Common Spaces of Design and Innovation

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In this article Marta Carrió identifies the common areas between design and innovation within the framework of product development and based on an analysis of the studies and writings available in this area. She also introduces the potential of incorporating design into the innovation process. She also attempts to place design within the framework of innovation by defining the different concepts associated with this and to determine the position of the designer in this process.
This article proposes that designers, irrespective of their area of activity, share skills and methodologies, particularly with regard to observing and understanding the market, generating ideas and conceptualising and visualising these ideas, this giving designers a fundamental role in several of the phases of the innovation process.
At the same time, it also points out that design, used in a strategic and coordinated way across disciplines, is an instrument that helps to promote the competitiveness of firms in different areas, among these being innovation.

Introduction

Within the current framework of rapid and constant change in the environment, innovating means creating value by improving existing products, processes or services (incremental innovation) or developing new ones (radical innovation).

By creating value, design not only plays a very important role in the innovation process but also in increasing the sales of companies, in exploiting new markets and consolidating existing ones.

However, in spite of the fact that the knowledge and skills of designers and the knowledge and aptitudes required for innovation are complementary, there are still many companies that do not use the potential provided by design for innovation.

Today, most efforts to promote design and its contribution within the framework of innovation come from the design sector itself (associations and professionals) and not from the institutional, university or business world.

Paradoxically, for many firms innovation is a great resource for growth and/or survival today. And it is within this context that design can help them to explore new ways of doing things. For this reason, this article identifies the areas of intersection between design and innovation by analysing the studies and writings available in this area, also describing how to incorporate design into the process of innovation.

It also attempts to position design within the framework of innovation. To do so, the concepts are defined that are associated with the notion of innovation and the role of the designer is explored.

The relationship between Design and Innovation: the difference between and complementary nature of these concepts. The importance of the term "creativity".

Today, the concepts of "creativity", "innovation" and "design" are used indistinctly and are misused as if they had the same meaning. However, there are fundamental differences that, if not taken into account, complicate and confuse the real scope of each of these concepts.

By way of summary and within the context of the product development process, we may define these 3 concepts as follows:

Creativity: the capacity to create ideas of new ways, with the aim of solving a problem and exploiting opportunities. Creativity is an essential aspect of innovation; it is its starting point. One of the great challenges facing companies today is how to generate more and better ideas or, in other words, how to be more creative.

Design: is the implementation of creativity. Design is a conscious decision-making process by which information (an idea) is transformed into a tangible result (product) or intangible result (service). Design is therefore related to doing things consciously, comparing alternatives to select the best possible solution, by experimenting and exploring.

Innovation: is the successful application of new ideas (creativity), improving or creating new products, services or processes. Innovation is implementation: putting ideas into practice. In this respect, the implementation of innovation has three areas: creativity, the selection and conceptualisation of the idea, its development and marketing.

Specifying and evaluating the common ground between Design and Innovation.

Within the context of innovation, we can find 3 broad interpretations of design:

- Design as a tangible element: a chair, vehicle, light.
- Design as a creative activity: an activity that generates ideas.
- Design as the process whereby information is transformed into a tangible element: design as a generator of new ideas, their conceptualisation and materialisation (see fig. 1).

The last definition is the one generally used and this concept is therefore understood as such. In spite of the fact that the first articles written on this subject looked at design from the perspective of the designer, great weight is currently given to the link between the designer and product development (e.g.: Oakley, 1984; Pilditch, 1987; Walsh, 1992; Bruce & Biemans, 1995).

This seems to be related to an increase in awareness of the importance of design for the competitiveness of firms and to the demand for designers to be involved in the product development process.

At the beginning of the 1980's, Kotler and Rath (1984) stated that design is a very powerful strategic element for companies in terms of obtaining sustainable, long-term competitive advantages, in spite of the fact that many

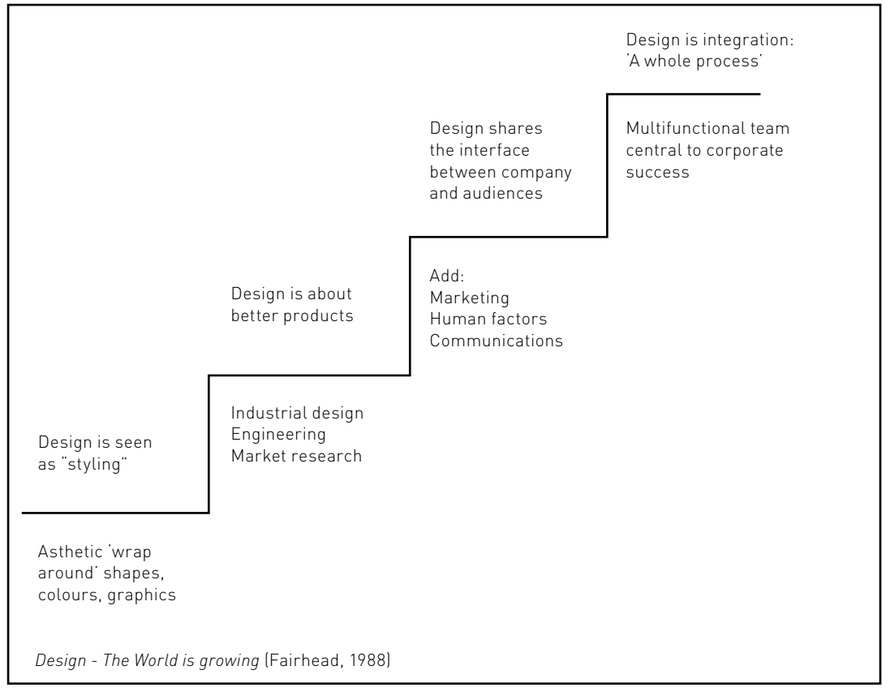

Figure 1: Differences between the diverse levels of design comprehension in the innovation process

firms reject design per se. For these authors, companies do not realise how useful good design can be for improving their products, environments, communications and identity.

As a strategic instrument placed within a context of the innovation process, design plays an important role in three areas:

- Design and market: design research techniques can be used to help identify new products or market opportunities.
- Design and creativity: the design process is used both to generate ideas and to implement solutions for useful, practical and appealing products, services and environments.
- Design and the conceptualisation of ideas: design techniques can be used to communicate innovation and new ideas by creating sketches and models or using other techniques such as storyboards, videos or computer simulation tools.

Design and Market

Innovating is a challenge. As companies mature, it is increasingly more difficult to differentiate their portfolio of products or services, to add value.

Given this need, most firms use quantitative market research as a tool to guide new product development. A frequent problem of using this methodology is that the ability of a product's target to guide the development of new goods or services is limited by their experience and capacity to imagine and describe possible innovations. In other words, the product's potential clients find it difficult to detect their own latent needs.

Innovating from the perspective of the user or client actually requires understanding and observation:

Understanding: of the market, the client, the technology and the barriers to resolving a problem.

Observation: obtaining information from real people in real situations to detect and analyse what confuses them, what they like, what they don't like, what their latent needs are that are not met by the products currently on the market.

Both understanding and observation are important talents of designers and this makes them particularly skilled at generating innovative ideas and providing solutions for useful, practical and appealing products, services and environments.

Design and Creativity

Today creativity is the new source of energy for firms. Many authors highlight the importance of design as the "heart of innovation" (Caldecotte, 1979). They believe that design forms part of the innovation process per se because it is its creative force, the time when the product is imagined (OECD, 1987). An idea becomes an innovation when it is integrated with other organisational strategies.

The creative process has two distinct parts:

- The process of constructing an idea: the convergence between a problem and a solution, the establishment of a point of departure in order to identify the means and ways to solve the problem.
- The process of formalising the idea (conceptualisation): formalising an idea to make it understandable by others and to be able to establish a system to process it. This part of the process will be analysed in more detail in the next section of this article.

Contrary to general belief, creativity, or the act of generating an idea, is an individual act that has little to do with "an inspired moment". However, the creation of teams stimulates the individual creativity of its members, encouraging ideas to arise.

Neither does creativity have anything to do with suddenly having marvellous ideas, without preliminary preparation. Creativity involves relating a concept to acquired knowledge. This knowledge is so important for arriving at the idea per se that truly creative people may dedicate many years to acquiring and refining this knowledge base.

In parallel to the existence of a debate concerning whether creativity is an attribute held by few or everyone, while there are individuals that are more creative than the rest, creativity can nonetheless be stimulated and supported through training and by creating the right environment and atmosphere (Teresa Amabile, Harvard Business School).

However, creativity cannot be produced on demand but rather it flows. Although the creation of teams encourages creativity, this ultimately depends on the intrinsic motivation of the person, on the individual's enthusiasm, their inspiration, intuition and knowledge.

Consequently, while the implementation of new ideas has a lot to do with being organised by using a methodological approach, creativity, on the other hand, is less direct. It has nothing to do with establishing a new process or structure. To be creative an individual must think differently. To be innovative an individual must behave differently. For a firm to be a competitive, it must have individuals who think differently and others who behave differently. That's why innovation is often defined as a "mental framework" towards creativity.

Allan Black (1990) lists the 32 skills that, according to his research, belong to creative people. Some of the features appearing are not necessarily important for having ideas but they are for implementing them. The characteristics of creative people according to Black are as follows:

Adaptability
Self-taught
Self-disciplined
Capacity to update themselves
Capacity to fantasise
Capacity to question themselves
Capacity to synthesise
Confident
Critical
Curious
Detect opportunities
Energetic
Resourceful
Flexibility
Fluidity
Imagination
Non-conformist
Independent
Specific interests
Intuition
Lack of economic motivation
Open mind
Observation
Originality
Divergent thought
Different world perception
Persistence
Constant recycling
Lack of fear of risk
Sensitivity
Sense of humour
Sense of destiny
Tolerance towards ambiguity

The difficulty in finding these characteristics in a single person demonstrates the importance of building multidisciplinary teams when carrying out the innovation process. However Black, like other authors (Bettina von Stamm, 2004), agrees that designers usually only have a lot of these traits, something that gives them a fundamental role in the first steps of the process of innovation and, more specifically, in the area of generating new ideas.

In fact, within a context in which the role of science in innovation is tending to decrease, new power is given to individuals with non-conventional profiles such as designers. Designers can actually provide new ideas in all stages of the innovation process, given that design is a discipline in which the generation of ideas, the use of the imagination to resolve problems, the breaking of established rules, the observation of the world from a different perspective and the contemplation of new products with the aim of satisfying user needs (or creating new needs) has particular importance.

Designers exercise the factor of creativity through this orientation towards design, allowing them to provide innovative ideas more easily than most other people.

Design and Conceptualisation

Designers don't only have ideas more easily than most individuals, they also have an ability that differentiates them and provides them with a very important role in the initial phases of the innovation process. I'm referring to their manifest capacity to conceptualise ideas quickly via sketches or models. Designers have the particular capacity and the necessary knowledge to express ideas tangibly and to visualise their consumers and contexts of use.

This step is fundamental in the innovation process because it allows a new idea to become intelligible, understandable, to be accepted or refused or refined; it means that we can decide whether it is worth continuing with the new idea, ultimately deciding whether the innovation process continues or not. In short, it saves time in seeing whether an idea works or not.

There is something wonderfully tangible in the conceptualisation of ideas. Good sketches, models or prototypes usually surprise, they make it easier to change ideas and to accept new ones. They also help to make difficult decisions, such as giving up on the costly or complex elements of a product. The conceptualisation and visualisation of ideas communicates, persuades, gives shape to ideas from a specific point of view.

If sketches are clearly associated with the more initial phases of an innovation process, prototypes are traditionally linked to a specific stage towards the end of the product development process. But prototypes become truly useful when this refinement phase of design is dispersed throughout the development process, not only at the stage prior to production but at the phases of the idea and concept.

Physical or analytical prototypes can be made. Physical prototypes can be used to communicate the shape and style, to evaluate the ergonomics or to evaluate the achievement of a physical specification, such as structural strength or the correct transmission of data. Analytical prototypes represent the product or service intangibly, normally mathematically.

Formal prototypes or models at the level of volume are important, as without a three-dimensional model we might end up opting for an alternative without having completely considered its particularities, making the subsequent phases in the innovation process more difficult.

There are other techniques related to the conceptualisation and visualisation of ideas, such as storyboards or videos, that present the future product in situ before it exists. All these methods are also instruments belonging to the discipline of design. However, a proposal cannot be approved with complete certainty merely after seeing it on a screen or on a two-dimensional support.

Conclusions

Today design and innovation are increasingly more important in a world characterised by:

- Increasingly better trained and more demanding consumers.
- Demographic change resulting from an ageing population.
- The increasing need for differentiation.
- The increase in competition on a global scale.
- The increase in demand for user-friendly products and even products with a high degree of innovation.
- The increase in demand for products taking their environmental impact into account (sustainable design).

All these trends open up opportunities for creating new spaces for innovation and present new challenges that can be tackled via the use of design.

When we talk about innovation, we refer to producing something new, which involves taking on a certain amount of risk. In a dynamic economy as today, not taking risks is

a greater risk. Companies need to innovate and to learn how to manage risk in order to avoid errors and costs and to take advantage of opportunities.

When we talk about design, it is understood that this has aesthetic connotations but, above all, it also has great strategic potential to be the driving force behind innovation, be it incremental (through repackaging, rethinking and updating of a specific product) or radical. Design doesn't merely improve existing products or help to create completely new ones. It can also improve the new product development process per se (the process of innovation).

Specifically, within the context of innovation, it has been seen that design can be interpreted broadly in three ways: design as a tangible element, design as a creative activity and design as a process through which information is transformed into a tangible element.

This allows us to appreciate a third variable concerning Design and Innovation, namely Creativity, which must inevitably be included in this analysis.

In fact, creativity is a crucial aspect for innovating in products, services or processes, as it helps to integrate design into a company's key activities (or those related to decision-making), enabling its innovation potential to be fully exploited. Design also develops the conceptual dimension of the generation of ideas. It develops concepts and acts as an integrator of these concepts. These two steps are the catalyst to the innovation process.

Although creativity is not purely the dominion of designers (and can be innate, but also developed and managed), design as a process necessarily involves creativity. In other words, the generation of new ideas that may create new knowledge.

Designers, irrespective of their area of activity, also share other talents and methodologies, particularly related to observing and understanding the market, generating ideas and conceptualising and visualising these, that provide them with a fundamental role in several phases in the innovation process.

In fact, at the heart of innovation lies the capacity to generate ideas and the skill to combine technological know-how with an understanding of user needs. Designers have a particular talent for working with technology and for capturing it in a way that can be applied and used. A mobile phone battery, for example, has a shape that people understand, in spite of the fact that its features or size may change to improve its usefulness. This involves an understanding of the technology, of production and of user needs that ends up being translated into an incremental improvement in mobile phones. Designers make this happen.

Companies therefore need design. It doesn't matter whether they make products or not, as in essence design per se is an approach, a way of making and doing new things. Used in a strategic and coordinated way across disciplines, design is an instrument that helps companies become competitive in different areas, among them innovation.

We might quote hundreds of practical cases that confirm this premise. One of the most paradigmatic examples would be that of the company Apple. The launch of the new design of the iMac G4 and the iPod has revitalised a brand that had lost impetus during the 1990's as a result of competition and its incapacity to react by launching new innovative products. In this way, the case of Apple is an example of the use of innovation and design as tools to revitalise a company, even giving it back the credibility it had lost.

Figure 2: Apple iPod: An example of the role of influence of design on the framework of innovation

The practical case of Swatch is also an example of what design combined with an innovative concept can achieve. The Swiss watch industry was relatively weakened at the start of the 1980's, especially because of the appearance of Japanese competition and their digital watches. Given this situation, Swatch, with its revolutionary business concept, tackled the situation by redefining the watch market. It transformed a watch from an instrument for measuring time to a fashion object, a collector's item. The idea adopted by the team of designers was to add Swiss experience in making watches to the design of Italian fashion at an affordable price. Consequently, people began to buy Swatch watches and to collect them, choosing one or the other depending on their mood or the occasion.

Given the many examples that demonstrate the important role of design within the framework of the innovation process, one of the explanations that would justify not using design as a strategic element per se for companies is the confusion existing between the terms management in design, new product development and innovation. However, another aspect that probably also helps to generate confusion concerning the function of design in the innovation process would be that, while it is understood that design is a discipline applied by designers, for companies most of the design functions or the decisions that influence their development would not be carried out by designers but by other members of the company, such as engineers, programmers or managers (Hales 1986; Norman 1988). These non-designers have great impact on the final outcome of the design without realising it.

In this article, when we talk of design, we are not referring to the generation of ideas, to their conversion into new concepts or their development into tangible products by placing the user as the central axis in their production.

Currently, most factors involved in a product can be controlled largely because of the sources of knowledge and the existing experiences, the quantity of techniques, methodologies and instrumental tools and the everyday nature of their application, all elements that have led them to lose their validity as a competitive advantage. In this context, creative activities and conceptualisation have become more important. Consequently, the role of the designer should also acquire more importance.

To date, the studies carried out and the work published on this area specify and evaluate the relationship between Design and Innovation but they don't manage to measure it.

To advance in our knowledge of Design and Innovation, it is vital to be able to evaluate quantitatively the correlation between investing in the common ground between design and innovation and the results obtained by companies from this investment.