

User involvement in product and service development: a literature review

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Abstract

A number of papers have introduced cases where users were incorporated into product or service development processes of companies. However, this literature is scattered and there is no consensus on how knowledge is created and learning achieved with users and then transferred within the organization. This paper provides a review to the literature surrounding user involvement in product and service development. The findings of a literature review are visualized into a framework where different product and service development processes and the stages of involvement are depicted. The visualization provided is of help to academics aiming for a shared context when discussing user involvement, and to managers who deal with user involvement in their jobs. The article seeks to find a common denominator in literature so that especially the suggested timing for involvement of users can be exposed.

Keywords: *User involvement, product development process, innovation*

1 Introduction

This article provides a literature review to user involvement literature in product and service development. Users of products and services are being involved in their development processes in order to avoid costly failures and make sure there is a demand for the services and products being created [1]. Current research in the field is extensive, but there is a lack of consensus in terms of a common product or service development process. Also, what is meant by “user involvement” varies widely among the work of different authors. This article aims at developing a clearer understanding within the topic by seeking answers to the following research questions:

1. What is user involvement in product and service development?
2. When to involve users in the product and service development processes of companies?

To answer the first question, a vast amount of academic literature is presented. The second question is answered on the basis of academic literature of which the findings will be depicted on a figure illustrating the product or service development process the authors are referring to.

The depiction also shows the stages of those processes in which the writers propose users should be involved. The article consists of six chapters, including the introduction. The second chapter presents the methods, and the third is the literature review, where user involvement literature is presented with a focus to the timing of involvement. In the fourth chapter, the analysis and the depiction developed as a result of the research is presented. The fifth chapter is the discussion and conclusion.

2 Methods

In searching the articles to be considered, search words such as “user involvement” and “users in product development”, “users in service development”, “customer involvement in product development”, “customer involvement in service development”, and “user involvement in new product development” were used. Google Scholar was relied upon when finding relevant articles, and Scholar directed us to databases such as Springer, Taylor Francis Online, ProQuest, InderScience Publishers and Emerald Insight. Relevant articles were found also in the reference lists of articles found in the initial online search. In total 60 full-text articles were found, and the articles with the most relevant abstracts and titles were favored in the selection of which articles to include in the final literature review. The literature review presents several articles, where suggestions about when to involve users in the product or service development processes were given. Those articles that differentiated among steps or stages in the product or service development process were depicted on the framework. Those that did not refer to a specific process [2, 3], were plotted in the figure in a dotted line. The framework is created with the same logic as Ulrich and Eppinger’s representation of a product development process [4]. The authors propose that a product development process begins with a perception of the market opportunity and ends in production, sale and delivery of a product. The different phases in their process are: 0) Planning, 1) Concept Development, 2) System-Level Design, 3) Detail Design, 4) Testing and Refinement and 5) Production Ramp-Up.

3 User involvement

Companies today are more and more concerned about providing customers with products and services that meet their needs better than competitors’ solutions. This has led to an increasing interest towards market orientation, so that companies can better understand customers’ needs [e.g. 5–7]. Especially for technology-based service companies, ascertaining customers’ needs is difficult as most users have limited technological knowledge and therefore find it hard to articulate their ideas about what would create surplus value for them [5]. If users or customers are the persons who decide whether or not a product idea represents a unique way of meeting their needs, then users and customers should be regarded as a valuable source to initiate new ideas – and should be involved in the development process [8]. Customers also benefit from having a both useful and usable product or service, which requires less training, and increases productivity [9]. User involvement literature has for long been concentrated in product development, service development literature having provided only a limited number of articles within the topic [10, 11]. Services are often stated to possess unique qualities (intangibility, heterogeneity, perishability and inseparability [12]) and it has been argued that services involve customers in their delivery and often require a longer commitment with customers [10]. Therefore, the involvement of users is proposed to be even a more important consideration in service rather than product development [10].

A general way to categorize user involvement in the design process of products or services is to differentiate among three approaches: *user-centered design*, *participatory design*, and *user innovation*. *User-centered design*, often also called human-centered design, is a practice where users are actively involved in the design process so that user and task requirements are clearly

understood [13]. Design solutions are iterated and designed multi-disciplinarily (i.e. relating to multiple areas of study) and functions are allocated appropriately between users and technology [13]. This means that the design team tries to identify and understand customer needs and develop their design based on these – however the users are not actively taking part in the actual design process. The core idea of *participatory design* is that “the people destined to *use* the system play a critical role in *designing* it” [14]. In this approach users are regarded as experts who know best how to improve their work and their work life, hence reversing traditional designer-user roles [14]. The third approach, *user innovation*, differs from the two previously presented ones in a sense that the user creates solutions by themselves with or without the designer [15]. The user creates own solutions before the bulk of the target market [15], and manufacturers may or may not be responsible for the commercialization of products [16].

The mainstream of literature about user involvement often assumes that involving customers or users to the new product and service development process is beneficial for the company [e.g. 17, 18]. However, it is very important for the firm intending to incorporate users into their product development to make conscious choices about which users to involve: which users are the ones with relevant development ideas [e.g. 18, 19]. The trouble related to user involvement is the lack of clarity in the actual ways to involve customers or users to the company’s processes. Next, we will first provide an outlook on literature about user involvement and then take a look at the timing of user involvement.

3.1 What is involvement?

A number of papers have introduced cases where users were incorporated into the service or product development processes of companies. However, this literature is scattered and there is no consensus on how knowledge is created and learning achieved with real or potential customers and then transferred within the organization [11]. In some articles, involvement is regarded as full-on participation into the product or service development process, and in others, involvement only means providing ideas for future implementation [e.g. 5, 20, 21].

Some common principles for user involvement can be pointed out from literature. An early review by Ives and Olson [21] proposes that user involvement suits best the kind of problems that are unstructured, or cases where user acceptance is important. The authors propose that the outcomes of user involvement are affected by two variables: cognitive factors (influencing the understanding of the system and its features) and motivational factors (influencing the commitment to the new system). The framework has been taken further later by Gruner and Homburg [22] who claim that the depth of the involvement is linked to the stage in which customers are interacting with the company. Also Brockhoff [23] recognizes the depth of user involvement as an important question: the degree of involvement can be categorized with respect to the needed efforts and cost level incurring for the company.

User involvement is often seen as a means to achieve organizational learning [e.g. 2, 24]. Organizational learning happens via a four-step process: 1) knowledge acquisition, 2) information distribution, 3) information interpretation and 4) storing of information into organizational memory [25]. Companies wishing to become learning organizations should aim to develop long-term relationships with their customers so that information can be stored in the organizational memory [2]. Continuous execution, evaluation and improvement of market information processing should be embedded in each worker’s mental maps so that present and future market requirements, competitor analysis and internal coordination would be part of each day [24].

The characteristics of the user being involved is a question addressed by many. Lettl [26] even argues that one of the most important capabilities for firms willing to innovate is the competence to involve the 'right' users at the 'right' time in the 'right' form. Enkel [27] categorizes customer involvement in terms of both the stage of involvement as well as the kind of customer who is involved. The author suggests that lead users could be integrated to the product development process from the earliest to the last phases, whereas customers providing suggestions and complaints would be integrated only at the latter phases, where no more innovation and concept development occur. Peng and Finn [28] also stress that it is important to screen customers in concept testing. This not only eliminates people who are not part of the target market, but also some respondents that might not provide relevant information. The authors' research provides evidence that quality of concept data provided by respondents varies substantially with their innovativeness.

Common user involvement methods described in literature involve forming a cross-functional team to be in charge of user involvement [2, 3, 11, 29]. User toolkits and customer collectives are also a valid method of user involvement. Magnusson et al. and Matthing et al. [3, 11] present the method of user toolkits in new service development, where users are given the opportunity to generate new ideas by themselves. This way, users can deliberate at a location where they would normally use the service. The findings from the authors' studies indicate that users generated more innovative services with the help of toolkits. Another, rather similar method of involvement is one of customer collectives presented by Ogawa and Piller [1]. Their method is one where online customer communities are used to submit, pre-evaluate and rate new designs. Information gathered from online communities is used to figure out which products would be the most successful ones, and those are produced. In the case presented in the article, the items designed by the customer community were found to be more successful than those produced by the company [1].

Literature reveals also a number of best practices and suggestions for the involvement of users. Brockhoff [23] suggests that users might prefer to develop ideas in groups if they enjoy network benefits or community effects such as reciprocity and reputation. The author also stresses that customers might expect higher compensations for involvement if it is initiated by the company. Enkel et al.'s research [27] also proposes that it is important to make known competitive advantages and the value created to the user, as this increases their motivation to partake in the process. Something else that according to Enkel et al. [27] increases the probability of successful involvement is to ascertain that the company's employees trust users and their skills and abilities. Rather similarly, Ogawa and Piller [1] propose that it is important to create an environment for open knowledge sharing, which is in controversy with traditional company cultures and therefore requires attention. According to Lettl [26], the personnel coordinating the user involvement should also have good social and professional skills. Also Gruner and Homburg [22] stress that it is of importance whom in the company is in charge of user involvement. The R&D head typically has a wider view of the complete new product development process whereas the marketing head might be more helpful in later stages of the process.

Profiles and characteristics of the users being involved are also a common discussion topic. According to Gruner and Homburg [22], lead users and financially attractive customers seem to be valuable cooperation partners. Enkel et al. [27] propose that lead users be involved from the earliest to the last phases, whereas customers providing suggestions and complaints would be integrated only in the last phases, where no more innovation and concept development occur. Not only the profiles of users, but also their number has been discussed [26]. According to Lettl

[26], an increased number of users provides better insights. Quite in the contrary, Lagrosen [29] proposes that only a few partner customers should be selected, and these customers should be activated so that they can actually ideate and innovate.

3.2 Timing of involvement

The timing of user involvement is a topic of discussion with many views. The literature review for this article revealed a rough categorization of the most common stages in product development processes. In reality, it cannot be assumed that all product or service development models are linear, but instead they can be parallel or iterative. However, in this article we use Ulrich and Eppinger's [4] linear representation of a product development process as a model and in order to visualize the differences in different authors' propositions, simplifications are made. The identified most common stages are: 1) idea or idea generation, 2) development or process design, 3) testing, piloting, or prototyping, and 4) market launch.

A major part of the articles studied refer to the first perceived stage of idea or idea generation with varying terms ("idea generation", "preliminary assessment", "ideation", "idea"). Many authors also stress that user involvement is especially relevant in this first stage of product or service development [2, 3, 11, 22, 23, 26, 29, 30]. This is often reasoned by the fact that after the idea is agreed upon, substantial alterations would become difficult to implement, and therefore early involvement and follow-ups are important [e.g. 30]. The types of involvement in the first steps according to Brockhoff [23] are suggestions, complaints or evaluations of the supplier's concepts, followed by prototype testing by users, after which feedback information and experience-based suggestions can be given. In Lagrosen's [29] view, users and companies should have integrative relationships, where users are involved as members of the product development team. Only a few essential users should be involved this way, but these should be a part of the process from beginning to end. A differing view by Kok et al. [24] is that users should not be involved in the earliest stages because of the cost factor: the product's technical and commercial feasibility need to be assessed before too much money is committed to the project. Out of the articles in favor of early involvement, Pitta and Franzak [2] do not however specify the steps in the product development process before or after the two steps presented. Also Magnusson et al. [3] study the innovative capability of users in the early phases of ideation and concept development. Outside of this notion, their research does not differentiate among more product development stages. Also, they do not comment involvement efforts for later stages than those stated.

A second popular phase referred to in the product or service development processes presented in literature is development or process design, also referred to as "development and engineering", "detailed design", "development", "service and process design", or "product development". All but one of the articles referring to such a stage suggest that it is useful to integrate users in that stage of the product or service development process. The author not suggesting to do so is Kaulio [31] who states that the most important steps where to involve users are those of specification, concept development and prototyping.

The third common phase represented in literature is one of testing, piloting, or prototyping. In different articles, it is referred to as "prototyping", "prototype testing", "service testing and pilot run", and "testing". All authors referring to such a stage in the process suggest involving users in prototyping [22–24, 26, 30, 31]. This seems reasonable because prototyping in its very nature involves gathering feedback from an early design.

The fourth phase identified as a common one in literature is market launch, also referred to as “final product”, “commercialization”, “introduction”, “completion”, “launch”, and “deployment”. A majority of the literature identifying such a stage propose users should be involved in the last phase [22–24, 29, 32]. Those articles not proposing user involvement in this step are ones that have stressed the importance of early involvement [11, 30, 31].

The types of users recommended to consult in different phases of the product or service development process is discussed by many. Enkel et al. [27] suggest different types of users to be best for different stages in the process. In the first development stages, the represented user is the requesting user, and in latter phases, launching customers, reference customers and first buyers are the recommended user groups. Lead users could be integrated in all stages of the process, but it should be noted that the same user does not represent the lead user in all stages of the process. Best practices for involvement include early integration to the development process and paying attention to both managements’ and the project teams’ motivation for integrating users.

Whereas some authors prefer some stages for involvement over others, Lettl [26] suggests that all stages are just as important with regard to user involvement. However, it would be extremely costly to try and learn all the tacit information from users and therefore users should be involved in product development selectively. This means that users should be met from time to time throughout the process. Also Voss et al. [32], writing in the context of software products, argue that because the status of ‘completion’ of a software product can often not be determined, it is unusual that users be involved with similar commitment throughout the process. The writers call for different types of involvement techniques at different stages.

4 Analysis

The depiction in this article follows the logic of plotting the stages referred to in a given article on an X axis. The product or service development process proposed is then plotted on the axis so that similar stages are in corresponding places on the axis. When the stages and their corresponding location on a time X axis are plotted, the stages in which the writers of each article suggest users should be involved are highlighted so that the overall figure reveals whether there are similarities in the different propositions. In case the authors of the article do not refer to a specific product development process when giving suggestions, the suggestions are plotted on the depiction in a dotted line.

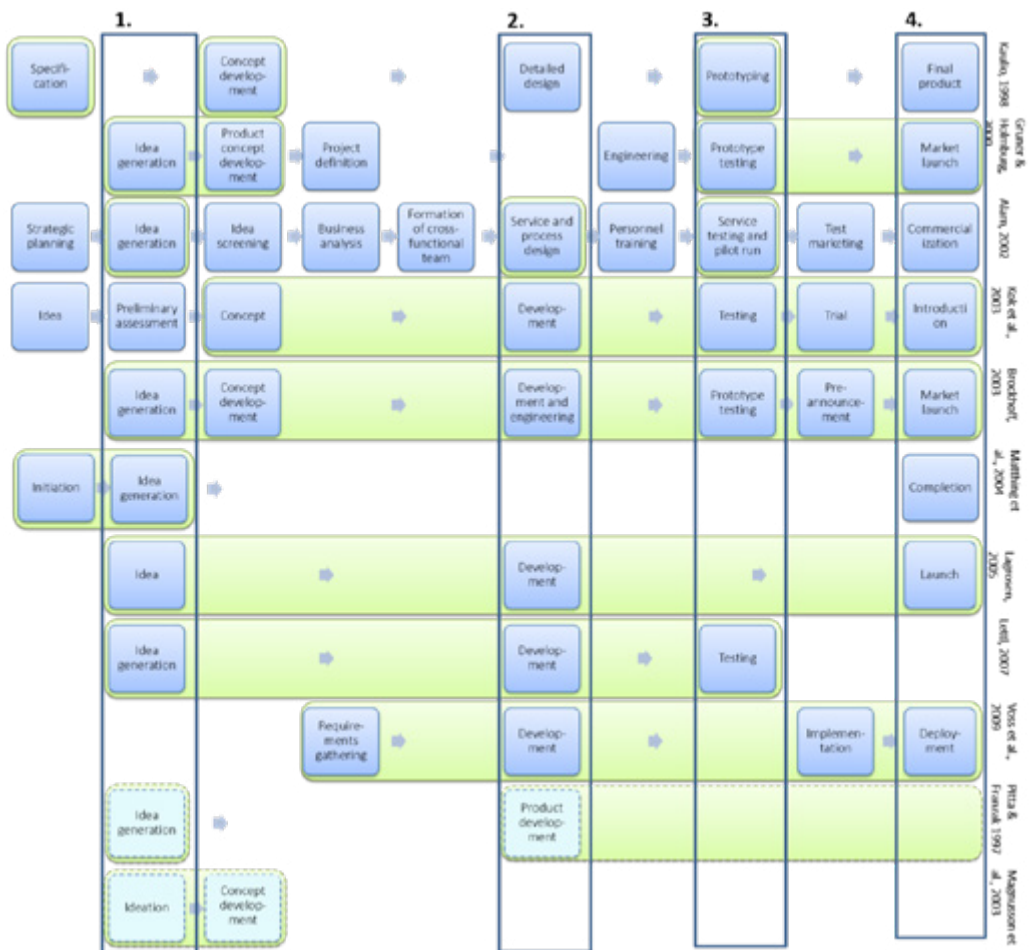


Figure 1 Summary of the literature review on stages where users should be involved

Figure 1 summarizes the findings from literature presented above, and depicts the corresponding stages at the same level vertically. The frames surrounding the stage boxes indicate where the authors in each article have suggested that users are best to be involved. The level or depth of involvement, or the user’s profile is not depicted in this figure. The depiction indicates that there are four most common stages in product development processes: 1) idea or idea generation, 2) development or process design, 3) testing, piloting, or prototyping, and 4) market launch. There however is not much of a consensus about the stage of involvement – suggestions shown in the boxes surrounding the stages in Figure 1 seem very scattered.

5 Discussion and conclusions

The first research question in the article aimed at developing an understanding about the multitude of understandings of what “user involvement” means in product and service development. The second question asked when to involve users in the product and service development processes of companies. Answers to both questions are multifaceted. To answer the first question about the meaning of user involvement, a number of articles were presented, where the concept’s meaning ranged from full participation to the product development team [2, 23, 29] to individual idea and concept development [3] and providing suggestions and

complaints [27]. Many differentiated among the different abilities and characteristics of the users being involved, and using lead users as sources of new innovative ideas was suggested [27]. A cross-functional team was often proposed to be in charge of the user involvement process [2, 3, 11, 29]. Another layer adding complexity is the fact that some of the articles were written to explain user involvement in services [3, 11, 30], and others in products [e.g. 23, 24, 27]. However, the processes described in this article do not seem to differ significantly in the case of product or service development and sometimes it even seems unclear what the differentiation among products or services is. Also, the terms “user” and “customer” seem to be used unsystematically, and therefore in this article, literature about both is considered.

The second question was answered by gathering articles differentiating among different steps in product and service development processes, and depicting the steps and the suggested involvement stages (see Figure 1). In some research, it is seen as beneficial to screen users’ opinions from the earliest stages so that the demand for the products or services being developed could be verified [e.g. 22]. In others’ view, it is not recommended to involve users in the earliest stages, because the commercial feasibility of the product should be first verified so that products generating attractive returns on investment can be favored [24]. When involvement in the latter stages is recommended, it often has to do with generating user acceptance [21] and providing suggestions for future alterations [27, 32].

The literature review and the depiction in Figure 1 presented different timing alternatives to involve users in the product or service development processes of companies. There is a lot of research about the issue from different fields, such as new product development, service development, product development, innovation management, and marketing. Part of the reasons why different articles are so hard to compare arises from this difference in backgrounds and areas of study of authors. On the other hand, this cross-disciplinarity enables a more comprehensive view because of the varying perspectives of the writers.

The limitations of this article arise from the heterogeneity of the material screened in order to provide a visual depiction. To compare different suggestions is not trivial, as there is not one article using an identical product or service development process to another one. Also comparing the timing of a stage presented in one article to a stage presented in another one is rather subjective and has involved reasoning from the authors of this article. The differences in suggestions given in different articles is not surprising as in real life, there are probably no two similar product development processes and therefore theory cannot replicate those either. Also, there is a multitude of different user profiles whose characteristics have a lot to do with their ability to contribute to the developed product’s or service’s success. However, sometimes authors talk about involving users in a specific product development phase without referring to how the stage is situated in the product development process overall [2, 3]. Future recommendations for academics would be to outline a product and service development process when commenting on timing of user involvement even at a rough scale.

To conclude, most of user involvement literature differentiates between the stages, i.e. the timing of user involvement, but there is no consensus about not only the product or service development process, but also the stage in which users should be involved. The contribution of this article is that it visually reveals how user involvement literature does not share a common view of the best timing, means, or stage of involvement. More often than not, authors refer to different conceptualizations of a product or service development process and therefore also make it hard to compare suggestions. User involvement literature is based on different views and processes because in reality processes vary: they can be linear, parallel, iterative etc. In this

article, we have attempted to find a common denominator for seemingly different processes and user involvement suggestions. For managers, the article reveals that there are many ways to involve users and this paper can provide an overview of those. It is sensible to acknowledge the differences in views and processes and the difficulty in their comparison, but the four stages identified in this article can help managers structure their thinking.

6 References

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