

Research on Customized Product Design and Product Planning Method Based on Style Characteristics

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Abstract: Consumers are no longer satisfied with the basic use function of products, but put forward higher spiritual functional requirements such as emotional experience and humanistic care. Product style has become an important medium for consumers to communicate with designers. Similarity or difference of style has also become one of the important sources of product innovation design. As an effective competitive strategy, industrial design has received unparalleled attention in the past. The competition between enterprises is increasingly fierce, and the innovation and personalization of the products developed have become the main means for enterprises to win the market. Product life cycle and product development cycle are shortened. Customers are more eager to get customized products and services that are low cost and high quality to meet their individual needs. Large-scale customized production is diversified and customized with flexibility and responsiveness. The traditional relatively stable market is shifting towards dynamic and chaotic.

1. Introduction

With the development of economy, market competition is becoming increasingly fierce. Consumers are no longer satisfied with the basic use function of products, but put forward higher spiritual functional requirements such as emotional experience and humanistic care [1]. With the rapid development of science and technology and the maturity of the global market, the traditional mode of large-scale production has been greatly impacted. Product style has become an important medium for consumers to communicate with designers. Similarity or difference of style has also become one of the important sources of product innovative design [2]. With the diversified market shift, customers are more eager to get customized products and services that are low cost and high quality to meet their individual needs. The rapid advancement of science and technology has also prompted companies to continuously upgrade their products. Industrial design as an effective competitive strategy has received unprecedented attention. The competition between enterprises is increasingly fierce, and the innovation and personalization of the products developed have become the main means for enterprises to win the market [3].

The emotional component of the design problem solving content needs to lay a rational foundation. Constructing a perceptual information model in image thinking, and completing the perceptual quantification under the mechanism of precise visual perception [4]. Product life cycle and product development cycle are shortened. Customers are more eager to get customized products and services that are low cost and high quality to meet their individual needs [5]. The competition in today's manufacturing industry is no longer limited to cost and quality. The focus has been on whether it can provide products that meet the individual needs of users and respond quickly to rapidly changing markets [6]. The production mode reduces the production cost through the batching of products, the price is lower, the parts are highly interchangeable, and the function is fixed [7]. Consumers' demand has gradually changed into diversification and individualization, and enterprises are expected to provide customized goods that meet their own needs [8]. At the beginning of design task analysis, design-related information is not clear, and the process of design solution is a trial process from fuzzy stage to clear stage depending on expert experience [9]. Unlike mass production,

which achieves high efficiency with stability and control, mass customization can achieve diversification and customization with flexibility and rapid response. The traditional relatively stable market is changing towards dynamic, changeable and chaotic direction.

2. Product Style Cognition Method Based on Feature Matching

The study of human perception and thinking information processing process covers from the input of perception to complex problem solving, involving the nature of human intelligence and machine intelligence. Product design is to meet the needs of customers, on the basis of dynamic product model, make full use of existing design resources, with configurator as the main tool. From the perspective of cognitive psychology and information theory, style recognition and operation are an information processing process. On the basis of the consistency of cost and time with large-scale products, the process of customizing customers' individualized needs and the way of thinking about enterprise problems from customers are realized. In the process of industrial design, the style characteristics of a product can be seen as a collection of common features presented by various products. The elements in the set can be constructed with the expected aesthetics and cognition through different construction rules. With the development of network technology and communication technology in modern society, communication between enterprises is more convenient and cooperation is closer. The product sales activities draw on the multi-variety marketing ideas of customized production, and have obvious characteristics in terms of business objectives, manufacturing philosophy, production organization management, production organization and process control.

The concept concept stage contains many images thinking deduction processes, and the rich tacit knowledge is the most creative design stage process. When the customer's needs are obtained, the fuzzy pattern recognition technology is adopted according to the customer's needs. Position it within the appropriate customer base to leverage the product family product model for that customer segment. The organization mode and production mode of an enterprise are mainly controlled by the market and serve the corresponding market environment. To effectively achieve large-scale customized production, the design must be able to capture and define the individual customer's demand for the product, integrating the entire product development process [10]. Because designers usually look for stylistic features from previous products and use reasoning to create new ideas. This leads to the inheritance, reproduction and innovation of product style characteristics. Traditional modularization methods can only be applied to products with serialized structure and distinct grading characteristics. However, for products with strong integrity, there is no obvious serialization and grading characteristics or complex structure.

The detailed stage of product design seriously lacks the precise understanding of human cognitive mechanism. As a three-dimensional carrier, products must satisfy users' implicit spiritual needs. The rationalization of product series is to find out those products which are not suitable for flexible environment, low sales volume, high general management cost and not popular with customers. The separation of product development stage and rapid design stage is conducive to improving product's adaptability to market changes. It helps designers understand customer demand information, improve product family structure, and improve corporate responsiveness. Rich styling features and many different composition rules are the basis for people to distinguish product style features. The new product development design is a modeling process for the product family by mining similarity information in the product family. Design standardized parts, parts, and part structure elements for the product family. The excitement of consumer emotions in real life is the result of the interaction of multi-dimensional modeling elements such as shape, color and quality in product form.

3. Product Design Oriented to Mass Customization Production Model

An important feature of product design for large-scale custom production is that product design is no longer performed for a single product, but for a product family. As the customer's consumer demand grows selectively, this diversified function is increasingly becoming the key to attracting

customers and retaining customers. New product development is designed for product families. Product developers analyze existing customer needs, anticipate future customer needs, and identify a reasonable customer base. In the process of traditional new product development, enterprise designers or expert groups dominate the product planning process. Product planning focuses on the functional design of products, and lacks systematic customer demand analysis in the early stage. Product design is a creative process, but this does not mean that new products or components must appear every time. The offspring product always retains the characteristics of the parent product. The process of product development is a process of iteration and evolution. New product development is to analyze existing customer needs and predict future customer needs, clustering customers with similar needs and forming customer groups.

Dynamic product model is a bridge connecting two cycles. In the process of building the product model, it is necessary to organize all kinds of related resources reasonably. From the perspective of the coverage of customer needs, the broad sense of the customer involves more people or departments, and the types of customer needs will increase accordingly. Some product design models mainly focus on two aspects: design process model and product information model. From the perspective of the form of demand, customer needs not only have natural language descriptions, but also various forms of expressions such as graphics, tables, and symbols. The income component of the recycling program includes the reuse value of parts and components and the value of recycled materials. The value of reused components and the value of recycled materials are changed by 10%, 20%, 30%, and 40%, respectively. The change in net income caused by recycling is shown in Figures 1 and 2.

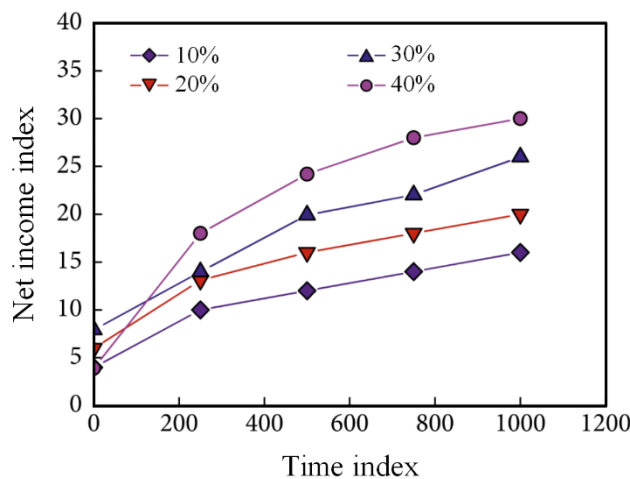


Fig. 1 Reuse income change sensitivity analysis

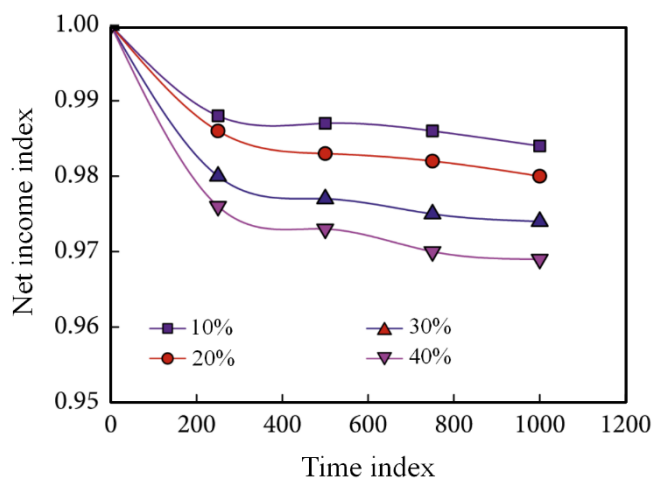


Fig. 2 Sensitivity analysis of changes in reproductive income

The designed modules need to be validated and optimized before they are stored in the module library to save the cost of materials and transportation for enterprises. Different from template theory

and prototype theory, feature contrast theory is that the matching object is the feature of the pattern, not the whole pattern or prototype matching. Step by step, enterprises are facing the situation that market disturbance is low and the increase is not sharp, and competitors have not yet changed to large-scale customized production mode. Under the influence of many factors, there is no significant difference between the offspring product and the parent product, and the performance of its characteristics is continuity rather than discreteness. The object's high-level object contains low-level features and internal lower-level sub-features. Aiming at the common needs of the customer base, establish a dynamic product model of the corresponding product family. And extract variable parameters to lay the foundation for a quick configuration that meets individual customer customization requirements. Modern product development requirements are based on knowledge, market-oriented, and multi-objective design for the entire lifecycle of a product.

Existing products are rationalized based on product sales, sales profit, versatility of parts, core capabilities of the company, and potential for the future. In the field of modular product design and development, there are relatively few studies on its evolution process and corresponding mechanisms. The evolution of modular products and the generation and planning of product families are closely related. People accept product information through senses such as sight and hearing, and form information through human brain information processing to realize human-machine information transmission. By analyzing the similar functions of parts and components, the redundancy is reduced. Attention should be paid to products that do not represent the core competence of enterprises, and the future potential of all products should be evaluated. The production of modern enterprises is based on accurate market forecast. Target market or target customer positioning of products is very important. It is a yardstick to guide the follow-up product design.

4. Conclusion

Based on the multi-dimensional feature view and holistic cognitive product design methodology, from the perspective of enhancing innovation ability, product image design is oriented. As a new production mode, mass customization production mode emphasizes the high efficiency and low cost of mass production. Reasonable product planning and product design based on it will make large-scale customized production mode show great competitiveness in the future market environment. In the process of product design, the characteristics of new products are expressed through components. A component is a system with independent functions, and is composed of lower-level components according to certain characteristics and constraints. Large-scale customized production models often face variant products based on the product family dynamic product model. For incoming customer order requirements, it should first be standardized and positioned within the appropriate customer base. The large-scale customized production model is a new advanced manufacturing model that enables rapid response from the receipt of an order to the provision of a product. The research on its production mode has quite important strategic significance for revitalizing China's manufacturing industry.

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