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THE INNOVATION–STYLING SPECTRUM: FACTORS CONSTRAINING THE DESIGN AMBITION OF UK SMEs

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1. Introduction

Good product design encompassing desirability, usability and producibility is a potent source of competitive advantage and plays a major role in product innovation. To support the development of usable and desirable products, *Industrial Design* has traditionally been viewed as providing aesthetic, ergonomic and visualisation input to product design [Herbst 1996], with the role of the industrial designer dependent on product type [Walsh et al, 1992]. However, the role of the industrial designer is changing and many designers now view themselves as creative leaders, innovators and strategists [Lorenz 1994, Desbarats 1994]. This suggests a spectrum of possible involvement for industrial design, from traditional styling through to leading the development of business strategy, irrespective of product type.

In practice, many small companies lack specialist industrial design skills and often employ an external consultancy. However, finding the right one and managing the relationship can be perceived as both difficult and costly [Moody 1980]. When the barriers to involving an external specialist are sufficient, it is likely that the engineering or marketing staff will take on aspects of aesthetic and ergonomic design themselves. This approach has been described as ‘silent design’ [Gorb & Dumas 1987].

The importance of early industrial design input into product development has been argued in both the academic and popular press [Kotler 1984, Tarasewich 1996, Harkins 1989]. In particular, several scholars have attempted to establish the connectivity between design input and the commercial success of a product [Black & Baker 1987, Roy et al 1993, Hertenstein 2001]. Typically, these studies isolate ‘design’ or ‘design orientation’ as the independent variable, often with a loose definition of ‘design’ to include industrial design, engineering design and other product development input. However, in practice, ‘design’ may also be treated as a dependent variable which is influenced by cultural, managerial, market and other organisational issues. It is thus difficult to isolate ‘design’ as the primary contributor to success [Gemser 2001]. Whilst recognising potential methodological issues, these studies generally conclude that early involvement of industrial design expertise is often strongly associated with commercial success. Gemser also suggests that the impact of industrial design input will be contingent upon the nature of the underlying technology and the ‘design orientation’ of the industry.

This study aims to explore the ways in which Small and Medium sized Enterprises (SMEs) take advantage of external industrial design expertise. Of particular interest are the the factors which inhibit the involvement of external industrial designers and restrict a company’s design ambition, where low design ambition is characterised by late (or no) involvement of industrial design during product development.

This exploratory study is part of a wider project which aims to provide practical support to industry in the design of effective products. An ultimate aim is to provide a decision support tool for the valuation and management of external industrial design.

For the purposes of this study, the *design process* is defined as the process of translating user requirements into a manufacturable reality for commercial benefit and *Industrial Design* refers to the aspects of the design process relating to usability, aesthetics and visualisation.

2. Methods

A review of NPD and product design literature was undertaken in parallel with four longitudinal exploratory cases. The exploratory cases (Pilot Projects) were conducted in action research mode [Maslen & Lewis 1994] and involved the facilitation of external industrial design involvement. These cases enabled the exploration of a range of design issues, including the management of external design resource, from product conception through to implementation and introduction.
Following the literature review and exploratory cases, a provisional framework capturing the issues involved in managing industrial design was developed. This framework formed the basis of a series of semi-structured interviews with industrialists and practising industrial designers working in a range of sectors. These interviews produced a series of example cases, providing a wider view of the role, benefits and barriers to adoption of industrial design in a range of markets. The provisional framework was revised following these discussions. A summary of companies and cases is provided in Table 1.

Table 1. Companies and cases

COMPANY	**SECTOR**	**PROJECT**	**PRODUCTION VOLUMES** (per annum)	**COMPANY SIZE** L=Large M=Medium S=Small
Pilot Projects				
P1	Medical	Optical instrument	<250	M
P2	Paper handling	Use interface	<250	M
P3	Medical	Ventilator	<250	M
P4	Telecoms	Radio	1000+	L
Example Cases				
C1	Consumer electronics	Hi Fi	1000+	M
C2	Consumer electronics	Modem	<1000	M
C3	Lighting	Control panel	<250	S
C4	Medical	Medical Laser	<250	M
C5	Scientific instruments	Instrument	<250	M
C6	Industrial & consumer electronics	Electronics demonstrator	<250	S
C7	Security	Detector	<250	M
C8	Scientific instruments	Measuring instrument	<250	M
C9	Scientific Instruments	Instrument	<250	S
C10	Medical	Precision robot	<250	M
C11	Industrial printing	Laser printer	<500	L

3. Case examples

Due to space limitations, only four of the example cases are discussed below. These have been chosen to reflect a variety of approaches to the involvement and management of industrial design.

3.1 Company C3

Company C3 is a small technology based company who design, produce and sell entertainment lighting systems, including both lights and control decks. In their traditional markets, they compete primarily on technical novelty and originality. The Technical Director commented that *"[the product] is often tucked away in a control room and so styling isn't very important."* Although the basic

technology is relatively mature, approaches to configuring this technology into novel lighting solutions are changing all the time. The customers (and competitors) are continually seeking new and original ideas. Thus, in this industry, time to market is critical.
Company C3 has a long term partnership with an Italian company who design the main lighting products. As a result, the main design responsibilities of company C3 revolve around the internal electronics and the control decks for full lighting systems. When their own control decks are compared to competition for product styling, there is *"probably room for improvement … the lighting designer wants to be behind his Ferrari."*
The company has previously involved industrial design minimally to repackage a 'high end' control deck. This exercise was not wholly successful and resulted in a casing which attached to a standard deck. More often, the company has kept all design work in house, and perceive external industrial design investment as expensive, high risk and time consuming. In particular, there is a belief that the internal skills are appropriate *"some of our staff have experience in the design industry"*. Furthermore, past experience has reinforced the view that industrial designers will not always produce manufacturable solutions *"we generally don't trust the limp wristed brigade who design stuff that can't be made"*. A further potential barrier to industrial design involvement are the existing *"processes, systems and ways of doing things that could get in the way."*
Although there are many competitors, there is little use of industrial design within the industry. However, when addressing potential new markets, there is a recognition of the opportunities for increased differentiation through styling *"The next product has to look sexy, as it will go in places like the Hilton. We might look outside [for a designer], but only after we have had a go ourselves … a sexy product could increase sales by 1/3."*

3.2 Company C10

As a relatively recent start up company providing novel robotic solutions to the medical market, Company C10 has grown rapidly over the last 10 years. The products are now in their second generation, with refinements and improvements to the original technology and professional industrial design input into the styling of the overall solution. This restyling was achieved efficiently, based around existing technology to minimise the overall engineering effort. At less than £10K, the industrial design budget was under 5% of the total project spend. However, despite the low *relative* spend, the total amount was still potentially prohibitive. Resistance to the investment was lowered by financial and management support from the local Business Links service. This external support helped to reduce some uncertainty amongst board members, who believed that styling was unnecessary, as *"they buy products rationally based on performance and functionality, not appearance"*.
In this market, industrial design is perceived as providing a 'clear differentiator' as the competitive products are typically *"boxy looking, painted sheet metal and extrusion built designs*." While the use of industrial design is still a relatively new competitive strategy, some of the competitors are beginning to produce products with improved styling. The technology is relatively new, but based upon well known engineering principles. The novelty is in the way the product is configured and implemented.
The external designer was chosen with support from the Business Links service who also facilitated the production of the design brief and negotiation of terms. Although many selection criteria were considered the final choice was heavily influenced by personal rapport.
A major benefit of the industrial design involvement was the 'wow factor', which helped the sales force to gain interest from potential customers. A further benefit was the excitement generated throughout the business from the generation of concept illustrations and production of the first mouldings. Following the launch of the final product, any initial reservations regarding the benefits of industrial design were forgotten and in the future, the designer will be involved earlier in the design process.

3.3 Company C5

As a small company which is part of a larger international group, company C5 produce a range of scientific instruments. The underlying technology in this market is relatively mature and industrial design is perceived as a strong differentiator.

Under strong influence from historical ownership by a major consumer electronics firm, the company is particularly aware of the benefits of early industrial design involvement. Despite several product generations with industrial design input, the competitors are *"just waking up to the benefits of styling and usability and catching up, although ID is still a differentiator. In this technology driven market, a well styled product will grab the customers interest to enable the sales force to then tell the story about how easy it is to use and how it will save time and money."*

Due to the long term commitment to industrial design, providing a justification for the investment has never been an issue, it has always been perceived as important. Thus, there are very few barriers. Indeed, the benefits of industrial design involvement are seen as stretching beyond the product and include improved teamwork, motivation and the ability to secure top management buy in. Typically, industrial design is involved at the product definition stage and carries on all the way through to first off production.

3.4 Company C2

Company C2 is a major player in the consumer electronics peripherals market and as such, has a strategic partnership with an industrial design group. This group is involved across all projects, from conceptualisation through to implementation. This case focuses on the development of a new computer peripheral in a specific market where competition is traditionally based on technical performance and functionality. The project vision was to produce a novel, fashionable and radically different solution to a market which is served by *"dull grey plastic boxes."* The company believed that the buyers were becoming less technically motivated and increasingly responsive to appearance. Thus, it was felt that a stylish product would be clearly visually differentiated.

The industrial designers were involved before the project kicked off, and helped to define the product requirements. They remained engaged throughout the design process until the first production batch was produced. In total, the investment in industrial design was relatively high at about 15% of the total project budget, representing an investment of more than £30K. The close working relationship between the industrial designers and the company meant that the brief to the industrial designers was verbal and relatively open, developed over a series of face to face meetings.

The final product won many design awards, but not commercially successful due to a mixture of technical problems and a late launch.

4. Framework

The preliminary findings from the case examples indicate that there is a spectrum of industrial design involvement ranging from superficial product styling through to playing a key role in the development of the business strategy. This is depicted as the '*innovation-styling spectrum'* in figure 1. This spectrum can be defined as ***the degree to which industrial design is involved in the product design process, from early involvement in strategy development through to late involvement in product styling.***

This concept is beneficial when considering the appropriate involvement of industrial design in different sectors and supports Gemser's [2001] proposition that the appropriate use of industrial design may be contingent upon the nature of the market and technology. Of greatest interest is the nature of the *design ambition* of an individual company within it's market. In order to successfully compete, there is likely to be a minimum level of acceptable industrial design input. In some markets, such as for company C3, this minimum equates to 'silent design'. In other markets, such as company C1, industrial design involvement during product definition can be regarded as a 'price of entry'. Thus, the concept of *design ambition* can be defined as the ***degree to which a company challenges the minimal requirement for industrial design involvement in its market.*** Several of the cases demonstrate that those companies which display higher levels of *design ambition* than their competition can gain

significant commercial advantage, such as companies C5 and C10. This suggests that it may not be necessary for all companies to operate towards the innovation end of the spectrum as suggested in some literature, but to demonstrate sufficiently more *design ambition* than their competition.

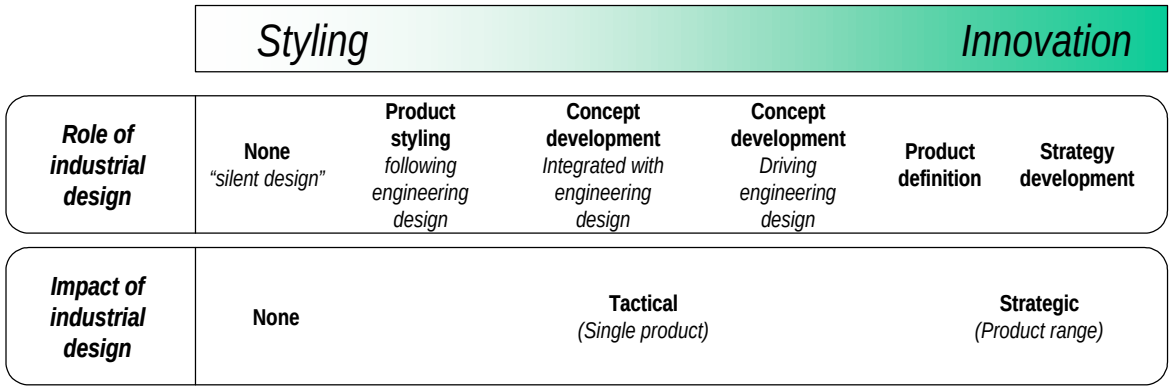

Figure 1. The Innovation–Styling spectrum

It is also interesting to consider some of the factors which can inhibit a company's *design ambition* and prevent a company moving up the *innovation-styling spectrum.* Frequently cited or observed factors include: design illiteracy, resource (people and money) constraints, internal politics, previous bad experiences, tradition bound behaviour, no focus on industrial design at a strategic level, no industrial design champion, poor market understanding, resistance from engineers or marketeers, silent design (a belief in internal capability), limitations of production capability, perceptions of high cost, time constraints and lack of expertise to manage the process.

Several factors contributing to increased uptake of industrial design were also identified. These included the progression from vertically integrated organisations with their own manufacturing capability, to flatter organisations with outsourced production. This development has given designers greater freedom to explore alternative production processes. A further contributor is the development of novel manufacturing processes to enable complex curved surfaces even with low volume products. In addition, the development of 3D CAD and rapid prototyping has resulted in greater possibilities for exploring alternative forms.

One traditional barrier to the integration of industrial designers has been the belief that they produce stylish but unmanufacturable solutions. This position is changing, with the industrial designer increasingly having a wide knowledge of a range of modern production processes and possessing greater practical experience of these processes than many 'in-house' engineers.

5. Conclusions

This study has investigated the role of industrial design in the development of new products in a range of sectors, with an objective of identifying the barriers to improving *design ambition*. Based on case evidence and literature, a framework has been developed which aims to illustrate a range of approaches to the management of industrial design. In addition, the concept of *design ambition* has been defined.

Preliminary findings indicate that there is still a widespread perception (mainly within the industrial goods sector) that industrial design is expensive and can be risky and time consuming. Indeed, some consider it to be a waste of time and effort. However, there is also persuasive evidence that those companies which demonstrate greater *design ambition* than their competition can gain significant commercial advantage.

Initial findings support the belief that there is a connection between the need for industrial design involvement and the maturity of the product technology and design orientation of the industry. However, more data is required to support any firm conclusions.

A number of barriers to *design ambition* have been identified, and further work will involve the development of a practical approach to overcome these barriers. This will take the form of a decision

support tool to assist companies to value the benefits of industrial design (financial and non-financial) and hence improve their design ambition.

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