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## How to Assess and Increase the Value of a Co-Design Experience: A Synthesis of the Extant Literature

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### Abstract

*Franke & Piller (2003) stress the success of mass customization (MC) depends upon optimal toolkit design and underscore the importance of the MC co-design experience. However, what do we know about the value of this experience? How do we increase its value? How do we optimize toolkit design? Based upon the academic literature, this paper aims to answer these questions. First, we discuss results of previous studies on the four key variables used to assess how the consumer values self-design: enjoyment, control, pride of authorship and complexity. Second, we analyze the best solutions to increase the value of the co-design experience on these key variables: we explore toolkit functionality and how it can be endowed with features that enhance the MC user's perception of the process. This paper contributes to the body of mass customization theory regarding the value of the co-design experience and emphasizes how to design efficient toolkits.*

### 1. Introduction

From the consumer point of view, the success of mass customization (MC) is said to depend on two elements (Merle, et al., 2010; Schreier 2006). While several scholars have emphasized the importance of the value of the MC outcome, relative to perceived uniqueness and preference fit (Franke & Schreier, 2008), others have highlighted the role of optimal toolkit design, thus underscoring the importance of how the user experiences the act of co-designing her outcome, or her MC co-design experience (Franke & Piller, 2003). The nature of this experience is the interaction between the consumer and the “configurator”, or the “co-design toolkit”, while she customizes her product.

In this context, understanding how to assess and increase the value of a co-design experience are crucial issues. What do we know about how the

consumer values this experience? How can we increase this value? How do we optimize toolkit design? Based upon the academic literature, this paper aims to answer these questions. First, we discuss results of previous studies on the four key variables used to assess how the consumer values the self-design experience: perceived complexity, control, enjoyment and psychological ownership (or pride of authorship). Second, we analyze the best solutions to increase the value of the co-design experience on these key variables: we explore toolkit functionality and how it can be endowed with features that enhance the MC user's perception of the process. This paper contributes to the body of mass customization theory regarding the value of the co-design experience and emphasizes for practitioners methods to assess the value of a co-design experience and design toolkits that best capture that value.

### 2. Assessing the value of the co design experience

Value is defined as a trade-off between perceived benefits and perceived costs. In the context of the MC experience, one cost and three benefits have been identified: complexity (the cost) and enjoyment, control and psychological ownership (the benefits) (Schreier, 2006). Following we explore the nature of these four variables, why they are relevant to the consumer's co-design experience, and their significance to the value of MC.

#### 2.1. The contrasting effect of perceived complexity

The MC process presents the user with a notable cost that could compromise the value the co-design experience generates for the customer: perceived complexity. A consumer's perception of complexity is related to the cognitive effort involved in how she

makes decisions (Dellaert & Stremersch, 2005), including the trade-offs in her selections (Dellaert & Dabholkar, 2009) and her investment of “time and mental energy” (Franke & Schreier, 2010). As a cost to the MC user, complexity has been shown to exert a negative effect on how the customer values the co-design experience. Indeed in their empirical study, Dellaert & Stremersch (2005) found that the more complex a user perceives a MC toolkit, the less utility he has for the product and for a certain MC configuration. Therefore, complexity negatively affects product utility and mass customization utility. In addition, Dellaert & Dabholkar (2009) demonstrate that complexity has an indirect effect on consumer intentions to use mass customization by the total mediation of two variables, perceived control and product outcome. It mediates perceived control because the more complexity the consumer experiences during the co-design process, the less control he perceives, leading to a decrease in his intention to use MC. Mediation of product outcome occurs because when consumers experience complexity, they are less likely to find a product that fits their preferences. However, this result of the study is weakened as participants’ responses were based on descriptions of several scenarios rather than on actual experiences of MC processes.

In contrast, Franke & Schreier (2010) revealed that perceived complexity did not influence the MC users’ willingness to pay (WTP) for a mass-customized product, specifically scarves. They show that this complexity could be perceived either as a positive accomplishment or as a negative affect, according to the perceived preference fit of the outcome. When consumers have a high preference fit, they are willing to pay more when they experience high process effort vs. when they experience low process effort. However, when perceived fit is low, consumers WTP is high when they experience low process effort. These results balance those of previous studies on the negative effect of complexity and tend to moderate the general assumption that lower perceived complexity is better.

## **2.2. The positive influence of perceived control**

The MC configuration’s ability to allow the user mastery over the topic at hand enables her control over the co-design process (Schreier, 2006). Thus, perceived control can be defined as “the extent to which consumers believe they are able to determine the outcome of the MC process” (Dellaert & Dabholkar, 2009). This desire to have control over

one’s environment is a driving force of human beings. The “locus of control” the MC toolkit renders is important because it “enables the [user’s] ability to focus on what’s relevant” to her inasmuch as the extent of control helps outweigh perceived complexity (2009).

To the best of our knowledge, only one empirical study analyzed the influence of perceived control on the MC experience’s context (Dellaert & Dabholkar, 2009). These scholars’ study discovered that perceptions of control positively influence the consumer’s intent to use MC. In addition, as previously revealed, the user’s perception of complexity erodes his sense of control over the co-design experience. Again, as Dellaert & Dabholkar’s study is scenario-based, we could go a step further by manipulating perceived control in actual co-design experiences to determine whether it has a positive influence on satisfaction toward the experience and on behavioral intentions (i.e., MC users’ website purchases, loyalty, etc.).

## **2.3. The positive impact of enjoyment**

Enjoyment is vital in a variety of off-line and on-line shopping environments (Babin, et al., 1994; Childers, et al., 2001). In the mass customization context, Schreier (2006) asserts that the co-design process, while being an “intrinsically rewarding activit[y]”, generates entertainment value. Therefore, understanding the manner and extent to which an enjoyable experience generates value for the consumer will contribute to firms constructing successful MC toolkits (Dellaert & Dabholkar, 2009). These authors define perceived enjoyment as the “consumer’s perception of the pleasure associated with the experience of using” MC (2009). This “excitement” also comes from the user “being able to compose [her] ideal product.” Supporting this view, Franke & Schreier (2010) employ the term “process enjoyment”, defining it as “a positive affective reaction elicited by the process of self-designing the product.” Both definitions focus on the design process itself as a generator of enjoyment and on the emotional effect on the consumer of actively participating in the MC process as a co-designer.

The positive influence of perceived enjoyment on the co-design process has been twice supported. Franke & Schreier (2010) validated that the more enjoyment the MC user experiences, the more she is willing to pay for a mass-customized product, regardless of the preference fit achieved. However, preference fit acts as a moderator: enjoyment has a higher influence on WTP for high preference fit

products than for items with low preference fit. Dellaert & Dabholkar's (2009) work also supported the positive impact of perceived enjoyment on intentions to use MC.

#### **2.4. The positive impact of psychological ownership**

The third benefit of the MC co-design experience is "psychological ownership". According to Franke, Schreier & Kaiser (2010), research in this area of behavioral decision-making has revealed that "psychological factors play a crucial role and subjective attributions sometimes matter more than objective facts" in the consumer's cost/benefit evaluation. The authors phrase this as the "I designed it myself" effect and consider it a significant factor in how consumers value the co-design experience and its outcome. Franke, Schreier & Kaiser describe it as "the value increment a subject ascribes to a self-designed object, arising purely from the fact that she feels like the originator of that object".

The importance of these scholars' findings is that the co-design process encourages the MC user to feel that the result of the experience is uniquely "theirs". This is consistent with Schreier (2006) who posits that the high value that users put on MC could be due to "experiencing strong feelings of pride". Merle, et al., (2010) empirically confirm that "the creative achievement value", defined as "the value acquired from the feeling of accomplishment related to the creative task of co-designing", is a dimension of the co-design experience value.

Franke, Schreier & Kaiser (2010) conducted several studies in which participants were afforded opportunities to design five different products - scarves, cell phone covers, t-shirts, skis and wristwatch faces - enabling different degrees of design freedom and choices between self-designed items and standard ones. First, they demonstrated the "I designed it myself" effect by showing that individuals are willing to pay more for a t-shirt when they are the originators of the design than is the case for the same off-the-shelf product (controlling for preference fit). Second, Franke, Schreier & Kaiser confirmed that the feeling of accomplishment acts as a mediator of this "I designed it myself" effect.

In addition to preference fit, quality of the outcome and contribution to the process interact with the "I designed it myself" effect. One of the studies yielded that "the higher the preference fit, the greater the effect of self-design on the subjective value" (Franke, Kaiser & Schreier, 2010). Kept constant in the studies, one might regard preference fit as a

rational valuation by the customer, with the self-design aspect a more affective, positive influence on WTP. The authors' research found that the variable, quality of the outcome, confirmed their hypothesis that as preference fit increases, the "I designed it myself" effect is stronger, a "subjective contribution to the self design process enabled by the design freedom the toolkit allows".

### **3. Increasing the value of the co design experience**

Now that we understand the customer's perception of the cost and benefits of the MC process, we proceed to identify antecedents of the experiential value of the co-design experience. Several studies (Dellaert & Stremersch, 2005; Franke & Schreier, 2008; Franke & Schreier, 2010; Franke, Keinz & Schreier, 2008; Dellaert & Dabholkar, 2009; Franke, Schreier & Kaiser, 2010) suggest or empirically tested MC toolkit characteristics that could promote the benefits of the co-design experience and address the consumer's experiential costs. We propose categorizing these features into three groups: 1) scope of customization, 2) feedback and 3) comparative elements. We proceed to explore how the co-design configurator can be endowed with features that enhance the MC process for the consumer; and the manner in which the MC user's perceptions of the co-design experience are influenced by these features (see Table 1).

#### **3.1. Scope of Customization**

Scope of customization is the breadth and depth of design options and tools that the MC toolkit offers the customer to use to create her design experience. What is the optimal scope of customization to offer to the consumer? Several scholars agree that MC toolkits with large solution spaces help reduce the main cost of the co-design process, perceived complexity. By being large enough to afford the customer greater selection, and structured in a manner that guides choice, promotes flexibility and fosters individual freedom to meet her needs and wants, solution spaces promote ease of use. The MC user can more easily pilot her selections, diminishing the effort related to decision-making or the burden of choice (Franke & Schreier, 2008; Dellaert & Dabholkar, 2009; Salvador, et. al, 2009). Empirical studies have been performed on three specific features: the number of modules, the range of options for each module and the degree of freedom.

### 3.1.1. Number of modules and range per module.

Number of modules refers to the number of options that one can customize in a specific toolkit. Range of options for each module refers to the number of choices available per module. Dellaert & Stremersch (2005) were the first to investigate the influence of number of modules and range of options on perceived complexity, asking study participants to customize PCs according to several conditions. They found that neither the number of mass-customizable modules (two levels: low with four modules and high with eight modules) nor the range of options (two levels) per module influence perceived complexity, concluding that the “extent of mass customization has little impact on complexity”. Dellaert & Stremersch surmised that consumers do not “perceive significant increases in complexity” because solution spaces enable the likelihood that the MC user achieves an outcome closer to her vision of the “ideal product”.

This result is contradictory to Dellaert & Dabholkar’s (2009) findings. They empirically confirm that “a greater range of mass customization options” increases the co-design user’s perceived complexity (two levels: low with six modules and high with 16 modules). However, they found participants’ perceptions of control and enjoyment of the MC process were enhanced by the range of mass customization options. Indeed, a consumer’s ability to have more choice with greater options allows her to exert more control over the MC process.

Further, Dellaert & Dabholkar (2009) proved that in having greater choice and more control, the consumer enjoys the process more. Because the MC configurator “creates [the] entertainment process with larger solution spaces” the co-design experience fosters the “joy of performing a creative or artistic act” (Franke & Piller, 2004). Additionally, firms could “increase [the] range of options” offered by the toolkit when they “offer complementary services”, such as visualization mechanisms and salesperson interaction, which help to diminish perceived complexity (Dellaert & Dabholkar, 2009).

Franke & Schreier (2008) considered uniqueness as a factor in psychological ownership and for a toolkit’s solution space. The authors examined consumers’ utility for product uniqueness, asking study participants to use “a real MC toolkit” to design their own cell phone covers. They found that large solution spaces are “essential for an MC toolkit” because they “enhance the user’s ability to create uniqueness” ... and “better identification with it”. The study implies that a configurator should “facilitate unique branding of self-designed products” with elements such as labels or indicators that the

customer designed the item. A comment from one of Franke & Schreier’s study participants sums up the affect associated with creating something from a co-design toolkit’s large solution spaces: “I kind of feel ... almost like an artist, creating something like this”.

**3.1.2. Design freedom.** Design freedom refers to the extent to which the toolkit enables the user autonomy to choose, create or devise her MC experience with the least restrictions. According to Franke, Schreier & Kaiser (2010), the MC configuration affords the MC user significant design freedom by heightening his “subjective contribution” to the MC process. This enhancement might generate pride of authorship, because the user perceives himself as the “originator” of his design. Toolkits devised with high design freedom capabilities may also augment the consumer’s perceived control.

Franke, Schreier & Kaiser (2010) manipulated design freedom in one of their experiments by using two watch toolkits. The first one offered several backgrounds, colors, face designs and styles; whereas the second toolkit extended design freedom by adding attributes, such as the ability to upload pictures and create new designs, enabling participants greater autonomy to modify their watch faces. The results demonstrated that the second toolkit leads to higher perception of individual contribution, measured as perceived control. In addition, respondents were willing to pay more in the “high degree of freedom” condition, than was the case in the “low degree of freedom” condition, even when preference fit and process costs were controlled. Consequently, offering a high level of freedom might have a positive influence on the MC user’s co-design value by increasing his perceived control.

To the best of our knowledge, no study has attempted to analyze the influence of degree of freedom on enjoyment. We can hypothesize that the greater the degree of freedom, the more enjoyment the consumer derives from the configuration experience. However, increasing the degree of freedom also influences perceived experiential costs. The caveat here is that the consumer must already possess the proficiency to cope with a more “open source” toolkit, or be taught such skills. Expertise toward the product category and toward the task of designing might have a moderating effect on these relationships.

One additional aspect of a MC configurator’s design freedom is another of Dellaert & Dabholkar’s (2009) “complementary services”, the ability for the user to engage in product adaptation, that is, “giving consumers the opportunity to have their product

altered or replaced free of charge in case it fails to meet their expectations.” Lowering the risk of using the toolkit reduces consumer uncertainty and reticence to engage in an experience that may yield unwanted costs of doing business with the firm, namely the time and effort involved in processing returns, final sale policies, etc. In addition, the ability to return or change an item sans restrictions, or adapt it to one’s needs, fosters control over the transaction because the MC user has the power to decide the ultimate fate of her experience of and outcome from the co-design process. Complexity is lowered by product adaptation because the ability to easily modify, alter, exchange or return an item reduces cognitive effort, difficulty and uncertainty associated with “virtual” MC transactions. In addition, due to its being interactive and complementary to other features of the MC toolkit, product adaptation enhances perceived enjoyment. Dellaert & Dabholkar proved that perceived enjoyment, control and complexity fully mediate the effect of product adaptation.

### 3.2. Feedback

Toolkits should be interactive, allowing customers “to visualize and experience customized products prior to purchase or to learn from the experience of others” (Arora, et al., 2008). Therefore, they should be designed with features that enable the user to obtain feedback about the co-design process and positive reinforcement about her progress through her self-design experience. In evaluating the empirical evidence, we identify two types of feedback. One type, which we term embedded feedback, is a mechanism integrated into the toolkit for use during the co-design process. Scholars place significance on trial-and-error as one of these elements (Franke & Piller, 2004; Franke, Keinz & Schreier, 2008; Salvador, et al., 2009; Franke, Schreier & Kaiser, 2010) and visualization as another (Dellaert & Dabholkar, 2009). We identify the other type of feedback as interpersonal feedback, that is, advice, assistance or interaction sought from individuals during the self-design process about MC tasks and outcomes. Specifically, two major elements cited by empirical studies include peer input/user communities (Franke, Keinz & Schreier, 2008; Franke, Schreier & Kaiser, 2010) and salesperson interaction (Dellaert & Dabholkar, 2009).

**3.2.1. Embedded Feedback: Trial-and-Error.** Theoretically, trial-and-error processes should lower complexity, enhance enjoyment and promote

psychological ownership (Franke & Piller, 2004; Salvador, et al., 2009). By allowing an individual to solve a problem through repeated attempts at doing so, the MC user learns how to navigate the configurator. She “matches and tests” her selections relative to the “available solutions” (2009). According to Franke & Piller (2004), “trial-and-error experimentation” is one of the “success factors” in the design of the MC toolkit. Salvador, et al., (2009) delineate three capabilities MC configurators must possess, one of those to support customers in identifying their own solutions, further reducing the cognitive effort and uncertainty associated with having to consider too many choices. This capability promotes an easier co-design experience via “assortment matching software” which connects user-designated needs to recommended options, and through an “embedded configuration” which makes the co-design process dynamic and easy because it “allows product models to adapt and reconfigure” to the user’s selections (2009).

In their seminal work on WTP, Franke & Piller (2004) describe a toolkit as “a design interface that enables trial-and-error experimentation and gives simulated feedback on the outcome”. The scholars employed “a relatively simple, design-focused toolkit ... [for] four experiments where ... subjects ... actually created their own watches”. Franke & Piller emphasized that the best design solutions require “the innovator ... be informed about all of the possibilities at ... his disposal ... try out various possibilities, learn from errors, compare different solutions, and thus engage in a time-consuming, step-by-step learning process. Toolkits provide just such a setting for trial-and-error learning” presenting rich opportunities to alleviate complexity involved in the co-design process.

Franke, Keinz & Schreier (2008) support their associates’ view. They describe the toolkit as “a set of user-friendly design tools which allow trial-and-error experimentation processes”. In their work on peer input, the authors observe that a trial-and-error process that is not “goal directed” ... “is a time-consuming cognitive burden”. This is especially so for novice MC users who have no outside support system to consult about previous designs, like that of fashion designers or architects who constantly search for inspiration in colleagues and other professionals’ works.

**3.2.2. Embedded Feedback: Visualization.** Dellaert & Dabholkar’s (2009) scenarios experiment revealed that toolkits designed to provide the MC user instantaneous visualization throughout the entire

co-design process significantly increase perceived control and enjoyment while decreasing the perceived cost of the co-design experience. In fact, of all the complementary services the authors studied, visualization is the most important in consumers' decisions to utilize MC. This type of feedback enables the MC user to get as close as possible to "personal examination" of his design creation since he cannot go to a store to see the outcome of his efforts. By being able to see his design at every stage of his co-design experience, the consumer gains a greater understanding of the process and its effects on his self-designed item. Visualization reduces uncertainty by offering "clearer decision progress cues" that help the consumer manage his outcome. He "creates vivid mental images" that equip him to exert greater control over the configuration experience. With regard to enjoyment, consumers "may become more immersed in the mass customization experience due to visual cues they themselves can manipulate [and] ... enjoy attractive visualization for its own sake ... enriching the mass customization experience and mak[ing] it more enjoyable". Dellaert & Dabholkar's study revealed that cost-benefit perceptions partially mediate the effect of visualization.

**3.2.3. Interpersonal Feedback: Peer Input/User Communities.** The MC user benefits from access to examples of products designed by previous customers, allowing her to see the possibilities her choices may yield (Salvador, et al., 2009). The MC toolkit should be user-friendly and "deliver immediate simulated feedback on the outcome of design ideas" (Franke, Keinz & Schreier, 2008). These definitions describe feedback via peer input and user communities that lower the consumer's perception of complexity. Franke, Keinz & Schreier's (2008) studies divide the co-design process into three phases, of which one controlled experiment concentrates on Phase 1, the stage of the MC user's "initial idea"; and the other on Phase 3, the conclusion of the self-design process in the form of the consumer's preliminary design outcome. Franke, Keinz & Schreier conducted two controlled experiments. The first, concentrated on Phase 1, had two groups of subjects design their own skis. One group had access to a library of peer designs while the other did not. Results yielded that peer input is vital at Phase 1 because at this point, "customer-generated sample solutions" ease the MC user into the co-design process through use of other customers who had gone through the experience. Because use of the library prompted the MC user to incorporate

these designs or "solution chunks" into her co-design process, the more often she did so, "the better the customer's perceived outcome" became.

The focus of Franke, Keinz & Schreier's (2008) second study, Phase 3, is the point at which the MC user completes her preliminary design. The authors divided participants into two groups: one received feedback from peers on their preliminary designs and the other did not. At this "near-conclusion" stage of the co-design experience, the user can evaluate her self-designed item with the help of others. The use of peer input at this stage of the MC process also prompts the consumer to incorporate that feedback into her configuration experience; the more she does so, the better her perceived outcome.

Thus, Franke, Keinz & Schreier (2008) concluded that "peer input" lowers complexity by "stimulating more systematic ... favorable problem-solving behavior". Positive peer input and user community feedback enhance the MC user's enjoyment of the co-design process. Franke, Schreier & Kaiser's (2010) studies on the "I designed it myself" effect revealed that such feedback acts as a positive reinforcement to "the user's role as creator".

**3.2.4. Interpersonal Feedback: Salesperson Interaction.** MC configurators that offer consumers opportunities to interact with sales personnel positively affect control and enjoyment while decreasing perceived complexity (Dellaert & Dabholkar, 2009). Results of the authors' study on complementary services proved that these cost-benefit perceptions fully mediate the effect of salesperson interaction. The ability to talk to, interact with and obtain feedback from someone trained to assist a customer in obtaining a smooth MC experience enhances the consumer's understanding of the toolkit and her creative options; but such also assists her in arriving at an outcome that might best meet her preferences. "Salesperson interaction offers meaningful feedback and allows for direct responses that can be used to immediately clarify potential difficulties, thereby ... reducing complexity" by mitigating uncertainty. Interface with a salesperson can empower the MC user by increasing his self-design competency to generate his own solution, thereby increasing his control over the toolkit process. Lastly, Dellaert & Dabholkar, note that the "social aspect of a salesperson interaction" can enhance enjoyment, but such interfaces must be "cooperative in nature".

### 3.3. Comparative Elements

Toolkit components that allow a user to compare, evaluate and select combinations of configuration options are comparative elements of the co-design mechanism. Specifically, such features include the ability to compare popular packages to individual modules, availability of a default version the MC user can compare to his design, and pricing of combinations of options on versus a la carte pricing of individual options (Dellaert & Stremersch, 2005).

We know that the plethora of alternatives the co-design process offers the consumer can be confusing to her. This makes the experience frustrating and more effortful, increasing the customer's perception of the complexity of the choice. Dellaert & Stremersch (2005) proved that when customers are presented with "prepackaged" groups of choices, rather than with several individually presented selections, MC users opt for the simpler grouping of options.

The scholars propose two additional design requirements, individual pricing of modules and the type and availability of a default version of the potential outcome of the MC process (Dellaert & Stremersch, 2005). When the toolkit offers the MC user opportunities to compare her designs to default versions, the user's perceived complexity was lowered, especially when her self-design was closer to her "ideal product". The same result was found relative to pricing modules as package alternatives, rather than on an a la carte, individual basis.

## 4. Conclusion

The aim of this literature review was to emphasize and compile what we know from the scientific literature regarding how to assess and increase the value of a mass customization experience. We identified the four main variables that need to be taken into account when evaluating a co-design experience from the consumer's viewpoint - complexity, control, enjoyment and psychological ownership. Indeed, scholars have proven that these variables have influenced several outcomes, like WTP for the mass-customized product or willingness to engage in the co-design experience. Additionally,

we focused on the ways in which firms can manage toolkit design in order to increase control, enjoyment and psychological ownership while reducing complexity. We show that several features related to the scope of customization, feedback and comparative elements might have an effect on some of these variables.

Empirical studies have provided significant insights into our understanding of how the consumer values the co-design experience and how to increase this value. However, these studies are few in number. Several issues still require empirical research. For instance, scholars have little insight into how, if at all, individual idiosyncrasies or personality traits shape the MC customer's perception of cost/benefit variables of the configuration experience (Dellaert & Dabholkar, 2009; Franke, Schreier & Kaiser, 2010).

What factors influence a user prior to engaging in the co-design process that impact their perceptions of experiential value and ultimate satisfaction with the MC experience? For example, given what scholars know about the learning effect and its enhancement of an individual's expertise, we should explore how to determine and measure the point at which advancing from novice to expert begins to reduce the user's perceived complexity. What mechanisms in toolkit design would encourage a consumer to engage in prior training on the configurator? Are there variables that influence the user's motivation to "educate" her to use or enhance her use of the MC toolkit? Insight into whether psychological ownership really "reflects the [user's] true preference function" would help firms shape the capabilities of their MC configurators (Franke, Schreier & Kaiser, 2010). Further, these authors note that there is "no empirical research" on how peer feedback and user communities influence the "I designed it myself" effect (2010).

Not only must further scientific research be conducted, it must delve deeper into the facets of the individual's cost/benefit evaluation of the experience. Such should further investigate and identify specific toolkit design mechanisms that effectively increase the value of MC for the consumer. A plethora of opportunities exists for extending our theoretical understanding and practical applications of how to maximize, and optimize, the consumer's value of, and satisfaction with, the MC co-design experience.

**Table 1. MC Toolkit Features' Effect on Consumer's Cost/Benefit Perceptions of the Co-Design Experience**  
(based upon extant empirical studies)

Category of Features	Effect on Perceived Cost/Benefit			
	<u>Complexity</u>	<u>Control</u>	<u>Enjoyment</u>	<u>Psychological Ownership</u>
<b>Scope of Customization</b>			(+) F&P '04	(+) F&S '08
Number of Modules	(ns) D&S '05			
Range of Options	(ns) D&S '05			
	(+) D&D '09	(+) D&D '09	(+) D&D '09	
Design Freedom		(+) FSK '10		(+) FSK '10
- Product Adaptation	(-) D&D '09	(+) D&D '09	(+) D&D '09	
<b>Feedback</b>				
Embedded Feedback				
- Visualization	(-) D&D '09	(+) D&D '09	(+) D&D '09	
- Trial & Error Mechanism (incl. recommender systems, smart agents)	(-) F&P '04 (-) FKS '08			
Interpersonal Feedback				
- Peer Input (via module libraries)	(-) FKS '08		(+) FKS '08	(+) FSK '10
- Peer Feedback (on user designs)	(-) FKS '08		(+) FKS '08	(+) FSK '10
- Salesperson Interaction	(-) D&D '09	(+) D&D '09	(+) D&D '09	
<b>Comparative Elements</b>				
Popular Module Package Levels vs. Individual Modules	(-) D&S '05			
Default Version vs. User Co-Designed Version	(-) D&S '05			
Package Pricing vs. A La Carte Pricing of Individual Modules	(-) D&S '05			

**Legend:** (+) increases variable; (-) decreases variable; (ns) no significant effect on variable. **Abbreviated Sources:** D&D: Dellaert & Dabholkar, 2009; D&S: Dellaert & Stremersch, 2005; F&P: Franke & Piller, 2004; F&S: Franke & Schreier, 2008; FKS: Franke, Keinz & Schreier, 2008; FSK: Franke, Schreier & Kaiser, 2010.

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