

Product Design Innovation Method Based on Systematics Theory

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Abstract: Product design innovation can change the brand weakness, market weakness, lack of technology and core competitiveness of China's industrial products. Research on design innovation is the key to product design innovation. As a "system theory based on product design innovation method", the research content puts forward the theoretical research topic of product design innovation method, collates the rules of product design innovation exploration method in system theory, and promotes the design of product system innovation. Product design innovation is a complex system innovation, which is necessary for innovative technological innovation, innovative theory and innovative tools. In addition, specific measures are needed for functional innovation, technological innovation and artistic innovation.

1. Introduction

In 2010, China became the world's largest manufacturing country, but not a manufacturing power. Most of the manufacturing industry is still low value-added, rear excess capacity, independent innovation ability and brand imperfection and system innovation gap, which is the low end of the global industrial chain. The system includes business management system, technology system, market system, brand promotion system, etc. In today's world, the cycle of transformation of scientific and technological achievements and industrial upgrading is shortening. All countries in the world are paying attention to the use of technological innovation and design innovation to cultivate new economic growth points. In addition to the integration of information technology and manufacturing in the fields of energy, materials and biology, technological breakthroughs have also brought innovative changes to the industry. In this industrial transformation, interdisciplinary linkages and competition promote innovation and development. The meaning and form of industrial design and product innovation are used to express that almost everyone and society provide them. In this case, the innovation of product development is the driving force of industrial development. The research of industrial design method based on system theory can effectively promote product design innovation. At present, among the research theories of industrial design techniques in the world, there are TRIZ theory, Six Sigma Theory and quality management theory, which are mainly used to solve the problem of invention. The theory of system innovation is a new theory which has been formed and evolved continuously [1].

2. Systematics Theory and Design Innovation

The basic theory of system theory is the common theory of system theory [2], information theory, cybernetics and operation research. The basic principles of system theory, such as absorption and dissipation structure theory, synergy theory, structure theory and supercycle theory, are synthesized and developed. Be the pink of perfection. That is a collection of methodologies and scientific theories. Systematic theory is widely used in natural and social sciences. Its main function is to let people understand the rules of the system, establish an objective and comprehensive understanding of the world system, so as to achieve the purpose of system control. That research and method is a systematic method that combines qualitative and quantitative methods. Systematic integration, hierarchy, openness, purpose, stability, mutation, self-organization, according to the similarity, irreversibility, structural function relationship of the system, information feedback, then competitive

coordination, then shake the order rule, optimization evolution is the principle and rule of the false legal system, which is contained in the objective world. This kind of research covers the methods of industrial design innovation [3].

The design starts with the hierarchical structure and structure of the system, recognizes innovation, and starts with the goal of the system, the innovation of open systems, the input of materials, energy and information. It requires innovative means, from the upgrading of the system and the realization of sudden innovation. Design innovation process is the process of changing product function, technology, form, quality, service and user process. In this process, judgment, market feedback, technical feedback, feedback function, price feedback, aesthetic feedback, quality feedback, feedback of the same competitiveness and other external information of the system to the internal feedback of the control system. Through feedback, internal, external and external competition and adjustment of the control system, it is based on the development and development of the established target system. Realize the optimization of the system in continuous evolution, so as to achieve the process of minimum dissipation, maximum efficiency and maximum benefit.

3. System Design Innovation System Solutions

The process of product design innovation is the cycle development and the whirlpool process. In this process, we need innovative concepts, theories and tools. We also need to consider the problems between innovation and function, science and technology, culture and art. Through the clear path of system integration, system coordination, system rectifier and innovation, design innovation is finally realized. Innovation is a proposal for the innovation of social demand analysis and product design, which determines the goal of innovation, realizes the upgrading, function, technology, merger and technological innovation of products, innovative strategic thinking solutions, innovative technology solutions, and innovative artistic strategy solutions [4].

3.1. Thinking innovation in product design

The innovation of product design, first of all, is the innovation of thinking. It is necessary to establish a systematic thinking system to realize the innovation of thinking. From the structural analysis of system thinking, thinking can be divided into logical thinking, impression thinking, dialectical thinking and inspiration thinking, which form innovative thinking by combining linear and non-linear inference, multi-direction, jump and link [5].

3.2. Technological innovation of product design

Function is the core and essence of product design with clear physical and technical characteristics, and the key to design innovation. This function has a clear system structure. In the process of innovation, the main function of all products is to improve the function of products by accumulating sub-functions. The essence of functional innovation is technological innovation. Functional innovation begins with functional analysis. Then, it analyses the technical system of the problem, lists all the constituent elements of the technical system, analyses the relationship between the constituent elements of the system, establishes the structural model, and transforms the relationship between the constituent elements into function. Functional technical solutions are based on resource analysis and contradiction solving.

Product design technology innovation resources include natural resources, time resources, space resources, system resources, material resources, energy resources and information resources. These resources and their derivative resources, differential resources (differential animal resources, differential field resources), quantity, physical and chemical properties, quality, price, scope, and preparation for design and application are in contradiction with corresponding technological innovation. In the process of contradiction, there are many trends of innovation.

The multi-direction of innovation contradiction shows the complexity of contradiction, but the systematic stratification of contradiction, the principle of contradiction and the type of contradiction are limited. The TRIZ theory system is based on the principle of innovation and invention of principle 40, which solves contradictions. Dynamic principle, asymmetry principle, types of

contradictory characteristics [6], such as mass parameters, pressure parameters, energy parameters and other 39 commonly used engineering parameters. The contradiction of design innovation is usually expressed as technical contradiction. Technological contradictions mean two harmful effects at the same time. This also means that the destruction of one or more subsystems is caused by the introduction of positive effects and the removal of negative effects. That usually appears in the system. In order to solve the contradiction between copyright and technology, specific solutions are as follows: (1) Innovation of main functions, copyright of specific classes and various auxiliary functions, hierarchical narration, and operating system of designed narrative functions, which should improve the characteristics of the decision, (2) Description of technical contradictions. If we want to improve the engineering parameters, which parameters will deteriorate. (3) Another explanation of technical contradictions. If the degree of deterioration of the parameters decreases, the parameters that need to be improved will be weakened, or the degree of deterioration of another deterioration parameter will be enhanced. (4) In the contradictory matrix [7], the corresponding matrix elements are determined by the contradictory party. (5) These measures are defined as the principles of availability of inventions. According to the principles of 40 innovative inventions, the principles are redefined. The principles are applied to solve the problems of design innovation, and the conceptual design and subsequent evaluation design and improvement are found, as shown in Figure 1.

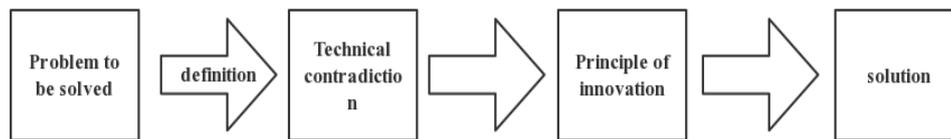


Fig.1. Technical contradiction problem solving mode

3.3. Product design system innovation

Users buy products, they generally look, quality, function, pay attention to the price of products. This is the composition of the product's highly physical system. In this process, the field from people is "experience" and the field from products is "experience", which is a process from whole to part; from macro to micro, from appearance to function, from intuitive perception to value judgment, it is a process from appearance to quality-price-function. Experience includes space experience, formal experience, material experience, mechanical experience, scientific and technological experience, emotional experience, functional experience and value experience. These experiences are the process of emotional judgment of rational judgment. The system innovation condition of products is reflected in value, appearance, function and technology. Product system innovation can be divided into two types. The two forms of technology are opposed. The process of product upgrading and innovation is: the goal pursuit of human experience, product experience, human product experience, cost experience of experience, emotional experience, experience value of technical experience, experience, value function and experience value of other five subsystems, 36 experiential elements, 36 experiential elements to spear with the requirements of upgrading innovation goals and values. Shield game, and ultimately achieve the ideal product upgrading innovation [8].

Apple's iPad air innovation is a human experience. The purpose of experience is to achieve simple appearance, comprehensive function, easy operation, easy to carry, so as to enhance the value of products. This goal reflects the contradiction between product appearance and function. This is a system of appearance, function and technology. With its delicate appearance and powerful functions, games need new materials, new technologies and new crafts. It needs innovation in technology integration and technology control. This is a process of technological progress in appearance and function. The smaller the size of an iPad product, the harder it is to improve performance. The longer the battery life is, the more difficult it is to maintain, so there is a contradiction, but to make the product lighter and smaller, on the other hand, it must be stronger. Through the design of appearance and function to promote technological progress, through the

system game, product innovation finally appeared. Apparently, the overall volume is 24% less than the previous generation of iPads (nearly a quarter), and the fuselage is only 7.5 mm thick. Aluminum metal in one body is formed on the material, making the body light and strong, giving a simple aesthetic feeling. The unique beveled edge is cut by single crystal diamond. The tolerance is controlled at micron level, which weakens the edge sharpness and makes the whole fuselage soft and natural. Functionally and technically, although the product space is reduced, the performance is doubled. New A7 chips and M7 motion coprocessors are used as the core components. In order to be portable, it uses two antennas to support MIMO technology. The combination of software and hardware achieves perfect integration. The interface design of iOS7 is simple, intuitive and easy to use.

In the process of original product innovation, the original product innovation mode (micro, virtual, digital)- Technical products - shape, function, market - experience - concept (person), as shown in Figure 2. In this process, technological advances have destructive effects on products that directly change people's concepts. This concept can act on the upgrading and innovation process of products, form the overall chain effect for the design of industrial products, and realize the sustainable innovation and development of products [9].

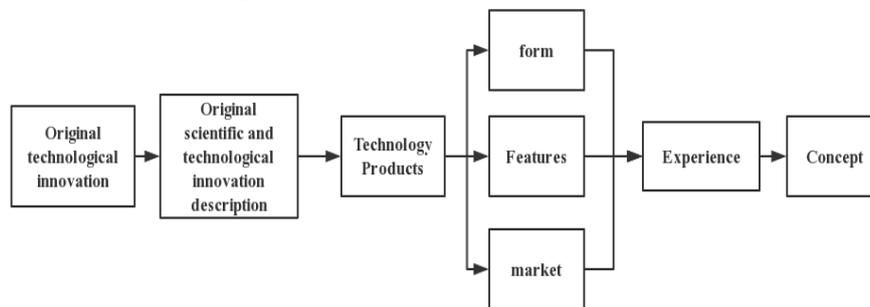


Fig.2. Product original innovation model

4. Conclusion

Product design innovation is a complex system innovation, which requires innovative concepts, theories, tools and methods. In addition, specific measures are needed for functional innovation, technological innovation and artistic innovation. Innovation reveals complete, hierarchical, open, intentional and irreversible attributes, such as non-contradictory innovation process, system coordination, system integration, system links and system optimization. Product design innovation is the meaning innovation of function, structure, technology and form. Overall innovation of market demand, product design, quality management, sales strategy and economic advantages. Systematic research on innovative methods can make product design concept more perfect, advanced technology, better appearance, more valuable products and more competitive market.

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