design process. The approach that most designers described was Design for Durability, though they did not use this terminology. There were also elements of Design for Disassembly, and a readiness to try and select materials sensitively.

“I don’t really like the word EcoDesign very much. I think if EcoDesign is the driving factor then you probably won’t end up with a great product. Designers are

becoming much better at this now because there's so much more awareness, you're generally thinking eco about everything, so thinking about material usage, where it's coming from, packaging, all those kinds of things." (DesK-m)

4.2 Sources of Information

SDCs are expected to carry out a wide range of projects, and even the larger organizations cannot be knowledgeable across all the fields that their clients may require. Designers are regularly expected to learn about relevant topics in the course of a design project. The interviewees were found to use a whole range of tools and techniques to search for the information necessary to carry out their work.

4.2.1 Colleagues or Contacts

The preferred way to find information was to ask colleagues or other contacts that the designer has built up over time. This is a very quick way of gaining knowledge from a trusted source and tends to be much more targeted than the Internet. However, the range of information is limited by the size of the network any individual or organisation may have. This group is also likely to be dependent on past projects, making it difficult to extend knowledge into new fields. However, before making contact with other people it was considered important to have done as much research as possible before hand. This is partly in order to have a clear idea of the questions that need to be asked, but also not to waste the time of the questionee on information that could easily be found elsewhere.

"It would almost be disrespectful to them if I called them before I had done my bit. Because if I phoned them up and haven't got a clue about what I'm talking about, I'm going to sound like a real idiot and they're not even going to really want to answer the question. If on the other hand, my questions are really quite specific, they're going to think, this man knows what he's talking about, so I'll give him the five or ten minutes of my time." (DesG-m)

Parts of projects were also sometimes outsourced to experts if the work was too complex to be completed within the SDCs. This tended to be either the design of electronics, or high quality prototyping.

4.2.2 Suppliers or Manufactures

Material suppliers and manufacturers were frequently mentioned as good sources of detailed information about material limitations and manufacturing techniques.

“If you talk to a supplier you already have a relationship with, they will tell you absolutely everything you need to know for your design, particularly if you work as a team.” (DesC-p).

In a similar way to asking colleagues or contacts, it was considered important to spend some time understanding the problem and having some idea of what the solution might be before contacting outside sources for information.

“We really encourage people just to read as much as possible about a new process, so you are asking the right questions. Then the easiest way is to have a stab at what you think it’s going to be. Send it to your manufacturer to have a look at, hopefully somebody you’ve got an existing relationship with and then it’ll be backwards and forwards to find a solution between you.” (DesK-m)

4.2.3 Internet, Online Forums and Blogs

Although the favoured methods to search for knowledge are using contacts and suppliers, the Internet plays an important role in this process. It is seen as the starting point for other techniques because it is a such a quick way to access large amounts of information. However it tends to be much less targeted than other techniques, and the quality of information collected is very dependent upon the search terms, and the ability of the user to filter out appropriate content.

“Using the Internet is like panning for gold. 99 percent of it is irrelevant, all you’re interested in is a few specs of gold, and the rest is gravel.” (DesD-p).

Designers have a variety of ways to deal with this inevitable dilution of information, and the associated accuracy issues. This either involves the use of trusted sources, based either past on experience or the reputation of the creator of the website.

“If the information is on DuPont’s website then there’s a good chance that it’s good and well thought out. If it’s a comment on a forum from a random Joe then you might take it with a pinch of salt.” (DesK-m)

The other alternative is to try and triangulate the information. If a number of independent sources are presenting the same information then there is a good chance that it is accurate. However, all the designers explained that if the information is critical then they will always

check it against a recognized published source, an expert in the appropriate field or someone they trust.

4.2.4 Books, Magazines and Trade Publications

Very few of the designers use books any more, and when they are used it tends to be for very specific reasons. Most of the SDCs had a set of reference books which included information about manufacturing processes, materials information and mechanical equations. Trade catalogues might also be used because they can be easier to navigate than their online equivalent, but always alongside their websites to ensure details are up-to-date.

“Books are almost completely redundant in our office. They are too expensive and too slow to gain wide ranging knowledge.” (DesD-p).

Magazines were mentioned as a source for inspiration, but this was often more to do with designers having general interest in their field, rather than searching for specific information. In general this kind of browsing has moved from paper based mediums to their online equivalent, partly to save money, but also because there has been a move away from printed media throughout society at large.

4.2.5 Studying Similar Products

Another common technique was for designers to look at existing products. Understanding the materials and methods used in previous designs is considered a good starting point. The designers said they find it easier to look at and touch tangible things, than comprehend and apply the more abstract information in data handbooks.

“We’ve got a mini library, but we don’t really use it. In reality we look around for a product doing a similar job and use that as a basis for our design.” (DesC-p).

4.2.6 Software

Compared to the extensive use SDCs make of software in general, and in particular Computer Aided Design (CAD) packages, there was very little use of software by the designers to find information. However, this was not necessarily because they did not like these types of solution. They were quite keen to have the ease of use computer programs provide, combined with much more targeted content than is available on the internet. The main barrier to more extensive use of software, in this context, was the cost of licenses.

“I’m quite happy to pay £3000 plus £1000 per year for my CAD software because I use it every day, but for something I might only use three times per year I might pay £100 per use.” (DesA-p)

Sometimes this cost can be included in overall project spending and billed to the client. Alternatively SDCs can take advantage of free trials offered by software companies.

“If you can get a free demo or something, a 30 day demo is often enough to do a project and then you don’t have to ever use it again.” (DesI-m)

4.3 Sharing Information

Many of the SDCs and in particular those with more than a few employees recognised that there can be a problem sharing information within their organisations. They realised that this could lead to time being wasted repeating research, but had not necessarily found a satisfactory way of solving this. Most of the companies had shared hard drives to centrally store useful information, though this still requires employees to know what is there so they can look for it. There had been some experimentation in using social bookmarking websites, which allow users to label web pages with topic tabs, so that they can be searched more easily. This information can also be shared between a network of people so that they can all have access to the information. However, despite using this technology, the lack of an official system means that employees often revert to ad hoc ways of sharing their knowledge.

“I think we definitely, as a company, we could improve in terms of having more of a system a clearer way of both holding information and sharing it. I still tend to send a lot of emails to everybody saying, look at this, or look at this. That kind of thing happens a lot here.” (DesJ-m)

4.4 Environmental Legislation, Directives and Standards

None of the designers interviewed had more than a superficial awareness of environmental legislation, directives or standards. This was mainly due to the fact that they had no need of this knowledge. Either because it falls under the remit of the client, or whoever they outsource specific aspects of a project to. Many of the environmental restrictions are directed towards or affect electrical appliances, but this sort of specialist design was not being carried out by the SDCs interviewed.

5. Discussion

The discussion of the findings has been broken down into four sections, reflecting the main areas covered in the results. Comparisons have been drawn between these findings and existing research into EcoDesign and design methodology in general.

5.1 Design Process

Despite the designers who were interviewed not following a formal product design process, the methods they described included key elements that are common amongst many established models of the design process. One of these was the linear iterative nature of design, a generalised form of this process is shown in Figure 1.

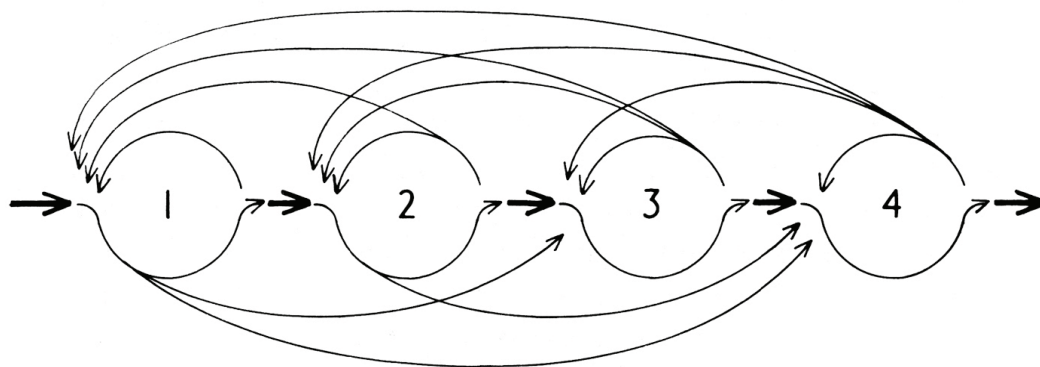


Figure 1: Linear Iterative Process (Hickling, 1982)

There are many models that use this combination of a sequential process with feedback loops (Dubberly, 2004) because it allows individual stages in the process to be designated and scheduled so that design teams can work to the same time-frame, whilst allowing for the evaluation and modification of decisions. Another element was the convergent-divergent (Brown, 2009) nature of design, whether the designer should be creating choices or making decisions. At various points in the process there is divergence to create a number of alternatives, and then convergence as these alternatives are evaluated and the most promising concept or course of action is selected (Banathy, 1996). DesG-m describes this as “not just looping, it’s more like expansion and contraction.” Both of these phases are needed, not only to create ideas, but also take them to a final solution. Cross (2008) notes that “normally, the overall aim of a design strategy will be to converge on a final, evaluated and detailed design proposal, but within the process of reaching that final design there will be times when it will be appropriate and necessary to diverge, to widen the search or to seek new ideas and starting points. The overall process is therefore convergent, but it will contain

periods of deliberate divergence.” This divergent-convergent behaviour, with an overall convergence in design alternatives is shown in Figure 2.

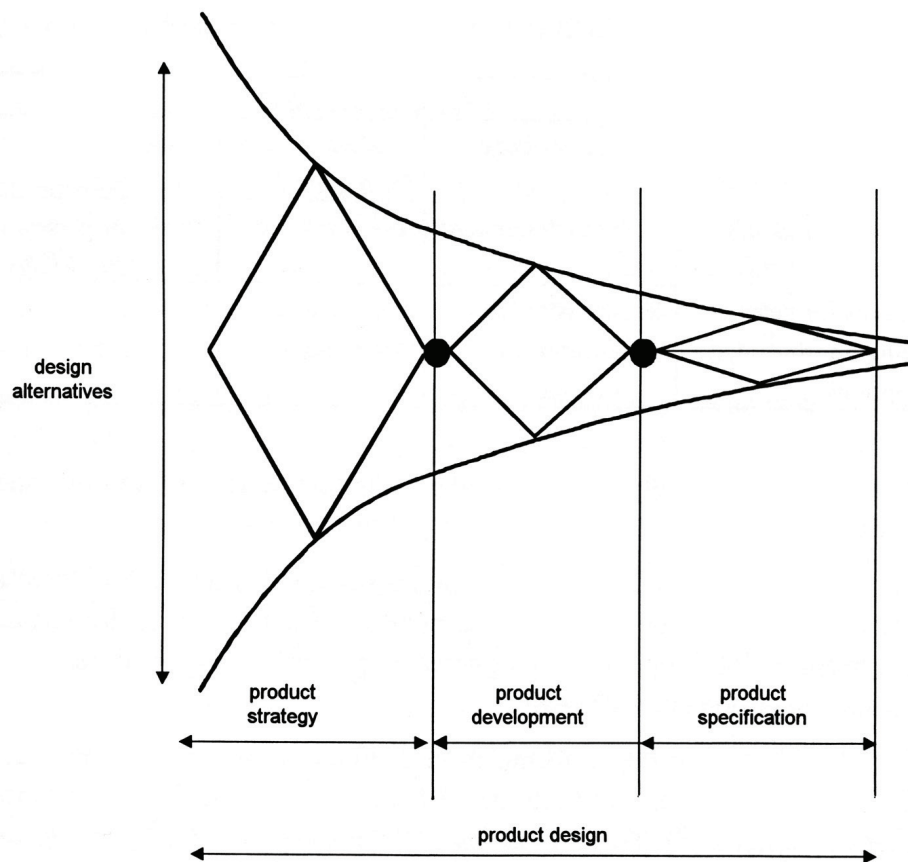


Figure 2: Convergent-Divergent Design Process (van Berkel et al., 1997)

Although the designers in the study seemed to follow an overall design process that is consistent with the literature in this area, there was a definite difference when it came to design briefs. Previous studies that have looked at EcoDesign (Dewberry, 1996; Sherwin, 2000; Lofthouse, 2001) have focused on larger organisations and found that “designers have little involvement and virtually no influence in the early stages, the design brief or specifications” (Sherwin, 2000). However, there is a clear parallel between the originators of briefs, because managers or members of the marketing department were often cited as the ones who created briefs rather than designers (Lofthouse, 2001). This can cause problems, as described in Section 4.1.1, but designers in the SDCs studied had much more freedom to modify briefs and specifications. This is important because the influence designers can have diminishes as the product development process progresses, and in turn the greatest impact can be made if environmental considerations are made right at the beginning with the definition of a need (Sherwin and Bhamra, 1999). The importance of this is demonstrated in the wedge show in Figure 3, which corresponds to the convergent shape shown in Figure 2.

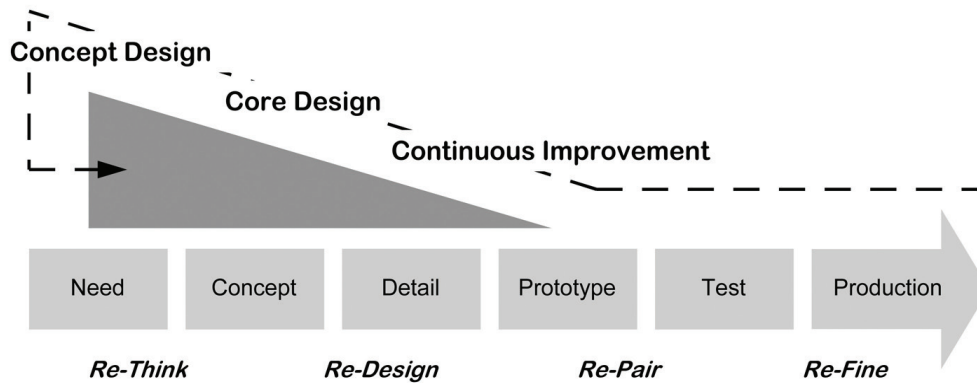


Figure 3: Conceptual and Descriptive Model of EcoDesign Process (Bhamra et al., 2001)

It is at a strategic level that decisions are made about the purpose of a product, the function it will fulfil and the way consumers will interact with it (Bakker, 1995). Designers in SDCs seem to have much more opportunity to influence strategic decisions than those in larger companies. However, this is still very dependent on clients, and the level of trust SDCs carry with them.

5.2 Knowledge and Information Sharing

It was clear that even with the plethora of technologies available, designers generally preferred to communicate with people they know and trust. However, this was tempered by the need to balance the speed of access to information, with level of accuracy available. Given the comparatively short duration of projects the SDCs were always very aware of the time they had to acquire and apply knowledge, and had learnt a series of strategies to deal with this. These tactics were generally ad hoc, with very little consistency within each business, let alone across the industry. The main reason for this seemed to be that the SDCs never felt they had enough time to stop and create a proper knowledge acquisition and sharing system, despite being aware that their current systems were inefficient. The suggestion was that if a system existed that was fast, inexpensive and above all could be trusted SDCs could see a definite benefit in adopting it.

5.3 Environmental Knowledge

Given that SDCs have a degree of control over their briefs, it would seem that there could be more EcoDesign practiced in these organisations if the designers were so willing. There was some evidence that the SDCs were amenable to this, but that they did not feel they had enough knowledge to convince indifferent clients to include environmental considerations in their briefs. There are already many EcoDesign tools available, including many free online resources and checklists. The work of Lofthouse (2006) demonstrates that there are many

reasons why designers do not use the available tools and in particular that “the slow uptake of ecodesign by industrial designers is considered to be a result of a lack of appropriate tools.” (Lofthouse, 2001) In addition to these reasons trust and cost were identified by the SDCs studied, they felt that there was no way of knowing if free resources were reliable, and if expensive tools would be worthwhile. This quandary had led to inaction unless clients had specifically ask for environmental aspects of a product to be considered or an individual designer was prepared to apply their current knowledge. This combination of reasons has clearly had a significant bearing on the uptake of EcoDesign, and goes some way to explain why even the limited activity in this area is generally restricted to Design for Durability. Notwithstanding this, there was some early evidence that younger employees in SDCs, or those who had more recently graduated with design degrees, had some foundation in EcoDesign because it had been included as part of their studies.

6. Preliminary Conclusions

The designers in this study experienced briefs of varying length, from one word to many pages. However, very few of these briefs had a sustainable agenda. Generally the products produced only included eco-features as part of general cost and efficiency improvements or eco-stealth on the part of the designer.

It was clear that in certain situations designers working in SDCs can have a greater level of influence over projects and design briefs, than would be expected in larger companies. However, even if client ethos and higher management control the general direction of projects, SDCs can inspire consumers, showing them how things could be through their designs, and create the associated demand for new goods. This consumer pressure could in turn influence company ethos, and ultimately help hasten changes in legislation. Research in this area may not be able to directly change ethos, or consumer demand, but could remove some of the barriers to widen the application of EcoDesign.

The designers were very unlikely to use books, or similar printed documents to learn about developments in materials and manufacturing. Their main sources of information were colleagues and others in their business networks, such as suppliers. There was also a large reliance on the Internet, but with a recognition that the quality of information could not always be relied upon. There was an acceptance that with such a broad range of data on the Internet it can be like ‘panning for gold’, but techniques had been learnt to help deal with this. There are several aspects of the Internet that the designers found useful. It is generally much more up-to-date than printed information, there is a huge amount of available information and it is easy to use. If a tool could combine these qualities with more targeted content from recognised and trusted sources it could prove incredibly useful. An intuitive and

engaging interface that inspires its use and integrates well with the design process would also be desirable. Some interest was shown in online social bookmarking and that it would be useful if there was an equivalent system that would allow designers to collaborate in their search for more environmentally sensitive design solutions.

Although SDCs can have some control over their briefs, and are in a position to influence their clients, they will not have the confidence to include ecological principles in their design process until their knowledge of EcoDesign has improved.

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