

How managers can benefit from multiple perspectives on design management

Gasparin, Marta (mg.om@cbs.dk)

Department of operations management, Copenhagen Business School

Christiansen, John K. (jc.om@cbs.dk)

Department of operations management, Copenhagen Business School

Abstract

Operations management should be more concerned with the relationship to design and how the interplay between design processes and operations can be managed. The design of products and services has huge implications on operations in different ways: Design can increase the value of products; influence and lead to innovation of manufacturing processes; implications for the supply chain processes and has implications on the life cycle of products and sustainability issues. To fully exploit the opportunities, we claim that it's useful for managers to be aware of the different ways that design processes might be perceived and managed. Illustrated with examples.

Key words: design management, case studies, product development

Topic 9: Innovation, Product and Service Development

Introduction

In this paper, we examine the organizational efforts that contribute to the development of new products: the design management processes. Even though the efficient and effective management of the design processes are relevant to the successful launch in the market of a new product, design management has been investigated in the field of product innovation management (for example, Chiva, 2009; Dumas and Mintzberg, 1989, 1991; Kotler and Rath, 1984; Olson, Slater, and Cooper, 2000; Walsh, 1996), but design issues and the importance of design management has not been fully explored in operations management (as already

Singhal, 2002 noticed). One possible explanation can be found in Ahire and Dreyfus (2000), who assert that design management efforts involve long-term work in the background while process management is usually more visible yet tactical. The process has often been described in a linear fashion (Christiansen and Varnes, 2007). However, empirical evidences and previous studies (for example, Ackrich et al, 2002, a,b, Christiansen and Varnes, 2007) have demonstrated that these processes are complex and far from being linear. Nowadays, design is considered a fundamental factor for competitive success across a wide range of products (Rothwell, 1994, De Mozota, 2003), and building on this assumption, the present paper addresses to the managerial benefits that managers can obtain from understanding design as a network process.

Managers can benefit from embracing many different management perspectives (Morgan, 2006) departing from a systematic review of the design definitions, of the role of designers, of managers, and of value creation during the manufacturing process, and analysing four cases studies in a Danish design manufacturing company. The review is presented in the following section.

The reflections emerging from the review leads to formulate the following research question: *how can we understand the relationship between operations management in different perspectives and what are the managerial implications of understanding the design of a new product as the outcome of a networked process?*

A review of the existing literature has revealed a multitude of different approaches that seems to come from different schools of thought on what constitutes management of design (Christiansen et al., 2011) and that the different approaches also are separated into different research clusters. Design, designers and lately design management seems to have their own outlets, which are different from the innovation and NPD outlets. The paper brings together theories from the areas of product development, innovation management and design management. Voss et al (2002) pointed out that research in operations management differs from other research in management studies because they address both the physical and human elements of the organisation. Therefore, a framework based on Actor-Network theory (ANT), which does not distinguish a priori between the social and the technical is used in this paper. The analysis draw upon theories from the sociology of science and technology (Ackrich et al, 2002,a,b) related to the innovation management literature (Ackrich, et al, 2002a, b; 2005; Christiansen and Varnes, 2007; Christiansen, Varnes, Gasparin, Storm-Vinter, 2010). Barratt et al. (2011) emphasize the change in trends of operations management research, highlighting the importance of case studies in operation research. “We define a qualitative case study as an empirical research that primarily uses contextually rich data from bounded real-world settings to investigate a focused phenomenon” (Barratt et al. 2011, pg. 329). The cases were chosen because they present different processes (Yin, 2009), and selected to have depth of observation and to create more robust and testable theory than single case research (Voss, 2002).

The paper proceeds as follows: first, based on an literature review five different views on how to understand design and design management are presented and distilled into five analytical perspectives on the management of design. The different schools on design management are classified. Then, the methodology is presented and the analysis of the cases is presented, as well as a discussion, managerial implications and directions for further research. Through the analysis of the case studies we can demonstrate how managers, through the understanding of a non-linear approach, can achieve effectiveness flexibility and responsiveness.

Literature review

Design management is a diversified discipline. In order to identify the different streams of research we designed a literature review, and applied a method from medicine, used to recognize and categorize outcomes of the study in a particular subject (Higgins and Green, 2006; Dahlander and Gann 2010). Articles have been identified for by for using the EBESCO database searching for “design management” in the topic field, including title, keywords and abstract. This search resulted in 8216 articles downloaded in a database. This search, however, provided also articles that had little to do with design management, for example more related to managerial practices, or how to design configurations or systems in the companies. Subsequently, the sample was refined by reading the abstract and keywords and the sample was purged to 200 articles. Since the EBESCO database does not include books, books were searched using Google and included into the database. The identified research could be ordered into seven different views on management of design presented in Table 1.

The table summarizes the main characteristics that has emerged in the literature. A review of the existing literature has revealed a multitude of different approaches that seems to come from different schools of thought on what constitutes management of design (Christiansen et al., 2011) and that the different approaches also are separated into different research clusters.

Operations managers can benefit from reading this table to understand what management means in different perspectives.

The first perspective is based on Simon’s decision making. Managers have bounded rationality, therefore they need to design patterns of actions to evaluate the best alternative available.

The second perspective is a linear perspective, based on the stage-gate model, aimed at integrating the design into the NPD for making the product more efficient and sell at higher value. The method of investigation ranges from case studies to surveys.

The third perspective explores the complexity of the management and the challenges that managers have to face for building an organization that is capable of producing value for the society.

The fourth perspective is investigating how to create a radical innovative design product that is able to satisfy the unmet needs of society. In order to create a new meaningful product, the designers have to understand the evolution of the socio-cultural contexts.

The fifth perspective is based on a constructivistic approach, which does not distinguish a priori between the social and the technical, but it considers the two dimensions equally important (Akrich et al, 2002). The role of management is in this view to make a profit (performance) but also to realize that management is a process of shaping anything and establishing strong networks (performativity). Therefore, design management relates to the managerial processes of creating, developing, producing and launching a new product or service.

Table1: perspectives in the literature review of design management

	Design as rational decision making process	Industrial Design	Managing As Designing	Design As Proposals Of New Meaning	Design as translation process
Design definition	Design is the science of the decision making process, and the product is the decision. It is the transformation of existing conditions into preferred ones, a process of problem solving	Design comes from the Latin designare, which is translated in English both as design and as to draw. The noun design has dual meaning: a plan, a project, an intention, a process or a sketch, a style.	Managing as designing means the monitoring, containing, and reversing of compounded abstractions	Based on this original meaning, one could say: design is making sense of things	Design is the outcome of the process of constructing things by translating interests and goals, enrolling and mobilising actors.
Design Process	Rational decision making by selecting an alternative, based on the identification and listing of all the alternatives, the determination of all the consequences. Planning courses of actions or artefacts.	Stage- Gate model; identification of customers' needs technology exploration, idea and concept generation, development, production, launch	Design thinking	Creating a meaningful radical product. Understanding the unmet needs of society, so they have to understand, make them explicit in the idea development phase, and presentation	Enrolment, mobilising translating, the design
Role of Management	Creating and developing the decision making process	Choosing the designer and the organizational structure	Idea generator who gives form to the new possibilities, based on problem-solving techniques	Create a network of actors to involve them in the process.	The spokesperson works for associating and disassociating features; works for enrolling actors and participates at the translation process
Value Creation	Process of reduction to declarative logic, optimization process	Higher price, lower production cost, better company image, emotional, symbolic and relational value	Valuable and sustainable workflow, attention to competitors and changing situations	value is in the meaning	Value is built in the relationship
Main Authors	Simon, 1969	Borja de Mozota, 2003	Boland and Collopy, 2002	Verganti, 2009	Christiansen, 2010

Design approach

Four case studies, obtained through case studies method (Yin, 2009) from Fritz Hansen has been carried out over a period of three years.

This study is exploratory (Drenth, Thierry, and Wolff, 1998, p. 15; Kotler, Adam, et al., 2006, p. 122), meaning that its purpose is to understand a complex phenomenon: the design process and the interrelation with different competencies, and the aim of being exploratory is to generate deep and new knowledge of current phenomena in their social context (Flyvbjerg, 2001).

The research grew from the authors' interest in studying the value creation of specific products while being theoretical sensitive, in order to conceptualise and formulate a theory emerging from the data (Glaser and Strauss, 1999).

This led define the pillars of the research study into research design, theory building, problem formulation, and analysis (Van de Ven, 2007). This approach allowed for flexibility and an adjustment of the research design, learning while researching and the possibility of improving the study. Such a situation emerged in the research process, when the data collected with the interviews and the observations registered were listed and analysed. Simultaneously, interviews with the design manager and informal conversations with the manufacturing manager in the company provided evidence that the company had an high involvement of the manufacturing in the design process, that are not considered in the literature. These observations led to a shift in the present research from a focus on investigating the design processes to the competences of the manufacturing department that are necessary for a successful product development, theme that is not researched in the literature.

Fritz Hansen is a leading design company, considered innovative and experimenting with new materials. Fritz Hansen's business strategy is to exploit the value created by the classic items and every year launch a new product in the market (at Milano *fuori salone* design fair), with the hope it would become the new classic product. The design philosophy adopted nowadays by the company consists of design ambition and core values, which are used as guidelines when developing new designs: the design philosophy continuously seeks the "obvious" visual (original pure, long lasting), emotional (genuine, serene, Danish), rational (superior, quality refined, aging with beauty).

The cases identified were considered innovative in using manufacturing techniques and new materials. Two cases are dated from the late '50, one early 2000, and one was a project accomplished in 2011. Fritz Hansen is the only Danish furniture company having a detailed record of its activities and the only Danish company compiling a balanced scorecard. This can allow us to make the assumptions that the data collected are genuine enough and possibly not distorted.

In the period 2011-2014 the company and archives have been visited for the preparation of the other 2 cases and going more in depth with the first. Preliminary interviews with executive officers (CEOs) of the case company allowed for a better description of the research question and the strategy for data collection. Such research process allows studying the phenomenon with a dynamic process and the unfolding events play an important role for constructing explanations (Pettigrew, 1992). The research process is explorative (Drenth, Thierry, and Wolff, 1998, p. 15; Kotler, Adam, et al., 2006, p. 122).

For one year, the company has been visited in different occasions, for some weeks on a daily basis, and several interviews have been conducted. The research was

conducted at the company's premises for 1-2 days, allowing the researcher to have access to most of the documents, warehouse, factory and participating in some of the meetings as a passive observer, to not interfere and obstacle with the daily activities. This discussions about events occurred in the natural setting, instead of simply relying on pre-arranged interviews. The warehouse, where the documents of the '50s and '60s are displaced, were explored and documented. Newspapers, marketing material and brochures between 1955 and 1965 and 1999-2002 (the years of the respective launches) were examined, photographed and stored in the computer. The visual analysis was carried out with special software. The data were triangulated with interviews (see the table 2) of length between 1 hour and 2 hours and half. They were recorded, transcribed, coded and analyzed with special software for qualitative research (Dedoose). All the visits in the company have been extensively documented in a field note. Two workshops and presentation of the results during the steering committee meetings have been carried out to validate the results. The steering committee consists of the representatives of the company and of the university, meeting every 4/6 months, to discuss the outcomes of the study and the further development for the intended areas of investigation. External validity of observations and the analysis was confirmed in multiple seminars and presentations in the company for senior-managers and in dialogues with employees.

Table 2: list of interviews

Position			Background			Position			Background		
June 2011	Design manger		Architect			November 2011	Internal designer		cabinetmaker		
June 2011	Internal designer	Graphic	Cabinetmaker			November 2011	Librarian of the kunst industries museum		Historian		
June 2011	Assistant at the Danish Design Centre		Historian			September 2012	HR manager		Business		
June 2011	Assistant at Illum Bolighus					October 2012	CFO		Finance		
June 2011	Brand Manager		Digital communication			October 2012	Former design manager		Architect		
June 2011	Head of Design		Architect			October 2012	Marketing manager		Business		
June 2011	Graphic Design		Design			October 2012	Design manager		Architect		
June 2011	Brand Operations		Business			February 2013	Librarian at St. Catherine College		Archeologist		
July 2011	Kasper Salto		Designer			March 2013	Design manager		Architect		
July 2011	Auction house in Milano		Historian of Art			March 2013	Marketing manager		Business		
October 2011	P.A. of the CEO		Technical school			March 2013	CFO		Business		

As methodology and theoretical framework, the social constructivist perspective was adopted. Such a constructivist perspective claims that organizational life is emergent, fragile and temporal, and to understand it, we have to look at how it is mobilized and how it makes a difference in organizing activities.

The approach is in line with parts of the sociology of technology that consider technology to be a network effect, where all technology has to be understood in the context of the network of which it is a part. In such a perspective, a phenomenon like open innovation is co-produced by the heterogeneous network of elements that constitutes it, *“actors and organizations mobilize, juxtapose, and hold together the bits and pieces out of which they are composed”* (Law, 1992).

Cases

The cases chosen are four products manufactured by Fritz Hansen in different historical times (Serie7, Egg, Ice, Ro). The cases present the actors, the designers, the processes, and the mediators in the development process and launch phase. The launch phase, which is an important phase in the product development literature (Krishnan and Ulrich, 2001) is rarely taken into consideration in the operations management literature. In the analysis the processes that illustrate how the network around the design of new product and design final before the first products reaches the market are illustrated.

The Serie7 is a plywood chair designed by Arne Jacobsen, manufactured by Fritz Hansen Eft., introduced in the market in 1955. The Serie7 is the result of the translations of the Ant chair to enroll and hush the customers that were making the networks of the chair unstable by criticizing the three legs and the lack of armrest. The accumulated sales were the made it the most sold chair in the world. The development process is represented in the following figure:

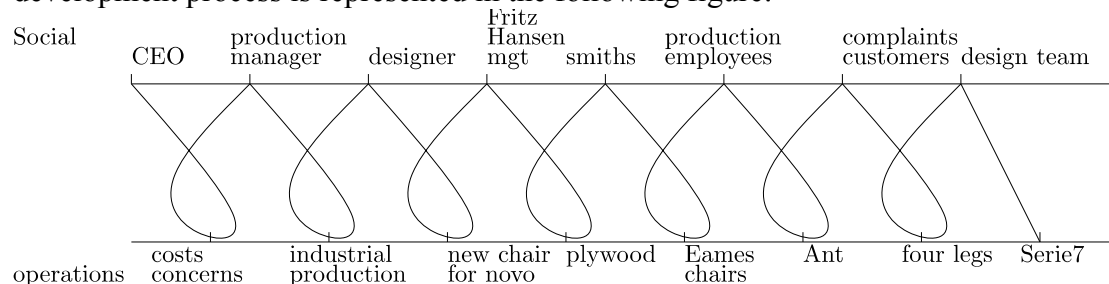


Figure1: the relations between the social and the operations in the NPD of the Serie7

The Egg is a lounge chair designed by Arne Jacobsen and manufactured by Fritz Hansen, introduced in the market in 1958, made of Styropor.

The presentation of the Egg was in November 1958 at the Formes Scandinaves exhibition at Musee des Arts Decoratifs in Paris, where the Egg and the Swan were presented as part of the interior for the SAS Royal Hotel. In a 1958 article in the Danish newspaper, Politiken, a headline referring to the Formes Scandinaves exhibition reads: “The French press is astonished by Danish Design.”

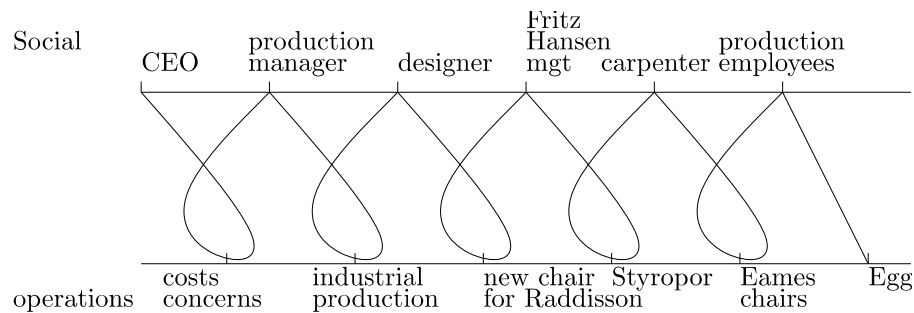


Figure 2: the relations between the social and the operations in the NPD of the Egg

The Ice chair, which is ascribed to designer Kasper Salto, marks a milestone in the history of Fritz Hansen: Ice is the first chair marketed from Fritz Hansen that is equally suited for both indoor and outdoor use. The chair with its rib-like back incorporates the virtues of classic chairs of the past while the choice of materials points to the future. The base is natural anodized aluminum and the seat and backrest are made of ASA-plastic, a both sturdy and sustainable choice. The result is a lightweight, highly comfortable and hardwearing chair.

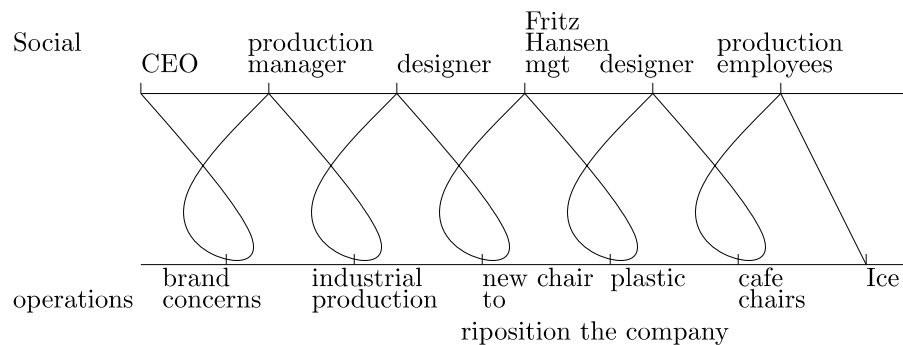


Figure 3: the relations between the social and the operations in the NPD of the Ice

The design manager described that the development process of the RO was an innovation compared to the previous experiences, because they tried to apply a more interactive process rather than following the stage gate model developed in the past years. The product development process was divided into two main phases: front end (design) and development (manufacturing and launch). The RO is considered an innovation in terms of product portfolio, since the company did not have an actual easy chair since Arne Jacobsen's Egg.

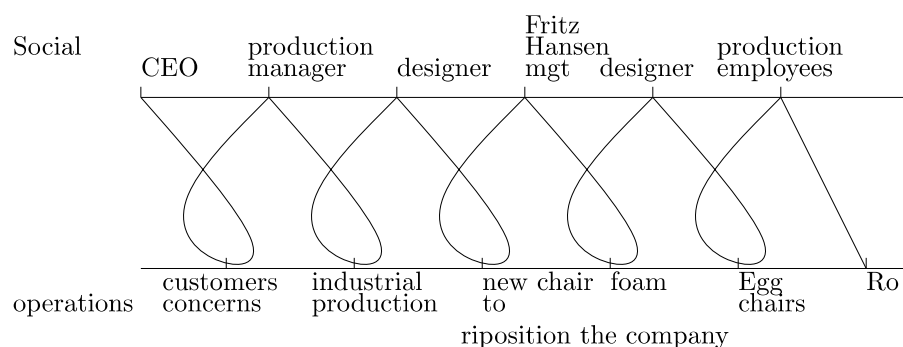


Figure 4: the relations between the social and the operations in the NPD of the Ro

From the data emerged that design can increase the value of products, not only in financial terms (high prices) but also for presenting high quality, high standard,

better design positioning, and the influence and lead to innovation of manufacturing processes. The value is produced when the relationships between the social and the operations level are created and successfully maintained. According to the study, this approach has implications for the supply chain processes (more involvement and decision making through the NPD process and after the launch) and on the life cycle of products and sustainability issues: the Serie7 and the Egg have been in production for more than 50 years, the Ice for almost 15 years and the Ro had good reception in the market.

A theoretical perspective that focuses on networks (Borum & Christiansen, 2006) on understanding innovation as a non-linear approach (Akrich, et al., 2002 a,b, Christiansen and Varnes, 2007) seems to provide valuable insights into new product processes and management of design in operations management. These insights are closer to the experiences of those involved, and may be relevant when talking about second-order learning. The social world and the operations world are interconnected, and this interconnection needs to be taken into consideration for high-profile decision making, for reconsidering the operations management settings. Thus manufacturing involvement influence with much less tough decision making than expected by the linear perspective. The network perspective raises a long list of challenges for our understanding of the management of product innovation in this relatively complex perspective (Latour, 2005), challenging the work of managers that need to successfully create stable actor networks, to increase the strength of networks, and to work for convincing an actor change direction in order to support one's own network. The development of the design, as illustrated in the cases, is not linear, based on structured design and innovation models (Cooper, 1990), but it is a backward-inward process between the social actors and the manufacturing and operations functions. The resulting process is not chaotic, but ordered interrelationship and of the different functions, and they are kept interested through the whole process, asking for feedbacks or being actively involved at the occurrence. Thus, the processes described in the cases are NPD processes that can be seen as a mish-mash of decisions that cannot wait, in an environment of complex changing markets and customer tastes, in which actions cannot be planned or predicted in any mechanical way (Akrich et al, 2002). The products face many different trials the involvement of the social and the manufacturing has assured that there are the design was better than prior solutions. This claim is confirmed by looking at the sales numbers of the chairs, which are considered successful according to the CEO. The product was influenced and formed during the processes. In all the cases, the actors involved were working together to transform the idea in a product, and the operations managers were managing the difficulties arising during the process, for example enrolling actors that initially refused to be enrolled.

This understanding of what constitutes "management" is suggested in recent works within sociology of innovation and management (Akrich, Callon, and Latour, 2002a and b; Christiansen, Varnes, Gasparin, Storm-Vinter, 2010). Design and products and services are in this view the outcome of fragile networks of human and non-human relations that are more or less stable. The managers initiated the process of participation of several actors in the development processes, in which the initial idea of the product is transformed, and the notion that the product (network) is able to connect to many different things simultaneously due to its permeable boundaries. The design process is tight to the manufacture process, in a constant interplay. In previous studies, the process was intended as linear. This meant that the process was conducted in one department, in one stage and then delivered to the next one (Cooper, 2008).

Within the constructivist perspective, instead, the process is interactive; it shows a dynamic interaction between the design and the manufacture department through the whole cycle. Elements such as the design process and the value of a product are the outcome of a stabilization of certain characteristics that are the effects of the interaction between the humans and non-humans. The manager's tasks are different from the other perspectives. The management processes is concerned with the assemblage of the heterogeneous actors into a stable network, trying to handle struggles and by framing the network formation. Multiple actors might try to frame and reframe the network in different ways and directions simultaneously. In this lens the design process is not a question of "forward and backwards" in the never-ending process, but to manage the creation of products "inwards and outwards" and framing the network. All those who participate in the innovation process can thus influence the final outcome, and thus could be regarded as being a collective process that the managers need to take into consideration to manage it properly and efficiently, being ready to manage the challenges present. Therefore, by using this managerial approach, managers, through the understanding of a non-linear approach, can achieve effectiveness flexibility and responsiveness.

Conclusions

As the analysis on the literature review on perspective on design management has highlighted that the understanding of the management of design and its relationship to operations management can be seen in multiple ways, and different managerial practices have been suggested for each perspective. Operations management can thus relate, explore and exploit design in different ways, and should be concerned about how they view the role of design in their everyday practices. In the empirical study, it was shown how the complex and interactive interplay between design processes and manufacturing might not be managed according to detailed plans, but can benefit from an interactive and dynamic approach. Furthermore, the cases demonstrated how the design processes and most important, the final product did actually improve, benefit and increase its design and market value due to the close interaction, inspiration and knowledge transfer between design and technology. The operations managers are seen, in the cases, acting as taking decisions and framing them in a process inwards and outwards, in a complex environment that is constantly moving and emerging, neither stable nor fixed, trying to exploit opportunities as they emerge, making connections and relationships between the technology and design processes. Therefore, operations managers are important if companies want to fully explore and exploit the opportunities that the manufacturing processes and technologies provides to them, by mediating between design processes and operations. Besides, the interaction with design processes might initiate innovation processes within operations itself. Further research is needed to explore how operations, operations managers, designers and design processes can benefit from a closer interaction.

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