

Design-Based Innovation for Manufacturing Firm Success in High-Cost Operating Environments

Abstract The manufacturing sector is increasingly looking to innovation to ensure productivity growth, especially in high-cost operating environments to achieve non-price based competition. The paper begins with an overview of regulatory, technological and consumer trends and developments impacting manufacturing. It considers the shifting balance between fragmenting and concentrating forces of global supply chains, and how manufacturing firms themselves are changing. This overview is followed by a discussion of the pivotal constituents of success for firms operating in high-cost environments, and concludes with the fundamental importance of innovation as a basis for success.

The paper then discusses value creation, value appropriation, and design-based innovation, and argues that manufacturers need to understand key differences between these paradigms. In particular, the difference between art and design is articulated, to avoid an otherwise common confusion between the two. The importance of an inter- and trans-disciplinary approach to innovation is emphasized, including the use of four value creation strategies – science and technology, design, art, and reverse-hermeneutic innovation.

The paper concludes that the design-based innovation paradigm is increasingly important within the manufacturing industry, but that its benefit can only be maximized if it is integrated with the other three value-creating approaches to innovation.

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Introduction

In the manufacturing sector, innovation is seen as a fundamental way to ensure productivity growth. This is especially important in high-cost operating environments where there is a need to engage in non-price based competition. Non-priced based competition is made up of a series of complex strategies that ensure inimitability. Some examples of this are customer co-creation and customization, service experience delivery, ongoing design-intensive innovation processes, and the production of offerings that operate on the performance frontier through technological innovation.¹ Successful non-price based competition requires continuous provision of multi-dimensional value for money – as opposed to offerings from low-cost operating environments – and the adoption and deployment of advanced manufacturing technologies is seen as means to this end.²

This complex operating environment is influenced by a number of forces. These include government policy, technology development, productivity expansion and growth, ever-changing customer preferences, the shifting balance between fragmenting and concentrating forces of global supply chains, and the dynamics of change within the manufacturing firms themselves. Applying the appropriate value-creating paradigm is essential for successful innovation.

It is possible to identify four value-creating paradigms: science and technology innovation, design-based innovation, art-based innovation, and reverse hermetic-based innovation. Later in this paper these paradigms will be addressed in greater detail, but first there is a need to understand value creation, and the complex environment in which value-creating innovation is to take place. Value-creating innovation should not be confused with an innovation strategy or an innovation management system.

An innovation strategy is not the same as a Research and Development (R&D) strategy. Research can be defined as the conversion of money to knowledge, whereas innovation is the conversion of knowledge to money. A research strategy is the articulation of the domains in which new knowledge is to be developed. Any causality between R&D spending and firm success is ambiguous at best. However, it is still necessary to dedicate R&D resources toward competencies development to explore options for innovation, even though this practice does not assure success.³ Spending more money on R&D is not the simple answer,⁴ nonetheless, firms that invest heavily in R&D reap the benefits of invention in the form of patents and new insights that become published papers. Invention is not innovation. Invention requires the successful introduction of something new into the firm and/or marketplace.⁵ In contrast, in its simplest form, an innovation strategy is the articulation of particular problems whose solutions would improve company performance, but for which there are presently no known off-the-shelf solutions.⁶ Anderberg and Roos note that an innovation management system embodies the processes, systems, and structures that an organization deploys to ensure that innovation itself becomes a business process – and is managed as such – rather than a one-time solution that occurs at random. The principle characteristics of an innovation management system are described in detail in an earlier publication.⁷

Value-creating innovations are pursued to maximize the value that an innovation holds from the customers' point of view. These types of innovations are:⁸

- Efficiency improving innovations that enable cost cuts which are then (partially) passed on to customers. These innovations normally occur when the firm finds new ways of reducing the nine types of waste identified through the Lean approach – unnecessary transportation, rework, overstock, overproduction, waiting time, non-value adding activities, non-value adding processes, unused creativity, and intellectual waste, i.e., an overqualified person on the job;

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