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A needs analysis approach to product innovation driven by design

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Abstract

Effective acquisition of customer needs is critical to product innovation, and customer needs can be classified into three types according to different difficulty levels of capturing, they are customer needs that can be got directly, the predictable customer needs, and the unpredictable customer needs. In the existing research achievements, voice of customers and in-depth experience of customers are applied to acquire needs from customers directly, additionally, the needs evolution laws and customer scenario analysis provide guidance for forecasting needs, but for the unpredictable customer needs, it lacks instructive method to follow. The study proposes an approach of analyzing unpredictable needs by introducing the core idea of design-driven innovation, which includes a serious of steps, classification of super-system resources, basic feature extraction process of super-system resources, four models of creating needs for product innovation. This approach changes a customer-centered needs analysis way into a way of needs generation triggered by resources variation in super system, decreases obstacles of innovation caused by the condition that customers don't know what they want in the future. Finally, office scanner was taken for example, and the generation of new needs for other types of scanners verifies the feasibility and validity of this approach.

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Keywords: Needs analysis; design-driven innovation; super-system resources; product innovation; scanner

1. Introduction

The objective of product innovation is to satisfy or stimulate customers' needs. The existing approaches to acquire needs include questionnaire survey (voice of customers), in-depth experience of customers, needs evolution laws et al [1-3]. However, these approaches are limited in the excavation process of potential needs for discontinuous innovations. According to the theory of design-driven innovation, the evolution of social culture is the root cause of needs' change, and the social or cultural factors influence product innovation. In fact, the factors are resources in super-systems of TRIZ [4]. These factors are resources, which possibly can be identified with TRIZ

TRIZ resources are a totality of things that can be applied to the greatest potential [5]. Based on a classification of systems, resources can be grouped into sub-system resources and super-system resources. Sub-system resources are resources in the system, and super-system resources are resources out of the system but related to the existing system [6],[7]. The effective analysis and application of super-system resources are in favor of product innovation.

Driven by design, a classification of TRIZ super-system resources is proposed in this study, and an approach to analyze potential needs by creating "new customers" or "new environment" is proposed. The creation of new needs can provide guidance for discontinuous innovations of products, and bring diverse technological opportunities for enterprises.

The approach to analyze potential needs provided in this paper includes four modes of creating needs, and the detailed generation process is stated in Sec.3. The related works on design-driven innovation, need analysis, and resource analysis are presented in Sec.2. Finally, the three modes in this approach are applied to generate potential needs for scanner, and the generation process is presented in Sec.4, followed by the conclusions.

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2. The related works

2.1. Insights into the theory of design-driven innovation

Design-driven innovation was stated in detail by Verganti in *Design-driven Innovation: Changing the rules of competition by radically innovating what things mean*. The design-driven innovation is a new innovation way followed by market-pull innovation and technology-push innovation[4]. According to Verganti, design-driven innovation is a new innovative way based on the innovation of products' meanings, and it delivers different information to customers by creating new product languages. The product languages include its material, texture, smell, name, and form. Design-driven innovation pushes innovation by creating new product value[4][8]. Dell'Era et al. conceive that design-driven innovation is a type of open innovation that faces social and culture knowledge, and they propose that product innovation is a combination of function design and product meaning innovation [9]. Bruce et al. conceive that the design factors that influence product promotion include channels, customs, languages and technology platform [10]. Additionally, Walsh [11], Roy[12] separately proposes that design is an important step in the activities of product development.

According to the existing research achievements on design-driven innovation, it is obviously that design is of great importance to product innovation. The core idea of design-driven innovation is that product innovation is pushed by the innovation of product meanings, and the product meanings include customers' living habits, the local culture and customs[13][14]. It stresses the information delivery from products to the surrounding things.

2.2. A brief introduction on need analysis approaches

According to different difficulty levels of capturing, customers' need can be classified into three types, the customers' need that can be got directly, the predictable customer needs, and the unpredictable customer needs. For the first type, voice of customers and in-depth experience of customers can be applied to acquire needs from customers directly. For the second type, the needs evolution laws and customer scenario analysis provide guidance for forecasting customers' need. With the dynamic change of customers' need, discontinuous innovations arouse wide concern gradually. Therefore, how to excavate potential needs and develop diversified products is an important issue.

Aliakbaria and Boghayerib propose a needs analysis approach to English for specific purposes [15]. Shamsudin et al. conduct a survey, and aims to find out the needs of first year engineering students for a glossary of introductory engineering terminology [16]. Karkkainen and Elfvengren stress the importance of customer need assessment in product innovation management, and propose that the report for instance describes what kinds of problems and self-reinforcing vicious loops, and they conceive that it is closely connected with the success of customer need analysis [17].

3. An approach to creating needs driven by design

3.1. A classification of super-system resources driven by design

Design-driven innovation attaches great importance to the information expression of products to the surroundings, and the objects to which product transmits information and the social or cultural factors in the environment where the product exists are super-system resources of TRIZ. In this study, two elements of customers and environment are extracted to guide the generation of needs. Furthermore, according to the judge of whether the resources are directly interoperable with the research object, the super-system resources can be divided into four types: direct-relevance customers, direct-relevance environment, indirect-relevance customers and indirect-relevance environment. The first two ones are collectively called as the direct-relevance resources, and the latter two ones are collectively called as indirect-relevance resources.

The direct-relevance resources are a totality of super-system resources that are directly in touch with the target research object, including the environment where the product exists and the customers who use the product. As shown in Fig.1, the indirect-relevance resources are the customers and environment that are not directly related with the product. As shown in Fig.1, A, B are representative elements in the areas of searching direct-relevance resources and indirect-relevance resources. Because the direct-relevance resources are the direct action objects that the research object transmits and expresses information, the annular area with a radius of r_a is their storage area (as shown in Fig.1). The area where indirect-relevance resources exist is located out of the annular area layer where direct-relevance resources exist, and r_b is its radius. Moreover, the radius of the two annular areas satisfies the following relationship: $r_a<r_b$. It indicates that the relevance that the research object to indirect-relevance resources is lower than that to direct-relevance resources.

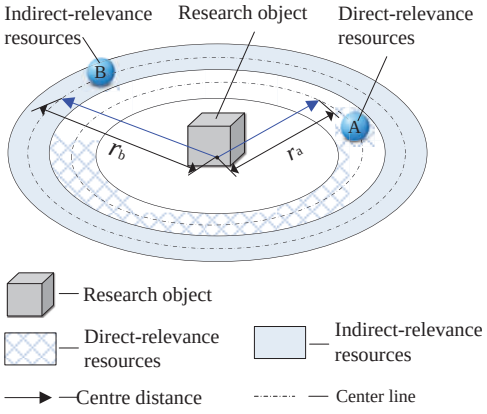

Fig. 1. The relationship between the two types of super-system resources

We can get that super-system resources include direct-relevance resources and indirect-relevance resources seen from the radius direction, and the super-system resources include