

# Users Involvement in New Product Development Process: A Designers' Perspectives

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**Abstract.** The purpose of this paper is to study user's involvement in new product development (NPD). It seeks to identify the factors involving user and design practices in the design process of new product development. A survey was conducted on 20 respondents consisting of designers involved in product development from various industries. The study focused on the early activities of the product design process which is called product specification. The analysis performed considers the importance of involving users in design decision. The outcome of this research is the significance of involving users and its effect on product development activities. The research also provides a model for an integrated user, designer and product knowledge activity in the product development process.

**Keywords:** User, Design and New Product Development

## 1. INTRODUCTION

The introduction of new products offers the opportunity for companies to increase its sales and enhance both competitive position and potential for surviving (Kleef, 2006). In the past few years it has been shown that user's involvement in product development has a strong influence on the success of a product. According to Margolin (1997), Preece (2002) a successful product require the product developers to know the target group for whom they are designing. Previously, Cooper and Kleinschmidt (1991) also mentioned that a clear definition on the market needs, i.e. exactly who are the intended users and what are the user's need, want and preference before the project is approved, increases the prospects of a successful product.

Small (2004) stated that emphasising users involvement and the incorporation of users perspective, pro-

vides a clear rationale for risk avoidance and the associated necessary management strategies. Hong *et al.* (2004) also agreed that sharing knowledge with users or supplies, and internal capabilities has positively affect product development, as well as indirectly affecting downstream strategic imperatives via enhanced process performance. The contribution of users in NPD process is not only to increase a product value but support decision making. Usually, the involvement of users in design development also can provide indirect commitment to support innovative idea, market information and development capabilities.

Thus, the purpose of this paper is to study user's involvement in new product development. In addition, it seeks to identify factors governing user involvement and designer practices in new product development. The contribution in this paper is threefold. First, the product developer and designer will increase their understanding

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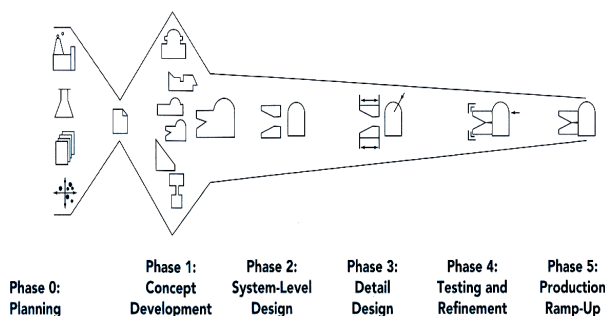
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of involving user in the NPD process. Second, several approaches to the involvement of users can be identified. Third, a model for integrating user, designer and product knowledge is presented.

## 2. NEW PRODUCT DEVELOPMENT (NPD)

NPD is defined as the process which aims to produce a physical product. Development also refers collectively to the entire process of identifying a market opportunity, creating a product to appeal to the identified market, and finally, testing, modifying and refining the product until it's ready for production. Product development also defines not only the product specifications and the product's basic physical configuration, but also the extended product offering such as life-cycle services and after-sale supplies. According to Ulrich and Eppinger (2000) product development is defined as the sequence of steps or activities which an enterprise employs to conceive, design, and commercialize a product. Krishnan and Ulrich (2001) defines product process as the transformation of a market opportunity and a set of assumptions about product technology into a product available for sale.

Meanwhile, the objective of product development is to translate an idea into a tangible physical asset. Salter and Narver (2000) stated that the central goal in a new product development is to create a product with superior value so that user needs will be satisfied. In addition, the product development process phase starts from product planning, design concept, design development, product detail, testing, and production. According to Ulrich and Eppinger, (2008) product development process began with planning, concept development, system design, detail design, testing and production. Figure 1 shows a generic development process as studied by Ulrich and Eppinger.



**Figure 1.** A generic development process (Ulrich and Eppinger, 2008).

### 2.1 The Early Stage of the NPD Process

According to Zhang and Doll (2001) the early stage of the NPD process is defined as the front-end activity which includes idea generation, assessment of market,

technology, competition, product definition and action plan. Studies from literature has shown that the NPD process is crucial in determining the success of a product but to reduce failure of new product introduction the early stage of NPD process should be emphasized. The early stage of product development focuses on the possible opportunity and risk for product introduction, e.g. studies on the target market of the intended product users, description of the product concept and the product's benefits. The early stage of NPD process also requires the involvement of users. The involvement of the user at this stage is also important to determine product characteristics. The involvement of the user in the early stage of the NPD process have been discussed by many researchers who agreed that there is a need for more awareness and a clear determination at the early stage of NPD process before proceeding to the next stages. Zhang and Doll (2001) stated that most projects do not fail at the end; they fail at the beginning stage of the NPD process. Thus, new product development needs to be done clearly in the early stage of the NPD process. It is important to define any possible influence on the success the product e.g., user requirements, market demand and technology driven.

### 2.2 The Involvement Of The User In NPD Process

Recent research has shown that many organizations have placed emphasis on user's involvement. The involvement of the users can be as a pilot or vehicle to ignite ideas and as well as support development progress. Brockhoff (2003) advocated the involvement of the user in NPD as a successful strategy and tactic for improving the success of a product. Previously, Ulwick (2002) argued that although the user may not always be able to express their wants, it is important to understand how they perceive products, how their needs are shaped and influenced, and how they made product choice based on them. However, the involvement of the user in NPD process need to be studied in systematic way because it can provide better understanding on design decision between designer and users. Schilling and Hill (1998) stated that one way of improving the fit between a new product and user's requirements is to include the user in the NPD process, for instance; involving them in the design team. In addition, this may be accomplished by including the user in the actual development team, or by designing initial product versions and encouraging user extensions, and then by exchanging information effectively with user. This helps the company maximize the product's fit with the user needs.

Several empirical studies have shown that active involvement of the users in the innovation process has positive influence on the success of the innovation (Bacon and Beckman, 1994; Murphy and Kumar, 1996; Gruner and Homburg, 1991; Kristensson *et al.*, 2002). The involvement of the user in the NPD process is also recognized as a central resource to accelerate product

development, to reduce development cost, and to enhance new product value. Finch (1999) found that in strategic and quality management literature, researchers have identified five roles for user in value creation: resource, co-producer, buyer, user and product. According to Nambisan (2002) there are three major roles of customer in NPD which are customer as resources, customer as co-creator and customer as a user. Table 1 shows the roles of customer in NPD as studied by Nambisan.

**Table 1.** Customer roles in NPD (Nambisan, 2002).

Customer Role	NPD Phase	Key Issues/Managerial Challenge
Customer resource	Ideation	<ul style="list-style-type: none"> <li>• Appropriateness of customer as a source of innovation</li> <li>• Selection of customer innovator</li> <li>• Need for varied customer incentives</li> <li>• Infrastructure for capturing customer knowledge</li> <li>• Differential role of existing (current) and potential (future) customers</li> </ul>
Customer as co-creator	Design and development	<ul style="list-style-type: none"> <li>• Involvement in a wide range of design and development tasks</li> <li>• Nature of the NPD context: Industrial /consumer product</li> <li>• Tighter coupling with internal NPD teams</li> <li>• Managing the attendant project uncertainty</li> <li>• Enhancing customers' product/technology knowledge</li> </ul>
Customer as user	Product testing Product support	<ul style="list-style-type: none"> <li>• Time-bound activity</li> <li>• Ensuring customer diversity</li> <li>• Ongoing activity</li> <li>• Infrastructure to support customer-customer interactions</li> </ul>

### 2.3 Does the Users Involvement Enhance Product Development?

It has been shown that users can play an important role by collaborating and communicating with the designer who then transform the information into design specification. User involvement is one of the most significant ingredients of product success. This is because the user can help generate valuable insights into the future. In product development, design can contribute to the overall performance of product function. The product definition stage in the NPD process is the most critical phase in which user should be involved. A study by Cooper (1999) revealed that the art of product development has not improved all that much-the voice of the customer is still missing, solid up-front homework is not done and many products enter the development phase lacking clear definition. Thus, the significance of product definition in NPD has been discussed by many re-

searchers. Most of them agreed it is important to identify product property and knowledge at an earlier stage, without which or unclear refinement will caused difficulties in production and sale. Nambisan (2002) stated that organization may face three major challenges in using the user as a source of new product ideas. The challenge is related to the selection of customer innovations, customer willingness to contribute new product ideas and capture of customer knowledge. Previously, Grunner and Homburg (1999) found users who have participated in successful NPD projects set themselves apart in three way: 1) a high commercial attractive, 2) the characteristic of a 'lead User', and 3) maintained a close business relations with the manufacturer. Previous research by Goffin (1990) also described that many companies do not integrate user involvement well into the NPD cycle.

Designer and user are important persons involved in a successful product. They play a big role to ensure that a product is successful designed based on requirements by users. The designers are usually involved in the design activity from the beginning of a product definition until it is realized. Henderson (1999) stated that designers are among those actors who are able to see and formulate culture into design proposals through visualizations, sketches, rendering, and models, among other thing. The designer also utilizes skills from applied science such as ergonomics, software ergonomics, and psychology and sociology (Korhonen, 2000). As usually practiced by designers before a product can be realized, they will take into account all users information and needs at the beginning of the design process. This ensures that a product can be successful use during it's life. However, the collaboration between the user and designer needs to be supported by an appropriate process method and good management strategy. Most literatures on NPD stress the importance of an accurate process to support better understanding of design development. For instance, in concurrent engineering, a successful multi-functional team approach to product development is recommended, so that multiple issues can be integrated by user, designer, engineer and marketer. Many researchers have suggested that more approaches need to be created to support the activity in the early stage of product development and take the user aspects into consideration. Clarkson and Keates (2001) emphasizes the need for user oriented representations and methods in design. In addition, Carroll (1995) stresses the importance of enhancing the product developer's awareness of the importance of user oriented approaches and supporting them in the adoption of such methods in their work.

### 3. RESEARCH METHOD

A review of the literature and a survey was conducted to answer the questions raised and to achieve the

objectives of this paper. The survey was conducted on 20 respondents working as designers. Ten of the respondents are involved in the automotive industry and the other ten are in the furniture industry. The respondents selected are involved directly in product development in these two industries. Furthermore, the survey also compares how both automotive and furniture designers appreciate the involvement of the users in the NPD process. The questionnaire is divided into 2 categories: 1) questions in Part A are on the general background of the respondents, 2) questions in Part B is on the role of the user and their contribution to NPD. Data from the survey is analyzed using SPSS. The result is used to determine the importance of user’s involvement on design decisions.

#### 4. RESULT AND DATA ANALYSIS

Since the original questionnaire was extensive, only selected relevant questions are shown. In this research, there were 50 percent of the respondents involved are designers, 25 percent are senior designers, 10 percent are executives, and the rest are managers. In terms of designing experience 65 percent of the respondents have less than 4 years of experience, 5 percent respondents have 5~10 years, and 30 percent respondents have more than 11 years experience.

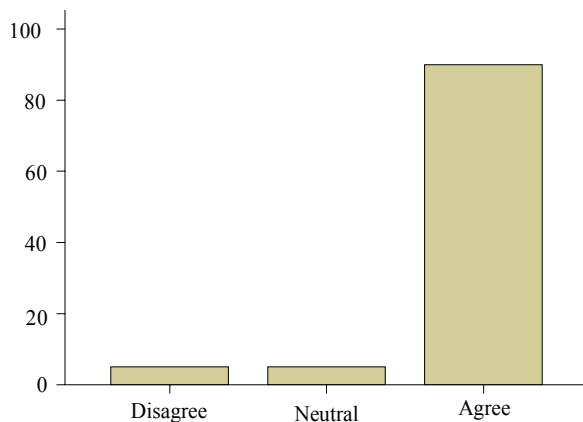


Figure 2. The respondents view on user involvement.

Figure 2 show the response to the question whether user involvement is preferred in NPD. It show that 90 percent of the respondents agreed that involving users is most welcomed in the NPD process, followed by 5 percent who are neutral and disagree. The importance of involving users in NPD stages are shown in Table 2. The result shows 85 percent chose both Product Definition and Concept and Sales and Marketing as being the important phase for user’s participation, 70 percent in Usability Testing, 60 percent in Design and Development and 35 percent in Product Detail and Engineering.

Table 2. Respondents opinion on user involvement in NPD Stages.

NPD Stage	Disagree	Neutral	Agree
Product Definition and Concept	5%	10%	85%
Design and Development	5%	35%	60%
Product Detail and Engineering	20%	45%	35%
Usability Testing	5%	25%	70%
Sales and Marketing		15%	85%

Table 3 shows the preference for the role of users in the NPD process. The result shows 85 percent respondent preferred in the Product Testing and Support, 65 percent in Design and Development, 60 percent in Ideation and 50 percent in Design Decision. Figure 3 shows the comparison of the role of users preferred by designers in the automotive design and furniture design firms. In general the automotive designers prefer the role of users less in most of the NPD process. The percentage of the roles of involving user in automotive design and furniture design are; As resource-Ideation (50: 70), As Creator-Design and Development (60: 70), As User-Product Testing and Support (70: 80) and As Design Decision (20: 80).

Table 3. The role of the involvement of the user in NPD.

User Role	Disagree	Neutral	Agree
As Resources-Ideation	15%	25%	60%
As Creator-Design and Development	25%	10%	65%
As User-Product Testing and Support	5%	20%	85%
As a Part of Design Decision	25%	25%	50%

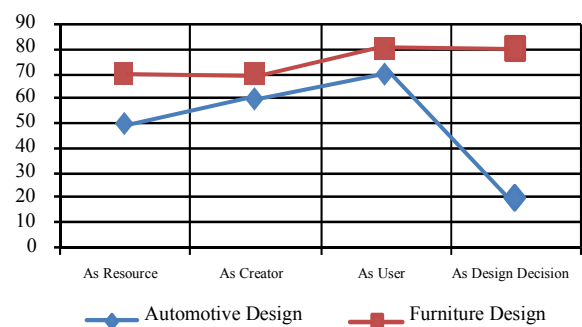


Figure 3. Comparison of involving user in design firm.

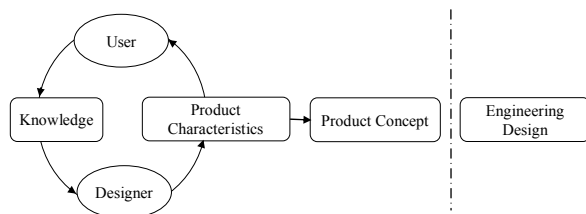
Table 4 shows the most preferred person to determine and identify design aim and objectives before conceptual design begins. All the respondents agreed that the designer is the right person to identify the design aim and objectives, 60 percent identified the Users, 55 percent identified the Engineer and 30 percent the Administrator.

**Table 4.** The important person to identify the design aim and objectives.

Person /Level	Disagree	Neutral	Agree
Designer	-	-	100%
User	10%	30%	60%
Engineer	5%	40%	55%
Administrator	55%	15%	30%

## 5. CONCLUSION

Users are becoming a valuable source or as a vehicle to support NPD process. The involvement of user in NPD is considered as a successful strategy and tactic to improve new product success (Brockhoff, 2003). Ulwick (2002) observed that although user may not always be able to express their wants, it is important to understand how they perceive products, how their needs are shaped and influenced and they made product choice based on them. Hassan *et al.* (2008) stated that new product development needs to be understood and followed in order to maximize the chance for product success. They emphasize that everyone involved in NPD process should understand the importance of each element and how it relates to his or her role in the process. Moreover, the integration of the user with product knowledge within the process is also essential. Figure 4 shows the integration of user and designer for product characteristic development. In addition, the figure also describes on how the knowledge of the users and designers contributed to produce product characteristics.



The early stage of design process (Product Definition)

**Figure 3.** Integration of user involvement user and designer in product characteristics development.

This research has found that the involvement of the users is not often practiced in the NPD process. Many product developers conducted their research in product development based on information from previous product performance. They frequently referred to information found either from user complaints, manufacturing defect report and market or lifestyle survey. However, this information is not satisfactory to ensure the success of a product.

Moreover, the designers are also required involved in the early stages of product development. They are mainly responsible to determine the product appearance

and features. Seung and Stappers (2000) stated that when a designer starts to design the form, they need to integrate many demands and wishes that the prospective users of the product may have. Thus, without the involvement of the users in the early stage of NPD process, the organization found difficulties to ensure the acceptance product by them. Besides that, it is not only technical and objective demands that are important, but also aesthetic, emotional, and other experiential factors, some of which are hard or impossible to express objectively.

Nevertheless, in order to facilitate the work of designing products to better result for the user, many researchers have recommended that product developers should focus on the involvement of the users in the early stages of NPD process. Then, a well-defined of the NPD method can also help to assure the product quality, facilitate coordination among team members, plan the development project, and continuously improve the process.

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