

# Research on Service-Driven Feature of Industrial Designers Under the Background of Industry Convergence

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**Abstract.** Over the past thirty years of development, China has become a strong economic power and manufacturer, and entered the middle stage of the development of industrialization. However, the deficiency in the innovation capability has become a serious obstacle restricting China's development. As one of the eight industries in modern service, industrial design has been ranked as key development strategies in China. How to further reinforce industrial designers' awareness of modern design service, strengthen the understanding of the service-driven feature, and better satisfy the society's demands for industrial design of the time under the background of industry convergence; how to assist enterprises and customers realizing innovative transformation through industrial designers' design service in technological means; how to really exert the value of design in industry through industrial designers' philosophy in design service by means of coordination and innovation in a "harmonious and smooth" mode will be another issue of critical concern in the industrial design field.

In the background of industry convergence, the paper has combed evolution of design service contents and new development of industrial designers from the early 19th century to now. Based on literature review, the paper has summarized the specific work contents of the current industrial designers and then put forward the contents of three-layer service-driven characteristics of industrial designers: firstly, driving the transformation and upgrade of traditional manufacturing industries by design power; secondly, helping manufacturing industries to shape brand by design innovation; thirdly, accelerating the transferring of scientific and technological achievements and linking technology with market. In study, the paper has found that industrial designers should become joint and mutual adhesive with various experts of the enterprise. Based on the training of service awareness of innovative design, application of comprehensive perceptual test means, establishment of design concept of collaborative innovation and others, industrial designers can better serve enterprise manufacturer and consumer. In the meantime, the industrial designer's responsibility consciousness should be transformed from simple delegate object to society and from

simple service-oriented design to organization-oriented design, that is, from customer subject consciousness to social subject consciousness.

**Keywords:** Industry convergence · Industrial designer · Design service · Service-driven

## 1 Introduction

In the background of rapid development of economic globalization and new and hi-tech industries, industrial structure emerges the trend of diversification and complication. In order to further improve enterprise's production efficiency and competitiveness, different industries or different industries in the same industry mutually penetrate and intercross, and gradually converge and develop into new development mode or industrial organization form, which is industry convergence. Industry convergence can be divided into three types of industrial penetration, industrial intersection and industrial restructuring. In the background, a large number of new industries, new type of business, new technology and new mode ("four-news" for short) are born. It becomes an important research topic that how traditional entrepreneurs break through traditional management idea and old mode of thinking and explore the development and management innovative mode of new industries and truly realize the industrial transformation in face of the above-mentioned new things and new economic development trend.

Over the past 30-odd years of development, China has become a strong economic power and manufacturing power and entered the medium term of industrialization development. However, the deficiency in the innovative capability has also become a serious obstacle which restricts China's development. As one of the eight industries in modern service industry, innovative cultural industry has been listed on China's development strategy. On March 14th, 2014, the State Council's Some Opinions about Promoting the Integrative Development of Cultural Innovative Industry and Design Service and the Corresponding Industries issued by China's State Council, focused on the importance of cultural creation and design service and development path of "industry convergence", and also put forward a new topic that how service-driven characteristics of industrial designers effectively worked in the background of industry convergence.

Industrial design is the important technical means by which original equipment manufacturer (OEM) can turn into original design manufacturer (ODM) and then into original brand manufacturer. For modern industrial designers, industrial design is not the simple creative activity, and involves various disciplines such as machinery, materials, information, social psychology, statistics, marketing, building and resource and environment. In 2006, International Industrial Design Association pointed out in the latest industrial design that industrial design aimed at a comprehensive and creative activity, including utensil form, processing procedure, design service and system related to the entire human life, and was the key factor of humanization of innovative technology and cultural and economic exchanges.

Industrial design faces another important topic on how to further strengthen service awareness of modern design of industrial designers and the understanding of

service-driven characteristics, and better satisfy the social demands of the time on industrial designers in the background of industry convergence; how to realize technically innovative transformation of the enterprise by design service of industrial designers; how to truly play the value of design value in the industry.

## **2 Evolution and New Development of Design Service Contents of Industrial Designer**

### **2.1 Evolution of Design Service Contents of Industrial Designer**

Industrial designers' role keeps evolving in the enterprise. With the rise of mass production in the 19th century, industrial designers began to emerge in the manufacturing industry and often served as product inventor or engineer. In 1919, Staatliches School (Staatliches Bauhaus) was founded in Weimar, Germany, and established a set of complete design education curriculum, which marked that design became an independent discipline. The core idea of Bauhaus is "the unity of arts and technology" in design, and still has profound influence now (Catherine Best 2008) [21].

From the 1920s to 1950s, with the wide recognition of the Bauhaus though in the world, the profession of industrial designer began to emerge, and industrial designers mainly designed beautiful, fashionable and durable products to satisfy consumer needs.

From the 1960s to 1970s, industrial designers became more professional. At the moment, there were many famous design organizations, such as Japan Industrial Design Association, (America) Aspen International Design Association. These associations provided industrial designers with exchange platform; in the meantime, they also promoted the form of design culture worldwide.

In the 1980s, industrial designers began to realize the important role of brand in the enterprise. Famous design companies, such as Alessi, Gucci and Ralph Lauren were founded in this period, and industrial design activities in Britain were also launched at this stage.

In the 1990s, industrial designers began to become the link between market demand and product development, and took as their main tasks how to effectively analyze the market demand information and convert it into a reasonable product. At this time, it became an important research topic that how industrial designers effectively cooperated with other technical personnel in the enterprise.

After 2000, industrial designers began to become the leader of enterprise product development, grasp product design process in all directions and coordinate the tasks of all links such as market, technology, manufacture and publicity (Table 1).

### **2.2 New Development of Industrial Designers in the Background of Industry Convergence**

The rapid development of network technology has an impact on design service of industrial designer from design environment, design methods and tools, design objects, design thought and other aspects. In the background of industry convergence, new

**Table 1.** Evolution of main tasks of industrial designers

Period	Main task of industrial designers
The early 19th century	Unification of art and technology, auxiliary function of product manufacturing
The 1920s and 50s	Design becomes a kind of occupation. Designers produce beautiful, fashionable and durable products according to the demands of consumer
The 1960s and 70s	Design becomes a kind of major. Based on the original design, designers promote to form design culture in the world
The 1980s	Based on the original design, designers become the leader of brand
The 1990s	Based on the original design, designers effectively analyze market demand information and convert it into reasonable products
After 2000	Designers comprehensively grasp design process of products, and coordinate the tasks of each link such as market, technology, manufacturing and publicity

development of design service of industrial designer is mainly embodied in the following aspects:

Firstly, in the background of industry convergence, innovation is the important technical means, and will bring the enterprise huge economic benefits. And industrial designer is just the organizer and performer of the creative activity, will get higher and higher position in the enterprise in the future and become the important talent safeguard of the enterprise in the competition.

Secondly, with the continuous improvement of people's living standards, people obtain the satisfaction of the basic material needs; in the meantime, they more urgently need to obtain the satisfaction of products or personalized spiritual needs of services. It is the higher requirement for industrial designers that how they obtain the latest science and technology, the information of market changes and consumer needs, and put forward the best personalized design plan at the fastest speed in the basis of manufacturing ability of enterprise design.

Thirdly, with the arrival of the era of big data, industrial designers not only take physical product design as design object, but also include all aspects of periphery of product design, such as brand design, service design and interactive design.

### **3 Cooperative Work Contents of Industrial Designers in the Background of Industrial Convergence—Prona Illumination Design as an Example**

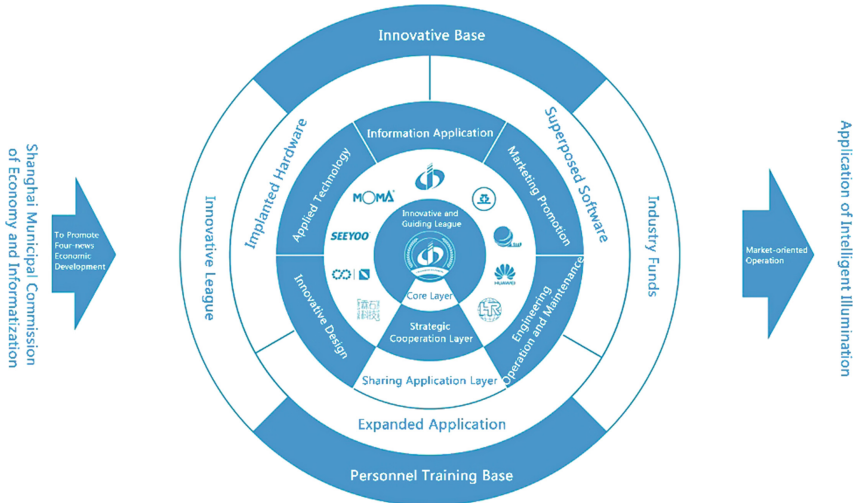
In the background of industry convergence, service mode of traditional design has changed, and design will become transboundary fusion that serves “new technology, new industry, new type of business and new mode”, and thus industrial design plus information plus brand and business model innovation will be the effective collaborative innovation design. In November, 2014, “Prona” intelligent illumination system designed by Torjan Horse was newly displayed at China International Industry Fair,

see Fig. 1. As one of application projects of public service of intelligent city construction, it gathers photovoltaic power generation, LED illumination, micro base station, urban video probe, multimedia advertising, information release, intelligent interaction, convenience services, charging piles and other equipments, and thus realizes the fact that city streetlight is not only lighting tool, but also has communication equipment and city information platform of the information interaction system and management and supervision system of city network. Led by design, Prona intelligent illumination product is new integrated innovative achievement, and involves many industrial areas such as industrial design, energy-saving technology, electronic message, mobile communications, and digital application. Among them, industrial designer plays an important role and better explains specific collaborative work contents of industrial designer in the background of industry convergence.



**Fig. 1.** Product renderings of scheme C product of Prona intelligent illumination

Collaborative design of “Prona” intelligent illumination system is mainly run by innovative league as main unit. Based on innovative league as core layer, it cooperates with Torjan Horse design, Lin Stone technology, Xin Yi technology and Hua Wei and other industrial designs, energy-saving technology, electronic message, mobile communications, digital application and other enterprises, and does product strategic cooperation, that is, strategic cooperation layer. By effectively collaborating with the industries in many ways, it has got sharing application in five aspects of innovative design, applied technology, information application, marketing promotion and operation and maintenance of the project, namely, sharing application layer, and thus realized product’s expanded application, superposed software, implanted hardware and other functions. Finally, under the support of innovative league, innovative base, industry funds and personnel training base (“four in one” for short), it realizes the market operation of the product. See Fig. 2.



**Fig. 2.** System diagram of development mode of collaborative design of “Prona” intelligent illumination system

In the background of industry convergence, industrial designer’s work contents keep updating with the change of extension of design service contents, and the environment that has an impact on design service also keeps changing. As dissipative theory points out, in an open system far from equilibrium, by continuously changing material, energy, information with the outside and making the change of the outside condition get a certain threshold, the original disordered state turns into the ordered state in time, space or function [5]. Industrial designer’s service-driven contents also refer to effectively integrate design resources inside and outside the enterprise and make the enterprise effectively collaborate the inner and exterior of the enterprise, and finally promote the promotion of innovative ability of the enterprise and get stronger competitiveness and economic benefits.

### 4 Three-Layer Service-Driven Characteristics of Industrial Designers

More and more enterprises have realized that design plays an important role in enterprise competition. Based on the research on evolution of design service contents and new development and work contents of industrial designers, the author has summarized and put forward three-layer service-driven characteristics of industrial designers in the background of industry convergence (Fig. 3).

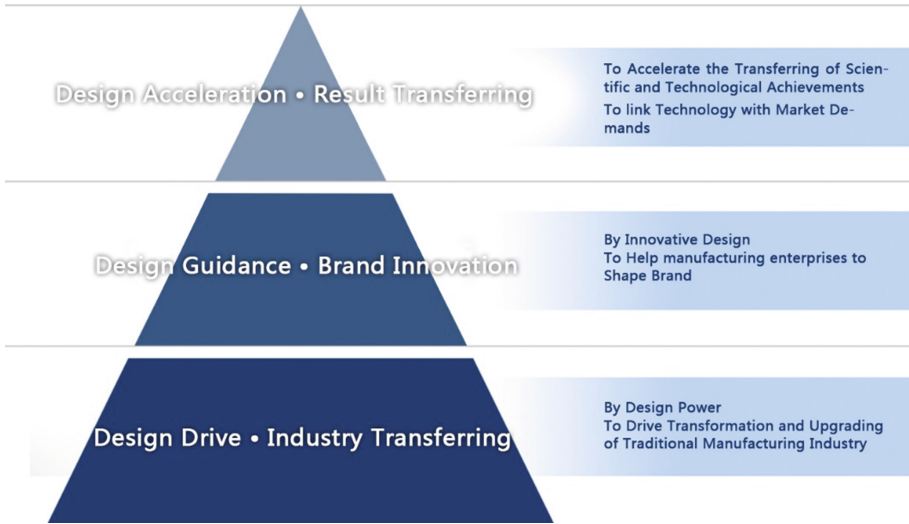


Fig. 3. Three-layer service-driven characteristics of industrial designers

#### 4.1 Design Drives Industrial Upgrading

Innovation is the core element of industrial upgrade. By formative innovation, functional innovation, methodological innovation, cultural innovation and other innovative technological means, industrial designers do product innovation and finally realize the industrial upgrade of the manufacturing industry [11]. Famous Chinese design expert Mr. Xu Ping thinks that if design can pull and re-integrate traditional manufacturing industry or service industry and form new industrial system with more innovative vitality and sensual charm, the then ‘design’ will turn into ‘leading’ type of business from the previous simple ‘subordinate’ type of business, and innovative, intuitive and preferred overall effect characteristics owned by design thinking will be amplified to the atmosphere of the whole new economic activity and creative development and get the promotion of humanized quality in the whole economic and cultural update and economic products in this sense [12].

Jointly promoted by Prof. Cheng Jianxin and Ding Wei etc. from School of Art Design and Media, East China University of Science and Technology and the government of Bao Ying County, Jiangsu Province, “County-based Design Plan” has become the important attempt of the Yangtze River Delta region to actively promote collaborative innovation development and realize that design drives industrial upgrading [20]. From there, we can find that industrial design is the core in innovative industries and knowledge economy. Only when industrial designers integrate advanced manufacturing technology, communication technological sources, traditional cultural resources, industrial resources and agricultural resources by innovative design, traditional manufacturing industry truly can realize industrial upgrading.

## 4.2 Design Leads Brand Innovation

Brand innovation means that with the change of enterprise business environment and consumer demand, brand connotation and manifestation also keep changing [13]. Brand innovation and protection can further promote enterprise market competitiveness, and brand value truly embodies enterprise soft power. When the enterprise grows to a certain stage, it undoubtedly needs the support of the brand, and industrial designer is the advocate and executor of brand innovation. Based on “family intelligent terminal” project developed jointly by our school and ZTE, the paper had found that design-led brand innovation can be embodied in the following aspects:

**Image Update.** In order to further promote enterprise competitiveness, the enterprise needs to determine own uniform image system, including Behavior identity (BI), mind identity (MI) and Visual identity (VI), which are the important tasks of industrial designers. And with the change of market and social environment, manifestation modes and marketing means also need to be constantly updated.

**Product Innovation.** While industrial designers establish the brand, they further improve the innovation on product shape, structure, color, technology, function, specifications, and so on according to the change of consumer demands; they particularly divide target market and accurately position the products, so that they can take effective product strategies.

**To correctly make Good use of Brand Extension Strategy.** Brand extension means that the enterprise promotes new products under the name of the original brand. Industrial designers can develop a series of products, and position brand on a series of products by the higher reputation of a brand and make many products share a brand. In this way, industrial designers not only ensure the smooth extension of the brand, but also make the original brand get a new appealing embodiment.

**To expand Brand Promotion.** Brand publicity and expansion have a direct impact on promotion and application of brand innovation. Industrial designers can adopt diversified means of publicity and ways of promotion and realize the comprehensive display of the brand and interaction between brand and customer. Only when brand is exchanged, it can win support among the people and has standing brand effect.

**To Strengthen Trademark Management.** In brand (trademark) innovation, the enterprise must establish and perfect brand management system, do good jobs of brand registration, filing, acceptance check and use, design the anti-fake label, set up brand management institution and brand protection network, appoint specialized management personnel, and faithfully implement the effective management of enterprise trademark right.

## 4.3 Design Accelerates the Transferring of Results

As a new product design concept and method, industrial design not only becomes the important method of market competitiveness, but also the powerful weapon of the economic development of the whole country and nation. Industrial design dynamically



integrates realization of human demand and technological humanization, and becomes the bridge of the transferring of technological achievements [14]. Industrial designers scientifically and skillfully combine advanced scientific and technological achievements and market demand by creative thinking and put forward solutions and make them realistic, which is the process that design accelerates the technological achievements into products. Based on OLED product developed jointly by our school and Nanjing first Photoelectricity, the paper summarizes result conversion accelerated by design is mainly embodied in the following aspects:

**Functionality Creation.** Simple technological achievements only exist on paper or in the laboratory, and cannot enter into people's daily life. For example, the research and development of Nanjing OLED technology is also in the leading position in the world, but cannot be applied to specific life products. At this time, based on the analysis of consumer demand, industrial designers do social adjustment and reorganization of technological achievements, create new function and target products that meet the demands of consumers, and thus realize functionality creation of the products and accelerate result transformation.

**To Create Beauty in Form.** Like OLED technology, if such modern hi-tech achievements are not innovatively designed, they cannot directly face consumers at all. The creation of beauty in form means that industrial designers effectively combine simple technological achievements and aesthetic form of products by industrial design technology, and thus realize the high-tech sense consistent with the inherent quality and aesthetic form consistent with operative function of products. See Fig. 4.



Fig. 4. Design plans of parts of OLED table lamp

**To Create New Way of Life.** People's way of life depends on the corresponding social material conditions. Product design is equal to people's behavior style design with the help of product, which will have a direct impact on people's daily life. The transformation of technological achievements means that industrial designers create way of life consistent with public value system and achieve the goal that new technology and new products are recognized by society by instillation and guidance.

## 5 Conclusion and Outlook

In the background of industry convergence, the paper has combed evolution of design service contents and new development of industrial designers from the early 19th century to now. Based on literature review, the paper has summarized the specific work contents of the current industrial designers and then put forward the contents of three-layer service-driven characteristics of industrial designers: firstly, driving the transformation and upgrade of traditional manufacturing industries by design power; secondly, helping manufacturing industries to shape brand by design innovation; thirdly, accelerating the transferring of scientific and technological achievements and linking technology with market.

In study, the paper has found that industrial designers should become joint and mutual adhesive with various experts of the enterprise. Based on the training of service awareness of innovative design, application of comprehensive perceptual test means, establishment of design concept of collaborative innovation and others, industrial designers can better serve enterprise manufacturer and consumer. In the meantime, the industrial designer's responsibility consciousness should be transformed from simple delegate object to society and from simple service-oriented design to organization-oriented design, that is, from customer subject consciousness to social subject consciousness, which is the organizational process of design behavior, and can be further deeply developed in the future academic research.

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