



## INVESTIGATING THE INFLUENCE OF CO-DESIGN ON DESIGN PROCESS FOR DEVELOPING NEW PRODUCTS

*Investigando a influência do co-design no processo de design para o desenvolvimento de novos produtos*

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### ABSTRACT

Co-design is an emerging trend in new product development that incorporates customer input into design process. It connects customers, designers, and engineers throughout product design and development process. This paper explores co-design strategies for product design from various companies. In particular, the paper addresses the following questions: What types of products are being co-designed? How co-design is influencing the design process? How can co-design help companies shape their design strategies? Examples of co-designed products are presented and different roles that customers play in co-design of these products is described. The influence of co-design on conventional design process is also discussed in detail. Companies can now directly ask their current and potential customers about various product offerings and base their strategy on responses received by the customers. Co-design will play a major role in shaping design strategy of major companies.

**Keywords:** Co-design, Innovation, Product users.

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## INVESTIGANDO A INFLUÊNCIA DO CO-DESIGN NO PROCESSO DE DESIGN PARA O DESENVOLVIMENTO DE NOVOS PRODUTOS

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### RESUMO

Co-design é uma tendência emergente no desenvolvimento de novos produtos que incorpora a entrada do cliente no processo de design. Ele conecta clientes, designers e engenheiros em todo o processo de design e desenvolvimento de produtos. Este artigo explora estratégias de co-design para design de produtos de várias empresas. Em particular, o documento aborda as seguintes questões: Que tipos de produtos estão sendo co-projetados? Como o co-design está influenciando o processo de design? Como o co-design pode ajudar as empresas a moldar suas estratégias de design? Exemplos de produtos co-projetados são apresentados e os diferentes papéis que os clientes desempenham no co-design desses produtos são descritos. A influência do co-design no processo de design convencional também é discutida em detalhes. As empresas agora podem perguntar diretamente a seus clientes atuais e potenciais sobre várias ofertas de produtos e basear sua estratégia nas respostas recebidas pelos clientes. O co-design desempenhará um papel importante na definição da estratégia de design das grandes empresas.

**Palavras-chave:** Co-design, Inovação, Usuários do produto.

## INTRODUCTION

In an increasingly competitive global economy, companies are continuously searching for innovative products and services. Innovation has been regarded as a source of profitable growth for these companies. To help companies innovate, customers can play a pivotal role through co-design. Co-design happens when designers and people not trained in design work together in design and development process (Sanders & Stappers, 2008). Co-design is different than traditional approaches to design. In conventional design process customer involvement is limited. They are consulted mostly through surveys for generating design specifications. They rarely participate in idea generation and conceptual design phase. However, in co-design customers become active member of the design team and participates in design process. The exact mode and intensity of customer involvement in co-design may vary by product type and complexity. In order to explain the role of customers in product design Kaulio (1998) defined three product development approaches: design for the customer, design with the customer, and design by the customer. The first approach relies on traditional market research methods, the second approach maintains a dialogue with customers during design process by letting them respond to various designs, whereas the third approach allows customers to become designers and this final approach is where co-design is realized. Pals et al. (2008) has used the terms no direct customer involvement, reactive customer involvement, and active customer involvement to represent the above mentioned three approaches to product design.

Currently, majority of products are designed without direct involvement of customers in the development process. Most of the time customers' involvement is limited to surveys and interviews. And customers typically provide feedback about the designs that are already developed by company designers. Co-design, on the other hand, ensures active participation of customers in design process. There are several advantages for adopting co-design. For examples, co-design can reduce the risk of product failure as companies can actively monitor the customer interest in purchasing the product. Similarly, customers will be more interested in buying products that they have helped designing. Sometimes, no demand forecast for co-designed products is required as customers show commitment to buy products even before they are manufactured. For these reasons, several companies have initiated co-design efforts to involve customers in the design process.

Using a case study-based methodology, this paper explores the co-design initiatives of five companies. First the co-design efforts of these companies are defined. After that the influence of co-design on conventional design process is explored and those steps of the design process are identified that are most affected by co-design. In addition, the relationship between co-design and design strategy of a company is also explored. Paper concludes by pointing future direction for research in exploring the influence of customer involvement in the design process.

## 1 THEORETICAL BACKGROUND

Several researchers have studied customer participation in design process and have discussed various issues related to co-design. Summary of key studies related to co-design and product development process are presented in this section. In order to study the customer involvement in service design, an experiment was conducted to related to design of a text messaging service (Kristensson et al., 2002). Students and company experts generated ideas to enhance the text messaging service in Sweden. The researchers found that the ideas generated by customers were more innovative than the ideas generated by service developers. Eric von Hippel, a professor of innovation at MIT Sloan School of Management, has reported several studies related to customer involvement in product design. He studied the role of lead customers in product innovation. Lead customers are those customers who are at the leading edge of the marketplace. They tend to experience needs ahead of the other customers and they are able to innovate for themselves (von Hippel, 1986). Working with these customers can become a source of innovation for new products for a company. Franke et al. (2006) analyzed the innovations by customers in kite surfing. The found that 10-40% customers have modified products for their use and these modifications can become a source of innovation for next generation of products. They also found that those customers that are 'ahead of trend' developed more innovative modifications as compared to other customers.

In another example, Buur and Matthews (2008) reported an experiment for redesign of waste water treatment facility that included the customers (technicians) in the design activity. During the course of the study technicians generated ideas that help their activities. For example, they proposed the design of a display system that moves it out of the central control room and place it next to water treatment unit. However, the engineers from the company were resistant to the ideas. The ideas generated by the customers required multiple departments to work together and it required organizational change at the manufacturer. Along the same lines, Piller and Walcher (2006) studied the role of 'Toolkits for Idea Competition (TIC)' in customer innovation. TICs are used to invite customers to generate ideas for products and services. The researchers found that customers are more sensitive to the need aspects of design, whereas company experts are more sensitive to solution aspects of the problem. They also reported that integration of co-design and conventional design requires culture change within a company.

In order to differentiate between customer and designer perceptions of products, an interesting experiment was conducted by Chamorro-Koc et al. (2008). They compared the visual representations of a product by designers and customers. They reported that customers and designers represented the same product differently. Specifically, designer's representation did not describe the experience of using the product, whereas the customer representation described the experience of using the product. This finding provides insight about how customers and designers approach the same problem from different perspectives. For this reason co-design can help to bridge the gap between customers and designers in product design. The above studies show that customers can become an important source of innovation for new product design. This paper adds to the literature by evaluating the influence of co-design on conventional design process. The next section explains the case study based methodology used for this paper.

## 2 RESEARCH METHODOLOGY

This paper relies on case study based methodology. Case study is a qualitative research methodology that helps to investigate a particular phenomenon from multiple dimensions using various data sources (Baxter & Jack, 2008). It is a frequently used methodology in qualitative studies of innovation, design processes, and creativity. Case studies can help to explain and explore phenomena in their original context and this in turn help to understand the causal links (Yin, 2009). Case study approach is different than experimental approach to research. In experimental approach, a hypothesis is tested under controlled conditions whereas in case study method the phenomenon is studied to capture information in an explanatory manner. Stake (1995) has described three types of case studies: intrinsic, instrumental, and collective. Intrinsic case studies deal with unique phenomenon, instrumental case studies relies on a particular case to explain an issue under investigation, and collective case studies rely on studying multiple cases simultaneously to get an overall view for an issue. The current paper relies on collective case study approach. To understand the influence of co-design on product design process, five co-design examples from different companies were analyzed. These case studies were identified by examining the literature related to product design and customer involvement in product design. The companies examined in this paper belong to various regions of the world and this helps to better understand the similarities and differences in their approach towards co-design. Next section presents the findings of these case studies and then examines the implications of co-design on product design process and design strategy.

## 3 RESULTS AND DISCUSSION

### 3.1 Co-Designed Products

Several producers of consumer goods have initiated co-design projects that have resulted in successful products. These companies include large corporations like IKEA and small firms like Threadless. Co-design initiatives of five companies including are described next.

#### 3.1.1 Muji

Muji is a Japanese retailer that designs and markets several household products. It has relied on co-design to produce some very profitable products. For its co-design activities, Muji invites customers on its website to

provide ideas about new product offerings (Ogawa & Piller, 2006). After several customers have posted their ideas, voting is conducted to select the best concepts. Once the concepts are selected, Muji designers conduct the detail design of these products. Then these products are manufactured and marketed. It is reported that the products produced through co-design outperforms other products. Muji is relying on its customers to drive the design process and by doing so it is creating a win-win situation for itself and its customers.

### 3.1.2 Threadless

Threadless, a company based in Chicago, has used co-design to develop very successful business model (Manyika et al., 2007). All the merchandise sold by Threadless is designed by Threadless customers. Threadless markets apparel designed by its customer base. Threadless invites its customers to submit designs on its website. After that voting is conducted to select the best designs that will go in production. The designs that receives the most votes are produced and marketed. Customers can buy apparel from online store or from Threadless store in Chicago. In this way, all the merchandise sold by Threadless is designed by its customer community.

### 3.1.3 BMW

Automobiles are one of the most complex products to design, and direct involvement of customers in design process is not an easy task for a car company. Nevertheless, few car companies have initiated co-design efforts to connect with customers and to tap into innovative ideas proposed by them. BMW has launched co-design initiative in slightly different manner than other companies discussed above. BMW has relied on innovation contests to collect design ideas from its customer's base (BMW Group Co-Creation Lab, 2021). BMW started an online contest around urban mobility theme and asked customers to submit ideas about mobility products and services that suited urban dwellers. This innovation contest provided a chance to customers to submit their ideas to BMW. The contest resulted in more than three hundred ideas. BMW has launched further co-design competitions to promote customer participation in the design process.

### 3.1.4 IKEA

IKEA is the world's largest furniture manufacturer selling its furniture in several countries across the globe. In order to involve its customers in design process, IKEA launched its co-design initiative in 2018 (IKEA Opens up to Cocreate, 2021) through a web based platform called "co-create IKEA". This platform encourages customers to provide ideas about new products or to improve existing products. IKEA is also using this platform to connect with startups and innovation labs. This initiative has received overwhelming responses from IKEA customers. Several thousand ideas related to design of furniture were submitted through IKEA's co-design platform. IKEA also provides financial rewards to customers who propose innovative and marketable product ideas. This platform has helped IKEA to tap into wisdom of thousands of customers around the world, generate ideas for successful products, and at the same time foster an online community of loyal and dedicated customers. IKEA has launched a customizable and modular sofa product line using the ideas provided by its online community of customers.

### 3.1.5 DeWalt

DeWalt is a leading manufacturer of power tools and it is relying on co-design to keep its product line up to date with changing customer preferences. Like IKEA, DeWalt initiated an online forum for its customers to involve them in the design process (DeWalt and Its Customer-Driven Innovation, 2021). More than twenty thousand customers are member of this community and thousands of design ideas are provided by this community. Using ideas submitted by customers, DeWalt launched a successful family of power tools powered by rechargeable batteries. DeWalt is relying on its loyal online customer community for co-innovation and design.

These examples show that several companies are involved in co-design initiative. However, blending conventional design with co-design poses many challenges both on strategic and operational levels. Next section analyzes that how conventional design is influenced by co-design and how to overcome challenges that are posed by involving customers in the design process.

### 3.2 Co-design influence on Design Process

A product designed by co-design is dramatically different from a conventional design process. The conventional design process involves customers only at the onset of the product design process. However in a co-design process, the design process starts by a customer proposing an new design idea or a new product. Then customers vote for a specific ideas to move forward to the next stage and they can also propose various features and price that they are ready to pay for the product. In this way the design process is driven by customers as they design the product. By making customers an integral part of design team, co-design heavily influences the product design process. In order to fully understand the influence of co-design on conventional design process, all steps of a design process need to be analyzed. Eppinger and Ulrich (2000) have divided a product design process into six stages as shown in the Figure 1. In this process the marketing department is involved more intensively in the planning and concept phases. They primarily interact with the customers, investigate new product opportunities, and explore various market segments. Engineering and industrial design departments are more involved in the later stages of system design, detailed design, and testing. Customers usually interact with the design team as ‘outsiders’ with the marketing department through market research tools such as focus groups, surveys, and ethnographic studies.

Figure 1. Product design process



Source: Adapted from Ulrich and Eppinger (2000)

However, co-design is changing this process. As Thrift (2006) has pointed out co-design of products involves customers through websites, open innovation, and it can replace or supplement conventional marketing research tools such as focus groups, ethnographic studies, and conjoint analysis. Using the five case studies presented earlier in the paper, Table 1 is constructed to highlight those phases of conventional design process that are most influenced by co-design. From Table 1, it can be inferred that most of the co-design happens in ‘front end’ of the product design. Whereas the later stages of detail design, testing, and manufacturing still remains with the company. Co-design will require a new approach to design that will facilitate interaction between customers, engineers, and designers

Table 1. Product design process and co-design

Company	Products	Product design process					
		Product Planning	Concept Design	System Design	Detail Design	Testing	Launch
Muji	Furniture	●	●	●	●	●	
Threadless	T-shirts	●	●	●	●		
BMW	Automobiles	●	●				
IKEA	Furniture	●	●	●	●	●	
DeWalt	Power tools	●	●				

Source: Prepared by author

Companies need to develop specific capabilities to ensure seamless integration of co-design and conventional design. Else companies risk alienating both customers and company designers. Company designers play a critical role in co-design as facilitators and collaborators. Companies must ensure that company designers

are comfortable working with customers who are not formally trained in design process. Companies also develop tools that allow seamless interaction between customers and designers in the process. Tools are needed to solicit ideas, to select ideas, and to refine them all while collaborating with thousands of customers and several designers inside the company

### **3.3 Implications for Design Strategy and Innovation**

Not only does co-design influence the design process but it can help companies to shape their design strategy and marketing efforts. Co-design can solve a pressing problem that most of the companies face when they try to answer the question: What to make using the design and manufacturing capabilities owned by the company? Ogawa and Piller (2006) have mentioned that more than fifty percent of new products fail to meet the financial expectations. It implies that companies are often wrong in predicting what customers really want and at what price. Any tool that can help companies to better predict customer wants will help reduce the product failure rates. Co-design provides an answer to this problem. Through co-design, companies can solicit customers' suggestions about future product offerings. The Internet has facilitated the communication required between companies and their customers. Companies can also judge customers' willingness to buy at given price and predict the volume to produce. In this way the design process has been initiated by the customer and customers may show a greater commitment to buy the products once designed. In summary, co-design can decrease the risk of new product failure by making customer an active member of the design team.

Furthermore, through co-design, customers can bring their unique experiences and play a pivotal role in innovation. However an important question is what type of innovation happens in co-design? A review of the literature shows two classification methods for innovation. One is based on the 'degree' of innovation (Reid & Brentani, 2004) and the other is based on the 'source' of innovation (Verganti, 2008). According to Reid and Brentani (2004) there are two types of innovation based on the degree of newness: incremental and radical. Incremental innovation happens when a new product is designed using existing technologies targeted towards existing markets, whereas radical (or discontinuous) innovation disrupts current technologies and markets and introduces "really new" products. Another classification of innovation is described by Verganti (2008) which divides innovation in three categories market pull, technology push, and design driven. Market pull innovation happens when either a designer observes user needs, analyzes them and proposes a solution to meet user needs. Or users themselves propose a solution to their unmet needs– as it happens in co-design. According to Verganti (2008), radical innovation happens through technology push or is driven by design. Technology push innovation occurs when a technology developed in R&D lab is used to solve exiting or latent needs of customers. Similarly design innovation occurs when 'new meanings' are given to existing products by a company (Verganti, 2008). For example, with the advent of semiconductor technology, mechanical watches were replaced with Quartz watches. So this represents a case of technology push innovation as a new technology 'semiconductors' changed the design of watches. On the other hand, Swatch – a Swiss watch company introduced colorful inexpensive Swiss watches that were meant to be worn as fashion items. Swatch did not introduce a new technology but they transformed the meaning of the watch from a utility item to a fashion item Verganti (2008). Users may be unable to foresee design and technological innovation, so co-design may result only in incremental innovation. Thus co-design provides an avenue to involve customers in the design process and facilitates market pull incremental innovation.

## **CONCLUSION**

Co-design can play an important role in innovation by involving customers in design and development process. For this reason, several companies have used co-design to develop successful and profitable products and services. Five case studies of co-design from various companies were discussed in this paper. Next the influence of co-design on conventional design process was investigated. It was found that co-design usually influences the fuzzy front end of design process. By involving customers in idea generation phases, companies can dramatically increase the pool of conceptual designs that can be considered for production. This in turn helps in developing innovative and profitable products. Co-design is changing the conventional design process and replacing it with a design process that makes customers an integral and active member of the design team. Co-design also helps companies in developing their design strategies, and at the same time it helps them in market

research and forecasting. It is quite possible, that co-design may replace traditional market research tools and forecasting. Future research should look at influence of co-design on design culture within a company, methods to increase customer participation in the co-design, and strategies to integrate conventional design processes with co-design.

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