CO-DESIGN: PRODUCT TYPE AND DEMOGRAPHICS

M. Mobeen Shaukat / **Richard Gonzalez** / **Kazuhiro Saitou**
King Fahd University of Petroleum and Minerals / University of Michigan / University of Michigan
mshaukat@kfupm.edu.sa / gonzo@umich.edu / kazu@umich.edu

1. INTRODUCTION

In an increasingly competitive global economy, companies are motivated to continuously search for innovative products and services. Innovation has been long regarded as the source of profitable growth for companies. Customers can play a pivotal role in innovation through co-creation. Co-creation is defined as the joint creation of value by the company and the customer (Prahalad & Ramaswamy, 2004). Co-creation is a new approach for interacting with customers in various value creation activities undertaken by a company. Co-creation may also have indirect benefits such as increasing customer engagement, loyalty and interaction with the company, which may have positive long term consequences beyond the immediate co-created outcomes. Co-design is a special instance of co-creation (Sanders, 2008). Co-design happens when customers actively participate in the design and development process of new products. Co-design is different than conventional approaches to design. In conventional design customer participation is usually limited to product specification development through market surveys. Customers rarely participate in the initial phases of the design activity where ideas and concepts are generated by company designers.

Kaulio (1998) identified 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 the customer during the design process by letting them respond to various designs, whereas the third approach allows the user to become the designer and this final approach is where co-design is realized. Pals et al. (2008) has used the terms no direct user involvement, reactive user involvement, and active user involvement to represent Kaulio's three approaches to product design. Most current products are designed using the first two approaches. Usually customers play a passive role in design through surveys and focus groups. That is, they typically respond to the designs already developed by companies. However through co-design customers are able to propose designs and become active participants in the product design process. Such a co-design process has several advantages over the conventional process. The customer provides the design and the customer makes a commitment for purchasing the product. In this way no forecasting is required for the product volume. Recent research has shown that co-designed products can outperform conventionally designed products. Nishikawa et al. (2013) has compared the market performance of co-designed products against the products that were not co-designed. They used the Japanese firm Muji for their case study. Their data showed that products that were co-designed outperformed products that were not co-designed. Specifically they found that in first year of introduction sales revenue of co-designed products were three times higher than other products. Not only co-designed products were highly successful in the first year of introduction, their sales revenues were five times higher than other products over a three year time period. Another case study (Poetz & Schreier, 2012) compared the design ideas generated by professionals working for a company to the ideas generated by customers of that company. They found that the company executives rated user generated ideas significantly higher for novelty and customer benefit.

Customers' participation in designing products can be much deeper during co-design than conventional design. Therefore conventional design processes should be adapted to account for various factors that can affect customers' participation in co-design. Co-design raises several questions. Will customers be equally interested in participating in co-design for all the products they own (or do not own) or will they be more interested in some products than others? For example, given a chance to co-design, will a customer prefer to co-design a house or a digital camera? How will customers want to participate in co-design? What is the right medium to contact customers for co-design? Online, offline or a hybrid of the two? Similarly, what mode will customers prefer to

submit their design ideas to the design team? Verbal, visual, or a combination of both? In order to find answers to these questions surveys were conducted using a pool of customers in the US.

2. METHOD

Surveys are extensively used in market research to gain customer feedback. They are usually the first tool researchers use to find out customers' perception about products and services. Therefore to gain customer's insights about various dimensions of co-design, surveys were conducted with an online pool of customers sampled throughout the US. These customers were accessed through a market research firm. Surveys were distributed to 2159 customers. Survey response rate was 26%. Customers were divided into five age groups as follows: Young Millennials (18-23), Old Millennials (24-32), Generation X (33-44), Young Boomers (45-54), and Old Boomers (55-64). 52% of customers were males and 48% were females. Survey questions are presented below in the relevant results subsections.

3. SURVEY RESULTS

The surveys asked six questions about various aspects of co-design. Customer responses to these questions are discussed in the following.

3.1. CO-DESIGN AND PRODUCT TYPE

The first questions asked the customers to indicate their interest in participating in the design process of eleven different products. The question posed in the survey was: Please indicate your interest in participating in the design of the following products: House, car, computer, cell phone, clothes, house hold furniture, shoes, digital camera, home appliances, sporting goods, inkjet printer. This list of products was not exhaustive but it represented the products that are commonly used by a typical customer. Figure 1 shows the responses from the customers. Customer's interest to participate in co-design varies with the product type. For example, a customer is five times more interested in the design of a house than an inkjet printer. Also the figure shows four distinct categories of products emerge from the customer responses. The first category consists of house and car with about 50% of customers showing interest in co-design. The second category consists of cell phone and computer with about 30% of the customers showing interest in co-design. Clothes, shoes, household furniture, digital camera, and home appliances fall in the third category where about 20% of the customers are interested in design. The last category consists of sporting goods and inkjet printer.

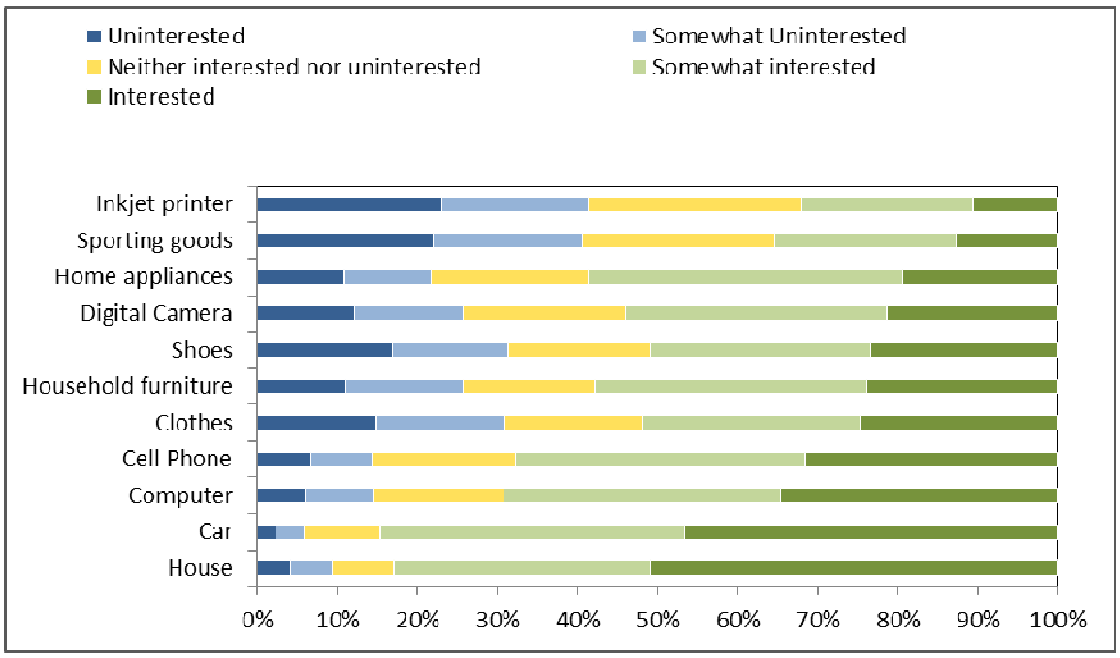

Figure 1: Customers' preferred interaction medium

Breaking down the results by gender revealed some interesting trends. There are some products where females are more interested in co-design than males and vice versa. And then there are products where gender does not influence customer's interest in co-design. The largest gap between genders is in co-design of clothes. About 20% of the females were interested in co-designing clothes whereas only 6% of the males were interested in co-designing clothes. The same trend appears for shoes. Nevertheless, males were much more interested in designing cars than females. The same pattern appears for computer. The third category of products is where male and female interest is approximately equal like digital camera. Based upon these data we infer that gender influences customer's decision to participate in co-design. Apart from gender, age group of the customers also plays a critical role in determining their interest in co-design of products. One trend that was obvious from survey results was that three age groups (generation x, young-boomers, old millennials) were more interested in co-design than the other two age groups (young millennials and old-boomers). Nevertheless there were some exceptions to this trend. For example, young-millennials were as interested in co-design of clothes and shoes as other age groups. But their interest in co-design in other nine products was less than other age groups.

3.2. CO-DESIGN AND PRODUCT FEATURES

Products usually consist of a number of components and features. There are some components that customers are more familiar with than others. For instance, in the case of a car, customers are more familiar with a steering wheel than the engine controller. It is possible that the interest in co-design may also vary with the component type of a product. About 50% of customers showed interest in co-designing a car. But does this interest vary by the components and features of a car? In order to answer this question the following survey question was posed to the participants: If you had the opportunity to participate in the design of a car, how interested in designing each of the following aspects would you be? (list of components in Figure 2). The summary of responses to this question is shown in the Figure 2.

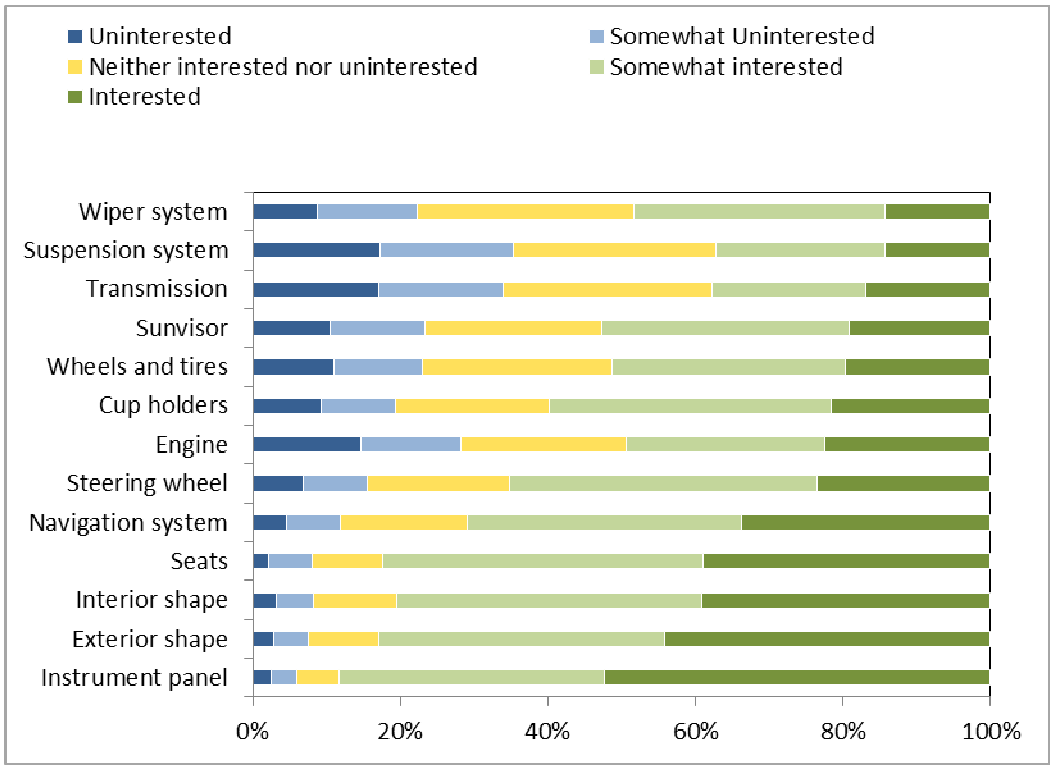

Figure 2: Customer interest in co-design by product features

We observe that interest in co-design varies with product features. Even though wiper system and instrument panel are both components of a car, 52% of customers were interested in the design of instrument panel and only 14% of customers were interested in designing wiper system. What does this means for co-design of cars? Maybe a car company has to focus its co-design activities to only on those components in which a majority of customers are interested in co-design. Or the company can form various groups of customers working with

various design teams working on specific components. For instance, only those customers who showed interest in co-design of transmission could work on the design of transmission. Dissecting the data by gender showed that except for cup holders, males were more interested in design of all the components of a car than females. Nevertheless the degree of interest varies by component type. For example, males were four times more interested than females in designing transmission, whereas, females were less than half a percentage point behind the males in showing interest in co-design of instrument panels. It was found that gender and age group correlates the percentage of customers who are interested in the design of various components of a car. For example all five age groups were about equally interested in design of the exterior shape, whereas young millennials lagged far behind than the other age groups in the design of seats. Apart from the navigation system and interior shape, young millennials were less interested in co-design of various components of car than other age groups. Maybe young millennials can relate better to the navigation system because of its similarity with other gadgets they use so they were more interested in its design as compared to the other components.

3.3. AWARENESS OF CO-DESIGN AND RELATED TERMS

There are various terms being used in the literature to describe customer involvement in product design. Some of them are co-creation, co-design, open innovation, open sourcing, and crowdsourcing. Are customers more familiar with one or the other term? This may influence the way companies want to name their co-design initiative. One question in the survey tried to find out customer awareness of various terms related to customer involvement in the design process. The survey question was: Are you aware of the following terms: Open innovation, opensourcing, crowdsourcing, co-creation, and co-design. Customer responses to this question are shown in Figure 3.

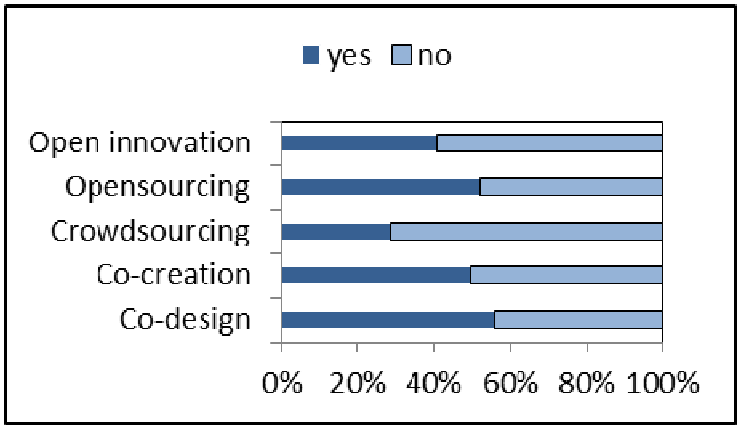

Figure 3. Awareness of co-design terms.

49% of the customers responded that they are familiar with the term open sourcing. However, most of the survey respondents report being unfamiliar with the term crowdsourcing. Maybe this finding reflects that crowdsourcing is a rather recent term as compared to the other four terms. Another noteworthy observation is that customers are aware of the co-design term more than co-creation (even though as used in the literature co-creation has a broader meaning and application than co-design) co-creation is much broader in meaning and application than co-design. Cuts of survey pool by gender and age group revealed interesting observations. For example, male respondents reported being twice as familiar with crowdsourcing as females. Companies may have to use multiple terms while involving customers in design efforts of products and services or companies may have to explain terms clearly at onset of co-design efforts. However based upon survey responses, co-design is the most recognized term (out of the five) by these customers.

3.4. IDEA SUBMISSION BY CUSTOMERS

Most of the participation of customers in co-design results from idea submission. These ideas are then transformed into products and services. Thus, ideas generated by customers form the basis of co-design. One measure of customer's interest in co-design is whether they have submitted design ideas to a company or not. Therefore the following question was posed to the online forum of customers: Have you ever submitted a design

improvement suggestion to any company? 79% customers responded in the negative to the above questions. This is stark contrast with the response to question one. In question one more than 50% customers showed interest in designing some products but only 20% of these customers have submitted ideas to other companies. A number of reasons can be attributed to this response. Maybe there is no channel for the customers to provide their ideas to the company. Even if customers want to submit their ideas, there is no website or forum where they can post their ideas. The gap between customer willingness to participate in co-design (response to question one) and actual customers submitting ideas is worthy of further investigations. The removal of barriers that prevent customers to submit ideas will enhance co-design and possibly more customers will submit ideas on the web sites.

The division of responses by gender and age group showed some interesting patterns. 26% of the male respondents have submitted ideas and only 14% of the female respondents have submitted design ideas. Reasons for this gap between female and male participation in idea submission is unknown. Young millennials are again lagging behind other age groups in submitting ideas. However, old boomers are leading in idea submission. Even though old boomers showed less interest in co-design of various products (response to questions one), they are relatively more active in idea submission. This may be because of their age they have had more opportunities to submit ideas and therefore they are ahead of other age groups on this regard.

3.5. IDEA SUBMISSION MEDIUM

Design ideas can be described in a number of ways--sketches, verbal explanations, prototypes, photographs. As co-design involves customers in the design process it is anticipated that multiple means of ideas submission should be provided to the customers. The following survey question inquired about the customers' preferred method of idea submission: If you are invited to participate in the design process of a product how would you like to submit your ideas. a) Design ideas described verbally, b) Sketches of design ideas, c) Computer drawings, d) Digital photographs. The responses by the customers are shown in Figure 4. 35% of the customers preferred to submit the ideas verbally. 29% of customers want to submit their ideas through sketches. And a combined 36% of customers wanted to use computer drawings and digital photographs to submit the ideas. So again customers are divided into three groups. One group wants to rely on verbal input, other on visual input through sketches, and the last group wants to use digital means to submit the ideas. Also, the medium of idea submission can influence the type of input received from the customers. For example, if customers can only submit verbal input, then they may not be able describe the design concepts for the product being co-designed and may limit their input to desired functions of the product. Therefore, we suggest providing customers a choice of multiple mediums to submit their ideas.

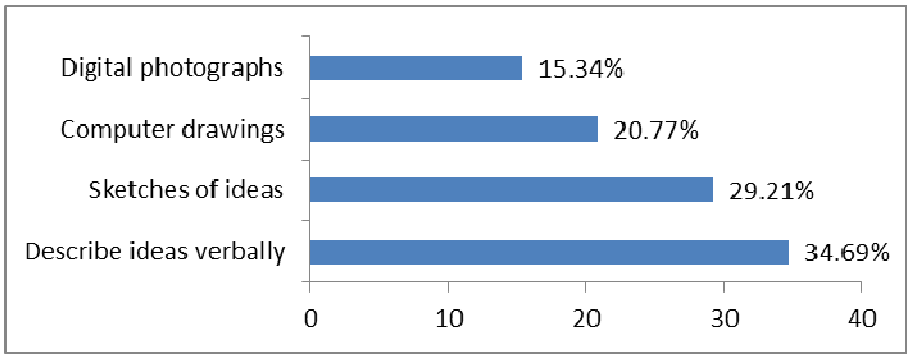

Figure 4. Idea submission medium.

3.6. INTERACTION MEDIUM

Last survey question asked customers to indicate their preferred method of interaction with the design team during the co-design process. The question in the survey was: If you are invited to participate in the design process, which of the following ways of interaction with the design team would you prefer: a) Working one-to-one with the design team at the company design studio, b) Working online with the design team, c) Teleconference with the design team, and d) Working with other customers on a web based forum. The summary of customer responses is shown in Figure 5.

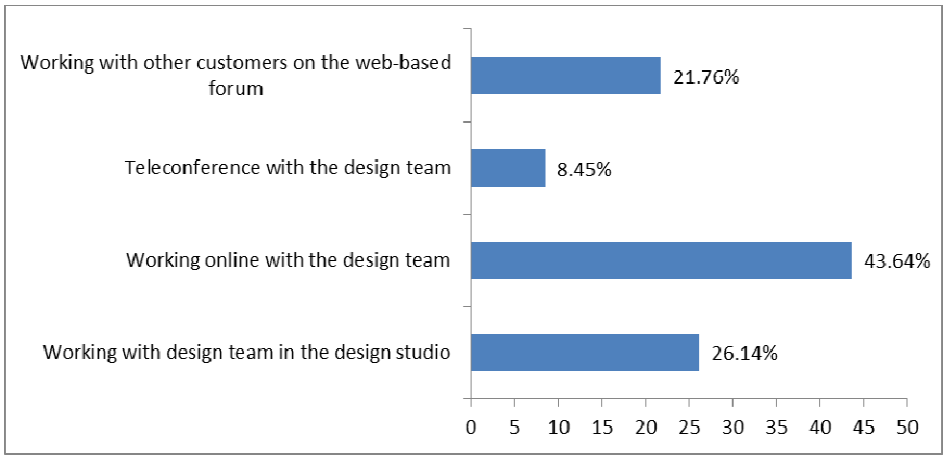

Figure 5: Customers' preferred interaction medium

Working online with the design team was the method preferred by more than 40% of the customers, whereas only 5% of customers want to work through a teleconference. Working with a design team in a design studio and interacting with other customer through an online forum was preferred by 26% and 22% of customers respectively. It can be inferred that an online forum where customers can interact with the design team and other customers while participating in the design activity of new products will satisfy about 60% of customers. Since computers with Internet access are ubiquitous and co-design usually requires a large number of customers to participate in the design process, online web forum may be the most cost-effective solution to engage a large percentage of customers in the design process. No significant difference was noted between females and males for the response to this particular question. Online interaction with the design team was the preferred method by both genders. For young millennials, the most preferred method of interaction was to work with a design team in a design studio. This response by Young Millennials was surprising as one would assume that young millennials (being most familiar with the Internet) would prefer online interaction over all other methods.

4. CONCLUSIONS

The following observations can be made from the analysis of customer responses:

- Customer's interest in co-design varies by product type. For example, customers are more interested in designing a house than designing a digital camera.
- Gender and age group of a customer influence the interest in co-design for certain products. Females are more interested in designing clothes than males.
- In a given product, customer interest in co-designing various components varies. Customers are more interested in designing the exterior shape of a car than transmission.
- Most of the customer would like to interact online with a design team.
- Most customers want to describe their design ideas verbally.
- Crowdsourcing is the least known term related to co-design.
- Only 20% of the customers have submitted design ideas to a company.

This paper reported preliminary findings from surveys about customers' perception of co-design. These surveys provided some interesting insights about influence of customers' demographics on co-design. Future research can further investigate the reasons underlying the observations mentioned above. For example, does prior training or experience with design plays a role in dictating customers' willingness to participate in co-design? Also the effect of duration and medium of interaction on co-design needs to be explored. It is anticipated that co-design will augment conventional design activities in coming years. In depth understanding of various factors affecting co-design will help in developing methodologies to better integrate customers in the design process.

REFERENCES

Kaulio, M. A., (1998). Customer, consumer and user involvement in product development: a framework and a review of selected methods. *Total Quality Management, 9*(1), 141-149

Nishikawa, H., Schreier, M., & Ogawa, S. (2013). User-generated versus designer-generated products: A performance assessment at Muji. *International Journal of Research in Marketing*, *30*(2), 160–167

Pals, N. et al. (2008). Three approaches to take the user perspective into account during new product design, *International Journal of Innovation Management, 12*(3), 275-294

Poetz, M. K., & Schreier, M. (2012). The Value of Crowdsourcing: Can Users Really Compete with Professionals in Generating New Product Ideas? *Journal of Product Innovation Management*, *29*(2), 245–256

Prahalad, C. K. & Ramaswamy, V., (2004). *The future of competition: co-creating unique value with customer.* Boston: Harvard Business School Press.

Sanders, E. B. –N. & Stappers, P. J.(2008). Co-creation and the new landscapes of design. *Journal of Co-Design*, *4*(1), 5-18