

EXPLORING THE ROLE OF INDUSTRIAL DESIGNERS IN ENTERPRISE INNOVATION STRATEGIES FROM THE PERSPECTIVE OF TALENT CULTIVATION

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ABSTRACT

Although, the literature indicates that Industrial Designers play a significant role in supporting companies' implementation of innovation strategies. The literature is not specific enough in to define what specific roles the Industrial Designers undertake in supporting the enterprise innovation strategies. Therefore, based on the five factors and four levels mentioned in Koostra's (2009) Design Management Staircase, this paper proposes a capability requirement map for the evolution of the role of Industrial Designers (Table 1). The research results show that the different roles played by Industrial Designers at various levels in supporting enterprises' innovation strategies are hierarchical and superimposed, which also requires Industrial Designers to possess more comprehensive capabilities. The research results aim to provide educators with more diversified ideas for talent cultivation from the perspective of innovative strategies and to rethink the potential abilities that novice Industrial Designers need to possess in the training process.

Keywords: Design talent, design management, innovation strategy, design process

1 INTRODUCTION

Design Management Staircase [1] assessment tool was developed to ascertain at what level organisations incorporate a design management function to support its innovation processes. It evaluates the organisational approach to design within an enterprise with a focus on the internal hierarchy of design activities.

First, we introduce the Design Management Staircase model (DMS) and its specific four levels: (i-dms) no design, (ii-dms) design as product, (iii-dms) design as function, and (iv-dms) design as culture and the five factors that contribute to assess at what specific Staircase level an organisation operates. Then we will propose four designers' roles (dr): (i-dr) Silent Design, (ii-dr) Product Optimiser, (iii-dr) Design Manager, and (iv-dr) Design Leader; each of these corresponding to one of the four Design Management Staircase model's levels.

The research aims to establish connections between the four Design Management Staircase model levels and the roles of Industrial Designers. We envisage that this information can be used to customise courses in order to cultivate design talents needed by enterprises operating at different levels. Recruiters can also use this knowledge to better match the role of designers with the specific needs of enterprises, thereby responding to the diversity of design talent education and development paths at different levels.

2 FIVE FACTORS IN DESIGN MANAGEMENT STAIRCASE

Buchanan [2] proposed that integrating design into complex organisations has long been one of the significant challenges faced by managers. By adopting a design perspective and applying design methods to address strategic and organisational issues has a potential to significantly transform the connections between enterprises and its stakeholders, such as their customers, and suppliers [3]. The following section introduces each of the five factors that are used to measure the Design Management Staircase model four levels. These are: Factor 1: Awareness of Benefits; Factor 2: Process; Factor 3: Planning; Factor 4: Resources and Factor 5: Expertise.

2.1 Factor 1: Awareness of Benefits

The key factors of awareness of benefits lie in clarifying for the company the "why" and "what" of potential value design, including Industrial Designers [1]. The scope of work of Industrial Designers by the management of an enterprise will directly affect the extent to which design can drive the enterprise to achieve organisational innovation strategies. This is related to the cultural background and strategic vision of the enterprise senior managers. As whether an enterprise wants to establish core competitiveness or gain competitive advantage is closely related to the skills of senior management personnel and their understanding of the expansion and modification of the enterprise's resource base [4]. In addition, the process of an enterprise reconfiguring its existing resources or capabilities needs to be undertaken in a series of specific and identifiable procedures. The affirmation of the value of dynamic capabilities (in combination with existing knowledge in other fields) and the construction in advance are the consensus for further understanding and promoting the competitive advantage of innovation. For different team members involved in the new product development process, it is important to have the awareness of achieving benefits in aspects such as design innovation and competitive advantage, because when an idea is accepted by the group, the group will review the feasibility of this idea in a collective form [5]. The degree to which employees within an enterprise recognise the value of design is also an important factor that affects the support of design for enterprise innovation. When the majority of participants within an organisation reach a consensus on the value of design, this represents the highest degree to which Industrial Designers support an enterprise's innovation strategy. Designers need to integrate the multiple roles of managers and leaders, managing and leading relevant participants to achieve and build a strong and effective team.

2.2 Factor 2: Process

The coordinated unity of strategy, talent, structure, rewards and processes constitutes an important evaluation system for enterprises to achieve the success of organisational innovation strategies, which effectively shapes decisions and behaviours at different levels of the organisation [6]. Among the process factors, as an enterprise manager, it is necessary to consider whether the design management process is incorporated into the core business and strategic planning processes of the enterprise's development. The design process in which Industrial Designers participate is not only reflected in the research and development of new products but also includes effective management collaboration and knowledge sharing among different departments to avoid unnecessary conflicts [7]. Actively guide stakeholders to put forward different ideas and feedback during the design process and aim to avoid potential risks and misunderstandings that may arise in the design process. The Industrial Designer will need to be able to coordinate and promote views of different participants in the design process and making reasonable design decisions at key stages.

2.3 Factor 3: Planning

Among the planning factor, as mentioned in the process factor, enterprise managers need to further clarify the scope of the subjects that Industrial Designers are concerned about, that is, the extent to which the enterprise plan supports the design and construction of the enterprise's strategic development. Scholars have indicated that the scope involved by Industrial Designers is constantly expanding, from the product itself, the product development process, user experience, to the construction of the enterprise's strategic planning vision [8]. When achieving different task goals, Industrial Designers need to have clear planning and management capabilities for future actions, clearly define the main scope of design goals, and thereby further break down complex design problems, plan design processes, and build strategic design visions, etc. In addition, prioritising the goals at different stages is also an important factor in further promoting the realisation of an organisation's innovation strategy.

2.4 Factor 4: Resources

Buchanan believed that design not only needs to fully recognise external service activities (relationships with customers, suppliers and the government), but also needs to plan and manage internal resources, emphasising the importance of organisational structure in analysing and managing resources and design activities [2]. Koostra regards resources as the total sum of all design investments made by the company in design projects, such as the number of designers, financial budget support, training budget, and production technical support [1]. Helfat [9] pointed out that enterprise managers need to be clear about the significance of internal resources, management processes, and the competitive dynamics within the

organisation. In addition, the informal connection content (cultural connotation, organisational culture) in the collaborative relationship between people has gradually become a part of the internal resources of enterprise organisations [10]. Therefore, the organisational structure determines the level of resources available for design. The Industrial Designers should be familiar with and understand the organisational structure of the enterprise and the design resources available to different departments. This includes the integration of explicit resources (such as design knowledge) and implicit resources that are difficult to replicate or imitate (such as experience, design cognition, membership relationships, and culture).

2.5 Factor 5: Expertise

Among the expert factor, the explicit emphasis is placed on the ability requirements for Industrial Designers. As a key figure in discovering, defining and solving design problems, the capabilities that Industrial Designers possess form the basis for determining the extent to which they support the innovation strategies of enterprises. The capabilities that Industrial Designers possess form the basis for determining the extent to which they support enterprises' innovation strategies. As the fields involved in Industrial Designers continue to expand, the capabilities they are also constantly increasing. This is not only reflected in the improvement of professional skills but also includes the requirements for non-professional skills. For instance, in cross-departmental team collaboration, one needs to possess communication, management and leadership skills, sensitivity to the product market, as well as the ability to plan enterprise strategies and many other capabilities [11].

3 REVIEW THE CAPABILITIES AND THE ROLES OF THE INDUSTRIAL DESIGNERS

Design Management Staircase model clarified that design management not only focuses on the visual presentation of companies and brand products, but it also involves non-visual aspects related to the design process itself, product development, production, distribution, sales, delivery and services [1]. Based on the five factors and four levels of the Design Management Staircase, this section will explore potential roles of Industrial Designers in relation to the level design management supports enterprise innovation, technology, knowledge, culture to drive organisations to achieve their innovation strategies (see Table 1).

Table 1. The capability requirements map for character evolution

The level of DM	DR	The function of Industrial Designer					Organizational innovation strategy
		Awareness of benefits	Process	Planning	Expertise	Resources	
No DM (i-dms)	N/A (i-dr)	N/A	N/A	N/A	N/A	N/A	N/A
DM as Project (ii-dms)	Product Optimiser (ii-dr)	Design value in R&D (User experience)	Separate design in NPD	Design group cooperation	Knowledge /Experience /Skill generation	People/Technology /Environment	Technology /Knowledge/Culture -oriented
DM as Function (iii-dms)	Design Manager (iii-dr)	Design value in R&D/ Market competition	Design incorporated in NPD	Cross-departmental cooperation and management	Knowledge /Experience /Skill utilisation	People/Technology/ Environment/ Organization/ Structure/Finance	Technology /Knowledge/Culture -oriented
DM as Culture (iv-dms)	Design Leader (iv-dr)	Design value in R&D/ Market competition/ Corporate culture	System design for NPD	Cross-departmental cooperation and strategic management	Solving social and environmental challenges	People/Technology/ Environment/ Organization/ Structure/Finance/ Policy	Technology/Knowledge/ Culture/Strategy -oriented

DM: Design Management DMS: Design Management Staircase DR: Designer roles R&D: Research & Development NPD: New Product Development

At the first level (i-dms, see Table 1), when enterprises do not use design management function to support their organisational innovation strategies, the Industrial Designers either do not participate, or their roles are taken over by others, or their efforts are "hidden".

3.1 Product optimiser at the project level

At the project level (ii-dms, see Table 1), Industrial Designer act as "Product Optimiser" to support enterprises in achieving organisational innovation. The design function is used as a marketing tool to add value to products during the new product development process through aspects such as appearance, design style, packaging, and marketing. For instance, it stimulates the formation of product-related memories or creates unique products to deepen their irreplaceability. Mugge pointed out that emotional design needs to focus on the emotional connection and dependence between the product and its usage, such as capturing users' memories and endowing the product with emotional value [12]. In the awareness of benefits, the design value is more reflected in the improvement of the visual presentation of the product based on user experience. By further proposing creative ideas through market data,

product optimisation, cost control, technological transformation and other contents, the user experience can be optimised. As a product optimiser, the design did not generate any additional value during the new product development process and rarely established close ties with other departments to support the organisation's internal innovation strategies. To be able to plan and cooperate with members of the new product development team members require Industrial Designers to possess basic communication, collaboration, project and team management skills. At the expertise stage, Industrial Designers need to possess professional knowledge, experience and proficient skills in operating design software (such as CAD/Rhino/UI, etc.) to generate the domain knowledge required for product development. In the resources, communication with different personnel, the degree of technical support, and the environment of cooperation will directly affect the quality of design work and the efficiency of design projects. When design management is used to support the innovative development of enterprises at the project level, technology and knowledge are important indicators that directly affect the realisation of innovation strategies.

3.2 Design manager at the function level

At the function level, Industrial Designers act as “Design Manager” to support an organisation in achieving innovative strategies. Based on the concept of ‘Managing as Designing’ proposed by Boland [13]. As a manager, the goal is to provide creative changes in the management methods, technologies, manufacturing and other aspects of the internal systems of the enterprise, thereby building a communication bridge for cross-departmental integration and product development, and transforming ill-structure problems into well-structured problems that can be solved [13]. At the high awareness of design benefits in the organisation, the value of design is not only reflected in the product development itself but also covers the innovation process. This also means that design function requires collaboration among different departments within the organisation. At this level, the Industrial Designers need to reconsider the key factors of design in achieving product innovation strategies from multiple dimensions, including individuals (Industrial Designers), groups (Design Departments), and organisations (cross functional collaboration across engineering, marketing, sales, and other departments during the new product development stage). This requires managers to have the ability to optimise the design process and improve and adjust the organisational structure. Managers need to seek opportunities for cross-departmental collaboration at the appropriate stage; In the process, as design experts taking responsibility for the organisation's management of the innovation process requires the ability to strategically and systematically manage the design process. If the design function is well managed within the enterprise, management knowledge is imparted to Industrial Designers, and the design thinking and the ability to use design methods and tools of non-Industrial Designers are cultivated to help the enterprise achieve growth goals. The design thinking methodology of “people-oriented, prototype iteration, and empathetic insight” is introduced into the enterprise’s innovation process, promoting the integration and practice of design thinking throughout the entire innovation process of the enterprise. In the planning, Industrial Designers need to collaborate with personnel from different departments of new product development around product services, brand design strategies, and user experience to complete the product delivery and build an innovative team that crosses departments and disciplines. In the expertise, more emphasis is placed on the rational application of knowledge, skills and experience to shape corporate culture. This includes a comprehensive understanding of changes in the existing market, social and cultural background, enterprise architecture model and political background, etc., to achieve technological and cultural transformation of the enterprise design model. In the resources, as a manager, when helping an enterprise achieve its strategic goals, one needs to take into account communication and cooperation among personnel, technological changes, the culture atmosphere of the enterprise, organisational structure, and financial support, etc., so as to realise the different functions of the enterprise at each level. In conclusion, to support enterprises in achieving organisational innovation strategies at the functional level, a model oriented towards technology, culture and knowledge will be more likely to realise the organisational innovation strategies of enterprises.

3.3 Design leader at the cultural level

At the cultural level, Industrial Designer undertake the role of leaders. This means that design function changes the original environment, organisational strategies, and future plans of the enterprise. The management supports the strategic vision of the enterprise through design, which not only includes the formulation of strategies within the enterprise organisation It also involves the construction of forward-

looking scenarios with the organisation's external environment. This is consistent with Hsieh, who pointed that design leaders need to possess a strategic vision, professional skills, and design leadership [14]. In the awareness of benefits, the value of design is not only reflected in the development of new products, system coordination and management design, and process innovation in other departments, but also in addressing the challenges faced by today's world and society based on cultural and knowledge backgrounds and designing for the future. In the process, when Industrial Designers are confronted with the ill-structure problem of the social system, they not only need to consider the user experience and the optimisation of the service system, but also need to consider whether the strategic decisions of the enterprise have a positive impact on social culture and whether they have forward-looking significance. In the planning, Industrial Designers need to take into account multiple aspects such as user needs, user service experience, market research on competing products, internal and external coordination of the organisation, clarifying the planning and design process, building an innovative atmosphere in line with the corporate culture, identifying and bridging the gaps in the innovation strategy and execution process, and influencing brand positioning, market share and business model through design. In the resource, Industrial Designers need to rationally allocate the key resources that directly affect the implementation of innovation strategies based on the priority of the strategies, break down the innovation goals, and form a feedback mechanism for factors such as knowledge, talent, technology, and culture to further optimise the deficiencies in the enterprise's innovation process. They should also put forward feedback suggestions through visual data reports. In terms of expertise factors, Industrial Designers need to be proficient in applying and imparting design tools and methods to non-participants. During the process of actively participating in the formulation, support and optimisation of corporate strategies, they also need to apply design thinking to develop innovative processes for the enterprise and promote consensus on corporate culture both within and outside the organisation. In the process of multi-disciplinary and cross-departmental collaboration, perceive and predict future market development trends, the potential feasibility of technologies and products, and changes in user pain points. In summary, the role of Industrial Designers is to spread the seeds of design thinking throughout the entire organisation, not just limited to systematising design thinking throughout the entire product production cycle process. At the same time, guide cross-departmental use of design methods and tools to complete process-oriented work content, and the design value guides enterprises to achieve organisational innovation strategies in the form of cultural display.

4 CONCLUSIONS

We suggest that the integration level of design in the organisation and the degree of support from enterprises for design management directly affect and restrict the role boundaries of designers. The success of design function depends on the full support of the enterprise for the corresponding five factors and by dynamic matching of designers' capabilities. Among the factors of "Expertise" and "Resources", the issue to be addressed is "How to do it", while among the factors of "Planning" and "Process", the problem to be solved is "How to manage". Among the factors of "Awareness of Benefits", what needs to be addressed are the essential issues of "Why to do it" and "What needs to be done". Compared with the degree of the five factors from low to high, the ability requirements for Industrial Designers have gradually shifted from "What to do" to "What to plan", and the role they undertake has also evolved from "Silent design" to "Team leader". This is consistent with the different roles that Industrial Designers undertake at four levels. From the perspective of talent cultivation, different roles have different independent value of existence, corresponding to the hierarchical progression from "i-dms" to "iv-dms". The role of Industrial Designers at different levels is not to replace but to continuously complement, which also means that designers need to possess more comprehensive capabilities.

For educators, it is necessary to rethink the goal of cultivating design talents. The ultimate goal should not be to become a single all-round designer, but to cultivate differentiated talents for different design management levels to achieve the creation of corresponding value at corresponding levels. Design talents need more diversified training paths. "Diversity" should be based on the theoretical framework of the design management staircase as its logical foundation, and the cultivation of different ability levels of design talents should be classified through systematic knowledge reconstruction. According to the dynamic matching and integration levels among organisations, designers need to undertake different roles and possess different capabilities. The success of design depends on the full support of the enterprise organisation for the corresponding five factors and the two-way dynamic matching of the designer's capabilities. Through systematic knowledge reconstruction, the cultivation of different ability

levels of design talents is classified. This is not only reflected in the imparting of design knowledge, but also in the cultivation of more tacit knowledge (e. g. experience) and abilities during the design process, corresponding to the dynamic matching and integration level among organisations. At the top level, designers need to possess more comprehensive capabilities such as coordination, management and leadership.

For the development of an enterprise, the role framework that Industrial Designers undertake at different levels can serve as a toolkit to help the management of the enterprise clarify the level of support for Industrial Designers to achieve the organisational innovation strategy and refine the ability requirements for design talents to avoid value mismatch.

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