

# Design of Experience: Measuring the Co-production with the Consumer Engagement during the Product Development Process

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**Abstract.** The literature discusses about the coproduction of value, emphasizing the involvement of consumers in Product Development Processes (PDP). This concept is associated with the interaction of consumers in creating value for the PDP. Thus, this paper discusses the measurement of user experience as an important factor for the coproduction of value through mechanisms that measure the usability of products. Thus, the User Experience can be treated as a core competency in design management within organizations. This study was conducted through literature review of the principles of Design and Management, User Centered Design, User Experience and about the function of the design department market research through mechanisms of consumer involvement. Shows the correlation of these approaches and issues for further research aimed at Measuring the User Experience with results that can enable feedback into the process of developing new products or incremental and radical innovation.

**Keywords:** Experience, User, Design Management.

## 1 Introduction

The measurement of user experience is an important factor for the coproduction of value in the PDP. Within the Department of Design, the sub-department of Design and Usability, must articulate the mechanisms for measuring the interaction process between users and products, in order to define the User Experience as a core competency in design management within organizations.

In the last decade, has emerged in the literature Marketing discussion on coproduction of value, especially the involvement of consumers in the Product Development Process (PDP), a concept associated with the interaction and integration of consumers in the process of value creation.

In this paper, the two main strands, derived from the approach of two books that have authors from different backgrounds. The first approach values the coproduction of user value in the design process presented by Tullis and Albert (2008) [11], and another study emphasizes the management of design, where design is used to build value and innovation, discussed by economist Brigitte Borja de Mozota et al (2011)

[8]. The arguments that will be presented complement and demonstrate the vision of each author as his experience and knowledge of the subject. This paper also presents views of other authors to corroborate with these thoughts.

The book *Design Management* [8] offers an approach that values the integration of values, creativity, ethics and innovations in the design process that helps the general administration. In this context, the process of design management can contribute to the company's performance and impacts the corporate vision. This strategic management can enable better integration of design organizations and implement design projects through incremental or radical innovations.

The book "The Measuring User Experience" [11] in turn, presents an approach which values the integration of aspects of creativity and innovation through co-production of value by consumers. This acts as a cooperating partner in building design. This involvement decisively influences the design and also requires attention of the company, combining this process with strategic management of design, aiming to find mechanisms to provide feedback to the creative process and innovation, measuring the user experience through usability of products, so it is the contribution of the user, while codesigner as an agent articulator of success in products. This is an important factor to be considered in design management.

Therefore, this paper proposes discussions about the approaches of the two selected books, but also has the vision of others. Finally, this discussion presents final considerations that point to new research questions.

## 2 Design and Management

The design is a creative activity whose aim is to establish the multi-faceted qualities of objects, processes, services and their systems in whole life cycles. Therefore, design is the central factor of innovative humanization of technologies and the crucial factor of cultural and economic exchanges [8]. Thus, the management of the design is a specific area of the design and is interested in the place occupied by design in an organization, identifying specific design disciplines that are relevant to solving important problems, and training of senior managers in the efficient use of design.

With the emergence of awards for excellence in design, are revealed four core criteria of evaluation for good design [8]: Functionality e efficiency; Aesthetic appeal; Ease of use and convenience to the user; Establishing new standards.

Tullis & Albert [11] corroborate the central criteria for assessing good design when presenting usability metrics that are methods for measuring the perception and user experience with respect to these factors, identifying the process of interaction with products, so to consider the effectiveness, efficiency and satisfaction. The authors note that the metrics are centered on users and should be carefully planned in conjunction with the usability study. The Metrics evaluate attitudes and behavioral aspects, and not the products alone. The metrics assist designers to make decisions based on data obtained through usability testing with users, made to measure qualitative and quantitative criteria to be subsidies during the PDP.

### 3 The User-Centered Design

Mozota et al. [8] discuss that before the development of new products or any innovation is important to know the users and their needs. Projects need to be user-centric. Thus, the launch of new products has been observed and studied by students and professionals in the areas of Marketing and Design as a strategy for companies seeking to gain competitive advantages over their competitors.

Given this context, it is the importance of development strategies [10-4], to investigate mechanisms that contribute to the success of new products. It should also consider some studies on market orientation suggest that products developed with guidance to consumers have better market performance [5-1-10-2-6]. In this sense, the design is redefined in terms of user experience, and that it operates in "co-design" [8]. So, based on your needs and expectations, the design becomes more defined not only by aesthetic criteria, functional and formal, but also adding experience design.

The development of consumer observation techniques enables an organization to "hear the voice of the user" through videos, photos, identification of problems and models. The designers are brought together expert market and establish relationships more intimate with consumers. Thus, there is an effort to develop enterprise lead prototypes and testing in order to measure the results derived from the use of the product [8].

Tullis & Albert [11] presents in his book many stories that demonstrate that the measurement of product usability can really save lives, bankrupt companies, and has a tremendous impact on society in general. Exemplify that usability can mean the difference between life and death. They cite, for example, that the health industry is not immune to poor usability and discourse that usability problems are still abundant in medical devices, procedures and diagnostic tools. Usability is more important than most people think. Not only influences the use of a website, a software, or the latest technology. The usability is about creating a product or graphic communication, is involved when someone drives a car that never ran, and the impact of usability are felt every day. The usability across cultures, age, gender and economic class.

Still, "The ergonomics and interface between machine and human are the main field of many designers and often means a gateway to the company" [8]. Within this approach to design management develops skills that go beyond ergonomics adapted to the body and reaching the perceptual dimensions of users.

#### 3.1 The User as Designer

Mozota et al [8] emphasizes that the design manager should make the design process more interactive, it must meet the demands of individual customers and maintain a database of its features, but also constantly developing the customer experience. The design management must put the client in the position of "co-producer of the offer". Should be developed assessment methods oriented to the user because: "All companies are in the business of perception. They live for their customers regularly and have an active role in their evaluation processes, that means creating a way to measure the perceived value of design aggregator" [8].

The design must integrate information about the needs of users in different phases of PDP, identifying [8]: Information about formal specifications; Information from tests, especially in complex projects; Informal information generated by designers during the creative process. A comparison of the performance of existing solutions in order to define the specifications, an overview of the heterogeneous needs of the consumer and its hierarchical organization.

Tullis & Albert [11] present techniques to measure user experience and seek to integrate the information needs of users, from usability testing, in order to collect self-report data concerning the perception. In this sense, show that the most efficient way to collect self-reports (Self-Reported Metrics) in a usability test is the Rating Scale. In this collection are made: open questions, which can be very useful, but are difficult to analyze and tabulate. However, interesting comments allow for improvements in products or systems, two of the classic rating scales can be applied - Likert and Semantic Differential [11].

The Likert Scale is subjective and establishes the level of agreement or disagreement that users have the interface with products or systems. From the scale positions obtain positive or negative aspect with respect to the product and typically is a 5 point scale according to the following parameters:

1. I totally disagree
2. Disagree
3. I do not agree, nor disagree
4. I agree
5. I fully agree

In Likert Scale is important not to use adverbs as very, extremely, absolutely, or use unmodified versions of adjectives. For example, declaring: "This site is beautiful" can produce results that are quite different to say: "This site is absolutely beautiful".

The Semantic Differential Scale is performed with the presentation of adjectives opposites / antonyms, such as the following: weak / strong; ugly / beautiful; cold / warm and dark / light.

The authors comment that the two best stages to collect self-reports are at the end of each task and the end of the session complete. Thus:

- Quick evaluations immediately after each task can help in the analysis of ad hoc tasks and characteristics of the interface are particularly problematic for the user.
- Deep evaluations and open questions at the end of the session can provide a comprehensive evaluation more effective because the participant had the opportunity to interact with the product more thoroughly.

Tullis & Albert [11] also attest that when the user answers questions or provides assessments orally, can be induced to some answers. However show that:

- Provide answers using some type of software tool, can corroborate to prevent induction.
- Provide answers orally may be the easiest method from the point of view of the participant and the observer can record the answers. This works better and faster.

- Printed forms are generally easier to create than online forms, but involve the completion data manually, including the potential for interpretation errors.
- Online forms are becoming easier to create, as evidenced by the number of web-based tools for creating questionnaires. In this new context, participants are increasingly accustomed to using online forms. There are some online platforms where forms can be created easily, such as: SnapSurveys, SurveyGizmo, SurveyMonkey, Zoomerang and SurveyShare.
- Collections of self-reports personally or by phone can have more positive results than when collected anonymously.
- When testing for usability lab, we can let the user to isolate it to respond to questions without influence observers.

However, the authors [11] still remember that compile answers open questions is always a difficult challenge. There is no magic solution to do this quickly and easily. Facilitates open questions to guide the focus, for example, a question that asks participants to describe all the things they found confusing about the interface, it will be easier to analyze than a field general comments. And also, punctual evaluations possible to recognize product specifications that can be improved, hardly recognized the global evaluation at the end of the session.

## 4 The Design of Experience as a Competence Center

Companies wishing to develop their capacity for innovation must seek alternatives to complement the traditional techniques of market research [10]. In this context, the involvement of consumers in PDP has been investigated as an alternative technique to collect valuable information and for measurement of user experience as a core competency for business seeking a competitive advantage through the launch innovative products [3-9-7].

The user interacts with the products and services, and the knowledge that the customer has a product is internalized by their perception of the product. Their behavior is then determined by how it perceives the products and services around them. Thus, the design plays an essential role because it promotes differentiation visual which is perceived by the end consumer, and the shape of the product significant influence on user behavior [8].

In this context, studies on usability and experience design has applicability in business, they are a key factor in design. Tullis & Albert [11] show that the definitions of usability, share some common themes as: the involvement of a user, the user in some activity and the relationship of the user with a system or product.

Some researchers differentiate the terms usability and user experience. Given that the term usability is generally considered the user capacity to use something, and the ability to perform a task successfully. Already, the user experience has a broader view, looking at the interaction of the person as a whole in relation to objects or services, as well as the thoughts, feelings, and perceptions that result from this interaction. The authors have a broad view of usability and user experience analysis. So when talking to “measure usability” are really attentive to the user experience.

Still Design Management Book [8] provides a general framework to represent the impact of design on consumer behavior. In this sense, the dominant model of information processing is contrasted with an experiential vision, focused on symbolic nature, aesthetic and hedonistic consumption. This view considers the experiences of consumption as a phenomenon directed to the search for fantasies, feelings and fun. This is an expanded model of consumer behavior, the consumer does not take decision, but part of an experiment. Thus, the shape of the product design induces behavior and perception of the consumer, thus reflects the shape an emotion, a message and a relation in cognition.

The consumer response to a shape-design is determined by two distinct styles of information processing: the cognitive and preference. Research on individual differences in behavior of the consumer first incorporate measures of verbal responses of consumers, other expand research including a holistic view of the processing of visual information by the consumer. The Visual Processing - especially the mental image - is a strong facilitator of information acquisition. The mental image is a model of internal learning, individualized for each consumer, who can attest to your mental image with a particular verbal response or graphical [8]. However, the design of products is associated with positive and pleasurable experiences. The goal is to promote positive reactions in consumers and not negative reactions. These affective responses can be in reaction to overall shape (or gestalt processing) or related to individual design elements.

## 5 The Department of Design and Market Research

The structure of a design department is divided into: product design, service design prospective, creative support and administration. Given that the management of a design department aims to provide the designer and manager methods and tools for integrating design with success, and leadership requires the following requirements [8]: develop competence in three different directions - creativity, user interface and technology; build a team of experts from design advanced to the redesign, requiring different skills and personalities; seek consistency in goals, tasks and time.

The design manager is responsible for creating a customer-oriented company with [8]: development of user observation techniques; design to minimize resistance to change; Knowledge of developing user interface; design of an information system user-centered; evaluation methods oriented to the user.

Given this perspective, the marketing research within design adopts a variety of approaches and research topics focused on the user. In this direction, the design methods used in the creative process become useful for the optimization of marketing research in three directions: the diffusion model fashion marketing, conventional research methods, and emergency tools that measure the perception [8].

The design enriches research in marketing because it provides a new way to segment the market, according to the perceptual and aesthetic preferences of the consumer, improving research of consumer behavior. Thus, a shape design is perceived as input of marketing and can be measured in two different dimensions: cognitive/emotional and behavioral - and play a role as segmentation tool offering models for analyzing attributes of the product according to the design attributes [8].

The traditional methods of marketing can be enriched by such questions as: mechanisms of appropriation of the object in the consumer's life, symbols of value in new social groups and finally with studies of consumer tastes and design experience [8]. Still the authors emphasize that designers bring to the marketing research talent for observation. Ethnographic analysis is the observation spot, without that user knowing. This technique provides a more individualized consumer behavior. The design develops tools for research of consumer behavior based on observation (through videos, especially the interface design), with the help of experts in ergonomics, anthropology and social psychology.

### 5.1 Tools for Measuring Experience

The design manager is responsible for supervising operations in order to emphasize customer insight in the creative process, minimize the perceived risks, strengthen the role of interface with the customer in the design process, make him participate as codesigner and establish a system information and evaluation tools customer oriented [8].

In the context of evaluation tools oriented to the customer, the usability appears as a expand theme [11], as a science in which there are several approaches focus on specific aspects of the use (or user experience) with the product. And, like all science the usability presents ways to transform knowledge in data, whether quantitative or qualitative. One of the ways this knowledge conversion occurs through the use of usability metrics. Thus, the authors developed a guide metrics, classifying them into four groups: performance metrics, metrics based on usability issues, self-reported metrics, behavioral and physiological metrics. These metrics can be summarized as follows:

- Performance Metrics: Evaluates aspects of specific tasks already planned in test use, considering aspects like efficiency and effectiveness. Evaluates: success of the task, task time (compared with expert time), number of errors (compared to expert), efficiency (quantity of effort required to complete the task) and level of learning (learning curve).
- Metrics based usability problems: They help to detect and identify usability problems. Users verbalize tasks; classification hierarchies based on experience or combined factors of the product, identify trends of usability issues from the specific selection of participants, tasks, methods, artifacts, environments and moderators.
- Self-report Metrics: The data collection occurs from reports made by the users. This analysis tool may be applied before, during or after tasks and the answers may be oral, textual, questionnaire, etc.
- Behavioral and physiological metrics: Data collected start from information not explicitly said or consciously planned. It is crucial observation and attention of the investigator (or more than one researcher), and can also use capture equipment. Behaviors can be evaluated as gestures, expressions, heartbeat, focus the eyes of the user (such as eye tracking equipment), pupillary reaction, and others.

Also regarding the tools used to measure user perception there is a questionnaire post-use scenario [11], which has a set of three scales for evaluating the user experience:

- I am satisfied with the ease of completing the tasks in this scenario.
- I am satisfied with the quantity of time it took to complete the tasks in this scenario.
- I am satisfied with the support information (on-line help, messages, documentation) to complete the tasks.

## 6 Strategic Management of Design: A Market-Oriented Strategy

A market oriented strategy is as a process in which companies should specialize in one segment or have a focus strategy. In this direction, their competitive advantage is guaranteed by the leadership in the understanding of a particular market or a certain type of user [8]. Thus, the design should reinforce this leadership in finding improvements and functional differences in the dimensions of the product, adapting their uses, but also anticipating new uses. In this way, this development leads to: behavior differentiated aesthetic that emphasizes the functional dimension of design: use, user interface and user experience; positioning of design between production and marketing; a design strategy that focuses on product design and research of consumer behavior.

In this perspective, Tullis & Albert [11] indicate that self-reported metrics for measuring the perception may be an important tool in the search for aspects of the user interface with the product. Given this, the most obvious way to learn about the usability of something is to ask users about their experience. In this way, metrics are self-reported subjective data and user preferences. With the application of this type of metric, a list of factors can be carefully evaluated, such as:

- product attributes;
- list of things the user like most about the product or system;
- general satisfaction;
- ease of use;
- efficiency;
- awareness of certain characteristics;
- clarity of action;
- visual terminology;
- familiarity.

The Familiarity (number of experiences that a consumer has with a product) and knowledge (ability to succeed in the functions of the product) create distinctions between categories of products that are perceived differently by consumers [8].

In self-report metrics are evaluated aspects of the users' perception regarding the product or system and their interaction, and it is evident [11]:

- the emotional level, as users feel;
- experience that makes you happy and that may be the only thing that matters to the interface;
- make the user think first on your product.



## 7 Discussion

The book “Design Management” [8] emphasizes the design in strategic management process, in order to identify better integration of design in organizations. The book “Measuring the User Experience” [11] presents an approach that emphasizes co-production of value through user involvement in PDP.

In this sense, the books complement each other because Design Management addresses the design as a key factor for success in organizations. Already, Measuring the User Experience discusses the consumer as codesigner as a collaborator in building design. In this way, the measurement of user experience should be part of strategic management of design, to find mechanisms that give feedback to the creative process and innovation.

However, the book Design Management presents how to structure the design process within the company, how to structure the design department and the articulation of its core competencies. The book Measuring The User Experience presents the measurement of experience as an intrinsic factor to the PDP, showing tools for data collection of user perception and its relationship with usability in interface products. However, from the two approaches proposed in the books, get up some research questions that may assist in formulating a strategy Design that complements the measurement of user experience as a core competency. In this way, future research may look: How is it possible to obtain good data to measure the user experience and what the best mechanisms for consumer involvement in PDP? How is it possible to create a strategic management model oriented market that emphasizes consumer involvement in the process of co-production of value in your design?

How to coordinate through design a model of Research and Development, using mechanisms for consumer involvement in order to determine the contribution of design in various stages of the PDP? How to measure the intensity levels of this co-production of value?

## 8 Conclusions

This study emphasized that the measurement of user experience can be an important factor in the coproduction of value within PDP, where the Design Department must plan the involvement of users in interface products, and collect data on their perception and experience. The Design Department must find a better way to develop a strategy for measuring the User Experience within organizations, and this strategy can become a core competency in design management

The visions [8-11] seem to be complementary because the book Design Management addresses the design as a key factor for success in organizations and Measuring the User Experience book addresses the consumer as codesigner as a collaborator in construction of design. Therefore, the measurement of user experience should be part of strategic management of design, aiming to find mechanisms that give feedback to the creative process and innovation.

The design process should be an iterative process, which attends the demands of individual customers and constantly develops user experience. Thus, the management of the design should put the client in the position of "co-producer of the offer." However, it appears that the user experience corroborates for Design, by measuring the usability of the products within the PDP, from methods and evaluation tools oriented to the user, and is intrinsic to Design Management, which in instead, corroborates strategies that help the general administration.

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