The Value of Design in Innovation: results from a survey within the UK Industry

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Abstract: A renewed interest in the positive impact of design in industry during the last few years, especially regarding the measurement of that impact, has produced a number of studies and research in the field. All these studies have contributed significantly to increasing the acceptance of design in business, however it is still not totally clear what is the position of design within the business structure and its contributions to other functions in the organisation like innovation. In this paper we present the results of a National survey done in the UK between 2015 and 2016. The purpose of this paper is to provide academics, policy makers, and business support organisations with the insights from this study on the current use of design and potential relationship between design and innovation amongst UK firms today and to consider what this means for the future of design in business.

Keywords: design value, innovation, R&D, businesses, survey

1. Introduction

The importance of recognising the value of design in business has been addressed in the UK since the latest 70s. Indeed many initiatives from academia took place in the 80s and 90s; these included promoting the inclusion of design in business’ curriculums, and encouraging the communication between practitioners of both disciplines. More recently studies carried out, for example, by the Design Council in the UK have built interesting case studies about the use of design and the benefits accrued to firms (Design Council, 2013). These efforts have indeed brought an increased acceptance of design in business and the conquest of new territories for design beyond styling activities (Cautela, Deserti, Rizzo, & Zurlo, 2014; Cox, 2005). However, the increased acceptance of design and the new applications of design don’t necessarily mean that the role of design in business is clear and well understood, specially the relationship between design and other functions in the firm like innovation (Cruickshank, 2010). Actually, not having a clear understanding of the connection, has led to spurious assumptions, like for example considering design’s ability to contribute to innovation is a given.
In order to gather the evidence required to build a clearer picture about the relationship between design and innovation and especially the conditions under which design is more likely to make a substantial contribution to innovation, an exploratory survey was recently developed and carried out in the UK. This survey was used to benchmark a large group of UK based companies in relation to four major areas: ‘Products, Services and Technology Readiness’, ‘Innovation’, ‘R&D and Design’, and ‘IP Protection’. This survey was designed, developed and refined based on a rigorous literature review from September 2014 to March 2015 including studies and reports like (BCD Barcelona Design Centre, 2014; Department for Business Innovation & Skills, 2014; OECD/European Communities, 2005). The survey was distributed in collaboration with Innovate UK with a response of 300 with 160 surveys completed in full. In this paper we present and discuss the main insights gained from this survey reflecting on the different definitions and uses the companies involved in the study give to design, the drivers and barriers they have experienced using design, its innovation activities, the type of collaborations they usually engaged on to innovate, and their general view about IP protection mechanisms, between others. The purpose of this paper is to provide academics, policy makers, and business support organisations with the insights from this study on the current use of design and potential relationship between design and innovation amongst UK firms today and to consider what this means for the future of design in business.

2. The Value of Design in Innovation

The value design can bring to a business has been in general widely recognised by academics, practitioners and managers. Evidence of this value has come from different studies, initiatives and research carried out during the last decades, (see for example (Cooper, Junginger, & Lockwood, 2009; D’Ippolito, 2014; Design Council, 2013; Roy, Riedel, & Potter, 1998). In one of these recent projects, for example, a group of worldwide leading companies manifested their views and perceptions on design and the contributions design have made to their activities in words like: “Design is everything. In all our brands and all our categories there is intense competition and anybody can design a decent product. They can’t all design outstanding products. So, design is the differentiator” (Design Council, 2013).

The renewed interest in the value of design in business has been partially focused in measuring this value (BCD Barcelona Design Centre, 2014; McNabola, 2013; Microgiants Design Research, 2006; National Agency for Enterprise and Housing, 2003). It is unquestionable that these projects and research have contributed enormously to increase the acceptance of design’s strategic value in business and helped to build confidence in design, however this acceptance has also partly diluted the discourse on the relationship between design and other functions in the companies like innovation. It has happened partly because of the rapid expansion of design as a discipline during the last decades, and also because of the tendency to consider successful examples of design-driven organisations as the base in the measuring process. The consequence has been for instance an unclear picture of the relationship between design and innovation that has led to spurious assumptions like considering design’s ability to contribute to innovation as a given.

This relationship between design and innovation has been already explored in the past from different perspectives but usually focusing in one particular issue or certain characteristic of the relationship (Cruickshank, 2010; Hobday, Boddington, & Grantham, 2011; Norman & Verganti, 2014; Walsh, 1996). From the innovation perspective these explorations have been supported by a long tradition of studies about measuring innovation activities and quantifying the benefits it produces (Bitard & Basset, 2008; Shapiro, 2006; Teece, 1986; Tether & Tajar, 2008; Utterback & Abernathy, 1975). On the design side this exploration is probably more recent and has been done in areas like design...
management, design thinking, and design research; typically based on successful examples of design-driven organisations and case studies (Borja de Mozota, 2006; Verganti, 2010; von Stamm, 2011).

We acknowledged the contribution of these previous efforts but we also recognised that the picture is still unclear partly due to the evolution of design claiming new territories and areas of application, and also due to the difficulties of transferring the positive experiences from successful companies to others with different contexts. We strongly believe design creates value and it contributes to innovation, but as the understandings and uses of design have changed in some cases very radically, we aim to build the basis for a better comprehension of the roles design is now playing in innovation activities and in relation to those new understandings and uses. In doing so the first step we took was to carry out a large national survey in the UK to collect part of the evidence needed to achieve that aim. In the following sections we present how this survey was done and what were the major insights we gained from it.

3. National Survey

A National Survey was carried out in the UK from March to October 2015. The purpose of this survey was to gather part of the evidence required to build a better understanding of the complexities between design and innovation and have a better understanding of the potential contributions design can make to innovation. The building of the survey followed an iterative process producing more than 24 versions and it collected insights and questions from multiple sources including for example (BCD Barcelona Design Centre, 2014; Bitard & Basset, 2008; Cox, 2005; D’Ippolito, 2014; Department for Business Innovation & Skills, 2014; Design Council, 2011, 2013; Kolar, 2011; Moultrie, Clarkson, & Probert, 2007; National Agency for Enterprise and Housing, 2003; OECD/European Communities, 2005; Teece, 1986). In total 58 references were consulted to build the final questionnaire. The survey was divided in four sections covering: ‘Products, Services and Technology Readiness’, ‘Innovation’, ‘R&D and Design’, and ‘Protection’.

In the first section companies were asked about the type of products and services they produce, the ‘Technology Readiness Levels’ at which they operate, their approach to satisfy their customers needs, their position in the industry in relation to the existence of a dominant design, and their perception about the ranking of different assets by their contribution to the company’s competitive advantage. In the second section companies were interrogated about their performance introducing different types of innovations into the market, the level of radicalness of those innovations, the type of collaborations they usually engaged in to innovate, their motivations to innovate, and the factors hindering and enabling innovation in their organisations. The third section explored the companies’ commitment to R&D, the different understandings and uses of design, the benefits companies had perceived by using design, the level of maturity using design related to the Danish Design Ladder, and the factors hindering and enabling the use of design in their companies. Finally in the fourth section companies were asked about their perception, use, and effectiveness of intellectual property mechanisms like patents and registered designs.

In relation to the participants in the survey, the majority of respondents were company directors, including business owners, chairmen, chief executives and managing directors. In terms of size, companies varied from small companies with 1 to 9 employees to large companies with more than 200 in the proportions shown in Figure 1.
4. Findings

While the companies were active in different industries, there was a strong orientation to technology-based sectors. The industries with higher participation in the survey were ‘High Tech Manufacturing’, ‘Other Manufacturing’, and ‘Software, IT and Telecom’, see Figure 2.

4.1 Products, Services and Technology Readiness

The first questions of the survey were designed to provide with basic information about the type of products and services produced by the companies involved in the study and the level of maturity of the technologies produced by those companies. To measure the maturity of the technology the eight levels of the ‘technology readiness’ model commonly used by Innovate UK was adapted as it is shown in Figure 3.
Interestingly the answers reflect a majority of active companies performing activities of discovery, research, development and commercialisation. This result is noteworthy considering the sizes of the companies involved in the study. In this first part of the survey, we also explored the approach of the companies to the development of their products in relation to the order in which they develop their technologies, developing first their products and then searching for the market, or identifying first the needs of the market and then developing the technologies, see Figure 4. In this case there is a notable concentration of companies at the right of the spectrum where the needs of the market are identified first and then the technologies are developed. It is important to notice that this concentration can say something about the orientation of these companies towards the use of design as design is commonly used as a means to know the markets and what people want. However this question does not enable us to make this inference.

Companies were also asked about the number of competitors they have in their industries. Surprisingly we found the companies involved in the study had in general a large number of competitors, more than 60% of them have more than three and 13% declared to have eleven or more.

Finally, we explored the assets that contributed the most to build the competitive advantage of the companies. The options presented to the companies included for example ‘capabilities in R&D’,
‘capabilities in design’, ‘relationships with clients’, ‘distribution channels’, and ‘after sales services’. Remarkably, ‘capabilities in design’ was ranked in the top 5 of very important assets alongside with other assets like ‘capabilities in R&D’ and overcoming others like ‘capabilities in marketing’ and ‘capabilities in manufacturing’. Between the crucial assets ‘capabilities in design’ occupied the sixth position after ‘protected intellectual property’, ‘capabilities in R&D’, ‘specific skills of workforce’, ‘relationship with clients’, and ‘quality of products and services’.

4.2 Innovation

In this section of the survey the definitions adopted to ask the companies about their product, process, marketing, and organisational innovations came from the OSLO Manual for Collecting and Interpreting Innovation Data 2005. The first part of this section explored the performance of the companies in relation to the number of new products and services introduced to the market in the last three years, see Figure 5.

| Introduction of new products or services over the last three years | Number of product or service innovations introduced over the last three years |
|---------------------------------------------------------------|---------------------------------------------------------------|
| **New products or services** | **Roughly how many innovations did you introduce in these three years?** |
| Yes (82%) | Roughly 0% |
| No | Roughly 100% |
| **Significantly improved products or services** | | |
| Yes (75%) | | |
| No | | |

*Figure 5. Products and Services Innovations*

More than 80% of the companies reported to have introduced new products or services to the market during the last three years. Between them 12% said they introduced one products or service innovations, 18% introduced two, 26% introduced three, being the most popular category, 17% affirmed to have introduced four or five, 14% between six to ten, and remarkably 13% of the companies reported to have introduced eleven or more product or service innovations between 2011 and 2014. These answers reflect highly innovative companies, which is very consistent with the fact that these companies all reported being highly active and committed to R&D.

Complementing this question companies were also interrogated about the contribution of those product and service innovations to the sales of the company and the level of novelty in those innovations as it is shown in the Figure 6. Regarding the contribution to sales around 40% of the companies reported that their product or services innovations contributed to 34% of more of their total sales in 2014, and in general the entire group considered their innovations as radical.

In addition to product and service innovations, companies were also asked about their process, marketing, and organisational innovations introduced from 2011 to 2014. The reason to include these other types of innovations was to have a better picture of the performance of these companies producing innovations, and also to cover all types of innovations that could have a relationship with design. Despite that for many companies product and service innovations can be strongly related to design, according to the definitions of the OSLO Manual it is under marketing that design innovations are considered. The answers to these other types of innovations are presented in Figure 7.
Percentage of sales in 2014 related to the product or service innovations introduced over the three previous years

| Percentage | 0% | 1% to 10% | 11% to 33% | 34% to 99% | 100% (all sales) |
|------------|----|-----------|------------|------------|-----------------|

Level of novelty in the product or service innovations introduced to the market

| Level of novelty | 0% | 1% to 10% | 11% to 33% | 34% to 99% | 100% (all sales) |
|-----------------|----|-----------|------------|------------|-----------------|

Figure 6. Contribution of product and service innovation to sales and level of novelty

Introduction of marketing, process, and organisational innovations over the last three years

Areas in which businesses have introduced marketing innovations

| Innovation Area | 0% | 20% | 50% | 100% |
|-----------------|----|-----|-----|------|
| Product/service design | 65% |      |     |      |
| Packaging        | 25% |      |     |      |
| Placement        | 33% |      |     |      |
| Promotion        | 53% |      |     |      |

Areas in which businesses have introduced process innovations

Areas in which businesses have introduced organisational innovations

Figure 7. Marketing, process and organisational innovations

Companies were also interrogated about the kind of collaborations they usually engage in to innovate, see Figure 8.

Business collaboration

Businesses often collaborate formally and/or informally with other businesses and organisations to innovate. These are the most common collaborations businesses participating in the study engaged in.

| Collaboration Type | No | Informal collaboration only | Formal collaboration only | Both formal and informal |
|-------------------|----|-----------------------------|---------------------------|-------------------------|
| Suppliers, including sub-contractors |   |                             |                           |                         |
| Clients or customers |   |                             |                           |                         |
| Competitors or other businesses in your industry |   |                             |                           |                         |
| R&D consultancies |   |                             |                           |                         |
| Design consultancies |   |                             |                           |                         |
| Other consultancies (e.g. Business consultancies) |   |                             |                           |                         |
| Universities |   |                             |                           |                         |
| Public research organisations |   |                             |                           |                         |

Figure 8. Business collaborations to innovate
The purpose of this question was to know the nature of those collaborations in term of formality, and also the type of partners involved. Between the possible partners for those collaborations appear for example ‘universities’, ‘design consultancies’, ‘R&D consultancies’, ‘suppliers’, and ‘competitors’. The most common partners for informal and formal collaborations are ‘suppliers’ and ‘clients’, whilst only in the category of formal collaborations ‘universities’ is the most usual partner. This predilection to work with universities is a very important opportunity for design schools beyond students’ internships, usually better used by engineering and business departments. Finally, companies were asked about the factors that have hindered or enabled their innovation activities. Between the enablers the most important one for the companies was ‘previous experiences’, while the factor that hinder the most their innovation efforts was the ‘availability of financial resources’.

4.3 R&D and Design

All the companies included in these findings reported to have engaged R&D activities during the last three years. In order to understand better this commitment to R&D, the companies were asked which percentage of their staff usually perform those R&D activities, and also to compare their investment in R&D in relation to their main competitors. In the first case it was very interesting to find that more than 80% of the companies had more than the 10% of their staff carrying out R&D, with 13% of the total number of companies affirming that the 100% of their staff is engaged in R&D. Only 17% of the companies who said being active in R&D had less than 10% of their staff engaged in R&D activities. In relation to the investments of these companies in R&D the answers are almost evenly distributed between companies that invest more than their competitors and companies who spend less, all the categories can be seen in Figure 9.

![Figure 9. Respondents’ commitment to R&D](image-url)

An important part in this section and in the general survey asked the companies about their understanding of design. Beyond personal interpretations, companies were asked how their companies understand design. In the context of the research the understanding of design was considered a determinant for the different uses companies give to design and also for the place where design is used during the development and innovation process. For this reason in this question companies were provided with a variety of statements that recover different perspectives and definitions of design that can be found in the literature. An interesting characteristic of these statements is that they reflect in some sense the evolution of the definitions and uses given to design during the last 50 years. Some of them present design in the most traditional way as ‘a styling activity’, while others present design in a more contemporary perception for example as ‘an interface with users’ or ‘as means to improve customers’ experience’. In Figure 10 all these statements are shown with the answers from the companies.
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Despite our own anticipation, design as ‘a styling activity’ was not the statement with the higher agreement between the companies involved in the study. The three statements ranked at the top considering the sum of the ‘agree’ and the ‘strongly agree’ categories were design is ‘a creative process’, ‘an interface with user’s needs’, and ‘a means to improve consumers experience’. The two statements to which companies less agreed to define design considering the sum of the same two categories were ‘a means to build strategy’ and ‘the creation of artefacts’.

Similar to the questions about the commitment of the companies to R&D, they were also questioned about their commitment to design, including investments, presence in the organizational structure and staff engaged on design. In terms of investments 25% of the companies affirmed to invest in design with a specific budget, 43% said they invest in design without a specific budget, and only 32% stated not to invest in design, see Figure 11.

**Figure 10. Understanding of design**

**Figure 11. Commitments to design: investments**
When they were asked about the expectations of those investments for the future more than 50% stated they expect the investments to be increased at different ratios. In terms of presence in the organisational structure only 29% of the companies affirmed to have a design department, while 71% affirmed not to have a design department in their structure. In relation to the number of people trained in design in their organisations the answers varied from companies with 1 to 5 designers to companies with more than 50 designers in their staff as it is shown in Figure 12.

Figure 12. Commitments to design: designers working in the company

The companies were asked to classify themselves in one of the four levels of the ‘Design Ladder’ developed by the Danish Design Centre to measure the maturity of the use of design. Trying to have a more complete picture companies were also asked for the level in which they were three years ago. The results of this self-assessment are shown in Figure 13.

Figure 13. Design Maturity

Finally, the most important reason for these companies to use design was explored. The top three of these reasons were ‘develop higher quality products-services’, ‘develop innovative products and services’, and ‘differentiate our products and services’. These three reasons show a strong link between design and innovation, and confirm design as a means to produce innovations.
4.4 Protection

In terms of IP protection, companies were mainly asked about their general perception on the effectiveness of different mechanisms like patents, copyright, trademarks, and registered designs between others. Also, the companies use that kind of mechanism to protect their technology, design, products and services was explored, see Figure 14.

| Use of IP Instruments to protect technology, designs, products, and services |
|---------------------------------------------------------------|
| Patent | Registered designs | Secrecy | Unregistered designs |Copyright | Trademarks | Inherent complexity | Branding and product image | Lead time | Quality of manufacturing | Non-disclosure agreements | Mkt sales service | Difficulty of manufacturing |
|--------|-------------------|--------|---------------------|---------|-----------|-------------------|-------------------------|-----------|--------------------------|-------------------------|------------------|---------------------------|
| Yes (71%) | No | Yes (87%) | No | Yes (57%) | No | Yes (10%) | No | Yes (10%) | No | Yes (65%) | No | Yes (65%) | No |

Figure 14. Use of IP Instruments

It is interesting to note that the most used instrument is the ‘Non-disclosure agreements’, while the least used are ‘Registered’ and ‘Unregistered designs’. However an instrument like ‘Branding and product image’ that can be very related to design was assessed as highly used.

5. Discussion and Conclusions

The respondents in this study are mainly micro (1-9 employees) and small (10 -199 employees) companies in manufacturing or tech sectors, they are also companies who have received some sort of support or resources from InnovateUK, the UK’s business support agency, and perceive themselves to have a large number of competitors. This then will colour to a degree the way in which they approach innovation and indeed view design. As might be expected from such companies they are developing and experimenting with early stage technologies, however it is clear they are not driven purely by their technological development, clearly they responded in the main to identify the market needs first and then developed the technologies. It is also clear that design is considered a significant part of the process of building competitive advantage.

In terms of innovation when asked most companies reported a significant proportion of product and service innovations introduced into the market, also process and organisational innovation, with considerably less in terms of marketing innovation, however of that marketing innovation a significant percentage was through product and service design. So does this relate to their understanding of design, the most ranked statements concluded that businesses believe design contributes by being a creative process, and interface with user needs and as a means to improve consumer experience, obviously making the connection between design and marketing innovation.

However only 29% of the sample said they invested in design yet 37% said they are planning to increase their investment slightly and 24% increase substantially. So why is that, is it because through support from a business promotion agency they are becoming aware of the value of design
to marketing innovation, or is it because they are building that competency. It is clear that most of the respondents have very few people with specific design training in their companies, yet when asked to classify themselves on the Danish design ladder many of them classed themselves as using design as process... ‘Design is not a result but a method integrated early into the development process, the production outcome requires contributions from a range of specialists’. And indeed the top reasons for the use of design within the companies was ‘to develop high quality/innovative products and services and differentiate them’.

So we again have the confirmation of the assumption of the value of design to innovation, but when pushed, the most prominent relationship recognised by businesses is the role of design in marketing innovation, they do not yet see the value of the protection of design through registered designs, and distinguished this from the protection of their technology through patents.

What can we learn from this study, we learnt that design is valued by micro and small companies. Companies repeat the hype and assumptions of the relationship between design and innovation, yet they still need to gain better insights into how and where design will create value, in what type of company and product service sector, to enable them to focus their very limited resources on apply design strategically.

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