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THE ROLE OF PRODUCTION MANAGEMENT AND ITS FUNCTIONS IN THEORY AND PRACTICE OF INDUSTRIAL DESIGN

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Introduction

The conditions for effective innovation include good cross-functional communication systems and techniques to share and appraise knowledge and experiences. They also include a formalized way of enabling projects to progress from concept to completion such that projects that will not make the grade can be eliminated in a timely fashion. As a part of innovation, industrial design requires the same conditions. It is a mistake to understand industrial design as a discreet element; that is, to only see part of the activity directly undertaken by the specialists. It would be the same as if we considered that the concerns of money in a company belonged only to those people in the finance and accounting office. It is a general managerial responsibility to work to integrate the specialist designers and other requirements of the product. This should be understood as, being sure that there is a good fit with what is proposed by industrial designers and the abilities of the company to make and sell the product. So, on the one hand, there are the concerns of the designers, but on the other hand there are also the concerns of the manufacturers and marketers. Each has a different, but equally, valid reality of needs and circumstance.

Production may be referred to as the process concerned with the conversion inputs of raw materials, machinery, information, and manpower into output, semi-finished and finished goods and services with the help of certain processes such as planning, scheduling and controlling just to mention a few. Guru (2002) asserts that management is the process of exploitation of these factors of production in order to achieve the desired results. Thus, production management is the management by which scientific planning and regulation sets into motion the part of an enterprise to which it has been entrusted the task of actual transformation of input into output.

Industrial design is a process of design applied to products that are to be manufactured through techniques of mass production. All manufactured products are the result of a design process, but

the nature of this process can take many forms. An individual or a large team can conduct it. It also emphasizes intuitive creativity or calculated scientific decision-making. According to Buttle (1997), production management refers to the application of management principles to the production function in a factory. In other words, production management involves application of planning, organizing, directing and controlling the production process.

Since the primary purpose of economic activity is to produce utility for individuals, we count as production during a time period, all activities, which either create utility during the period or which increase ability of the society to create utility in the future. Business firms are important components of the economic system. They are artificial entities created by individuals for the purpose of organizing and facilitating production. The essential characteristics of the business firm is that it purchases factors of production such as land, labour, capital, intermediate goods, and raw material from households and other business firms and transforms these resources into different goods or services, which it sells to its customers. Production management is not independent of marketing, financial and personnel management.

It is observed that one cannot demarcate the beginning and end points of production management in an establishment. The reason is that it is interrelated with many other functional areas of business, marketing, finance and industrial relation policies. Alternately, production management is not independent of marketing, financial and personnel management because it is very difficult to formulate some single appropriate definition of production management. According to Bell, (1994), production management deals with decision-making related to production process so that the resulting goods and services are produced in accordance with the quantitative specifications and demand schedule at minimum cost. The emphasis in this definition is on proper planning and control of production management. It looks from the above definitions that production planning and control are the main characteristics of production management. The organization will be able to achieve its objectives only if production planning and control are exercised properly.

Management becomes essential for directing and unifying group efforts towards a common objective. It integrates various activities to get objectives achieved. Management is the activating agent for getting work done through its personnel. Today, production is done on a large scale basis to cope with increasing demand for goods and services at the national and international level. This has increased the competition in the market. Increasing competition requires efficient and effective handling of men and materials.

Functions of Production Management

The functions that production management performs can be broadly categorized into planning, organizing and controlling. The definitions discussed above clearly show that the concept of production management is related mainly to the organizations engaged in production of goods and services. Earlier these organizations were mostly in the form of one-man shops having insignificant problems of managing the productions. With development and expansion of production organizations in the shape of factories however, more complicated problems like location and lay out, came into existence. This resulted in the development of production management in the area of factory management. In the beginning the main function of production management was to control labour costs, which at that time constituted the major proportion of costs associated with production. With development of factory system towards mechanization and automation however, the indirect labour costs increased tremendously in comparison to direct labour costs, e.g., designing and packing of the products, production and inventory control, plant layout and location, transportation of raw materials and finished products etc. The planning and control of all these

activities required more expertise and special techniques. Functions of production management includes selection of product and design, selection of production process, selecting the right production capacity, production planning, routing, scheduling, production control, quality and cost control, inventory control, and maintenance and replacement of machines.

Design Management

Today design is not simply about aesthetics or making a product easier to use. The traditional role of design in business was on skills associated with the intuitive, visual and sensual ways of working (Cross 1993). Whyte, Salter and Gann (2003) suggest that leading companies recognize that design is an intellectual asset and they invest in extending these capabilities. The role of a designer in a company is growing and those complementary design activities are from marketing, management and market research. This shift is most recognizable in the new product development process, where the role of a designer is most important. Perks, Cooper and Jones (2005) suggest that three distinct roles can be discerned: functional, integration and process leadership, where the last two being far away from traditional scope of any designer's work. Designers more often take actions to manage and lead the development process, along with non-design functional actions. Different roles lead to different management structures and the value of design management to business has been recognize for many years. As Bruce and Bessant (2002) put it: "Good design does not happen by accident, but rather as the result of a managed process". At the same time however, literature provides the view that the term 'design management' presents a significant challenge, as it contains a contradiction between the remits of the disciplines of design and management. Borja de Mozta (2003) stresses that design is based on exploration and risk-taking, whilst management is founded on control and predictability.

Design management is a field of inquiry that uses project management, design, strategy, and supply chain techniques to control a creative process, support a culture of creativity, and build a structure and organization for design. The objective of design management is to develop and maintain an efficient business environment in which an organization can achieve its strategic and mission goals through design. Design management is a comprehensive activity at all levels of business from the discovery phase to the execution phase. Design management is the business side of design. Bell and Lilian (1994) assert that design management encompasses the ongoing processes, business decisions, and strategies that enable innovation and create effectively-designed products, services, communications, environments, and brands that enhance our quality of life and provide organizational success.

The discipline of design management overlaps with marketing management, operations management, and strategic management. Traditionally, design management was seen as limited to the management of design projects, but over time, it evolved to include other aspects of an organization at the functional and strategic level. A more recent debate concerns the integration of design thinking into strategic management as a cross-disciplinary and human-centred approach to management. This paradigm also focuses on a collaborative and iterative style of work, compared to practices associated with the more traditional management model. Design has become a strategic asset in brand equity, differentiation, and product quality for many companies. More and more organizations apply design management to improve design-relevant activities and to better connect design with corporate strategy.

Early contributions to design management show how different design disciplines were coordinated to achieve business objectives at a corporate level, and demonstrate the early understanding of design as a competitive force. In that context, design was merely understood as an aesthetic

function, and the management of design was at the level of project planning. The practice of managing design to achieve a business objective was first documented in 1907.

The Deutscher Werkbund (German Work Federation) was established in Munich by twelve architects and twelve business firms as a state-sponsored effort to better compete with Great Britain and the United States by integrating traditional craft and industrial mass-production techniques. A German designer and architect, Peter Behrens, created the entire corporate identity (logotype, product design, publicity, etc.) of Allgemeine Elektrizitäts Gesellschaft (AEG), and is regarded as the first industrial designer in history. His work for AEG was the first large-scale demonstration of the viability and vitality of the Werkbund's initiatives and objectives and can be considered as first contribution to design management.

In the following years, companies applied the principles of corporate identity and corporate design to increase awareness and recognition by consumers and differentiation from competitors. Olivetti became famous for its attention to design through their corporate design activities. In 1936 Olivetti hired Giovanni Pintori in their publicity department and promoted Marcello Nizzoli from the product design department to develop design in a comprehensive corporate philosophy. In 1956, inspired by the compelling brand character of Olivetti, Thomas Watson, Jr., CEO of IBM, retained American architect and industrial designer Eliot Noyes to develop a corporate-wide IBM Design Program consisting of coherent brand-design strategy together with a design management system to guide and oversee the comprehensive brand identity elements of: products, graphics, exhibits, architecture, interiors and fine art. This seminal effort by Noyes, with his inclusion of Paul Rand and Charles Eames as consultants, is considered to be the first comprehensive corporate design program in America. Up to and during the 1960s, debates in the design community were focused on ergonomics, functionalism, and corporate design, while debates in management addressed just in time, total quality management, and product specification.

Managing Design Methodically

The work of designers in the 1960s was influenced by industry, as the debate on design evolved from an aesthetic function into active cooperation with industry. Designers had to work in a team with engineers and design was perceived as one part of the product development process. In the early years, design management was strongly influenced by system science and the emergence of a design science. Early discussions on design management were strongly influenced by Anglo-Saxon literature, methodological studies in design research and theories in business studies. Design management dealt with two main issues:

- How to develop corporate systems of planning aims
- How to solve problems of methodological information processing

Instruments and checklists were developed to structure the processes and decisions of companies for successful corporate development. In this period the main contributors to design management were Michael Farr, Horst Rittel, HfG Ulm, Christopher Alexander, James Pilditch, the London Business School, Peter Gorb, the Design Management Institute, and the Royal Society of Arts. Debates in design disciplines were focusing on design science, design methodology, wicked problems, Ulm methodology, the relationship of design and business, new German design, and semiotic and scenario technique (Wikipedia 2019).

Industrial Design and Innovation

Design is most readily understood in terms of tangible things, for example automobiles, computers, clothes, furniture, restaurants and shops. Most people use the word for both functionality and style.

According to Dumas and Angela (2003), industrial design is therefore, a part of innovation. It makes its most significant contribution in the differentiation of similar products either by making them appear very different through colour and style, or by enhancing them with detail and minor additional features. In more radical innovation where new technology is involved, industrial design usually has a less central role because the novelty is provided by the new functionality. There are occasions where the new technology needs to be made more palatable to consumers and then the role of industrial design is more centre stage. An example of this is in areas of medical technology, where patients need to be re-assured about new machines and procedures. If we return to the major contribution of industrial design, examples include the increasing variety in lap top computers, the increasing number of small consumer electronics for the home where colour and style are becoming the major differentiators. All increase market range and therefore consumer choice.

The Effects of Organization Structure on Design

There are three main structural forms for design, one is where a single function has control, another is where there are separate design functions, usually industrial design and engineering and a third where one of these separate functions dominates the other. A fourth form of structure, though not often seen, is where functions share control of design, for example marketing. The second for separate design functions is often found in industries. This model is often quite comforting to both designers and managers but it is not a model that encourages real innovation. Innovation tends to come out of the separate chimneys. Nevertheless, this form of structure has created some very successful enterprises and should not be entirely dismissed. In the past, when the flaws in this chimney model were first identified, some firms tried an alternative.

For a while Ford tried placing industrial design in the dominant role with the industrial designers or stylists as they are often known in the car industry, developing the initial design with other designers in engineering having to conform to it. The reverse situation is probably more often seen, however, where engineers dominate and the industrial designers are brought in to wrap the engineer's product in some kind of pretty skin that ensures that the whole thing ends up being attractive and user friendly. On balance, making one design group dominant over another unbalances the design reality, and is therefore, unlikely to be a sustainable model for success. It is a structural form that is best avoided, because as problems become evident in initial design, the only recourse is to throw them back over the wall for redesign, which inevitably results in costly delays.

Conclusion

In conclusion, production management has an undoubtedly important role to play in theory and practice of industrial design. Since there is a general move in all industry to flatter, less hierarchical structures and an emphasis on team and cross functional working, the potential to integrate industrial design is quite real. To achieve integration it is essential to consider what we might refer to as a cooperative design structure. In this situation the absolute structure of the company is now less influential because a commonly held design reality spans all functions. Industrial design specialists are respected for their particular capabilities and in turn, these specialists respect the design expertise of general managers.

It is these managers who are hands-on designers of product-market fit. In this design reality, design is not understood as a particular activity undertaken by a particular individual or function. It is rather understood more as a sort of umbrella. Under the centre of the umbrella are the specialized design activities, the functions of industrial design. Still under the umbrella, are the activities of those in marketing and production that are linking needs of manufacturing processes and the

purchasing customers. Holding all this together is the general manager whose task it is to ensure appropriate levels of cooperation among the various specialized functions and the broad fit of product, process and context.

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