



# Contributions of design emphasis, design resources and design excellence to market performance in technology-based service innovation



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## ABSTRACT

The value of design in product innovation is widely acknowledged and supported by empirical research, although extant research tends to focus solely on the role of designers, or design excellence, or design emphasis. Design in the context of service innovation is less well understood. Technology-based firms are viewed as key loci of innovation and, indeed, this innovation is not limited to product innovation, even though many of the stereotypes that come to mind have to do with the development of ever more technologically advanced 'widgets'. In response to the gaps in current literature, this work takes a holistic approach to measuring design and examines how design resources (designers), design emphasis (emphasis on aesthetics and experience) and the outcomes of design (design excellence) jointly contribute to market performance in technology-based firms engaged in service innovation. Based on a survey conducted among managers of 176 technology-based service firms and evaluations of design excellence by design experts, the findings suggest that design emphasis and design resources both contribute to market performance. Surprisingly, design excellence is not found to contribute to market performance and possible reasons for this are discussed.

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## 1. Introduction

A growing body of research has demonstrated that integrating design in the innovation process can contribute to enhanced business performance. The value of design as an element of product innovation is widely acknowledged (e.g., Gemser and Leenders, 2001; Hertenstein et al., 2005), while design in the context of service innovation is less well understood, although there is some work that suggests the value of design in this context (e.g., Candi, 2010a). The aim of this research is to examine how design contributes to market performance in technology-based service innovation. Design is a vague term, fraught with a wide range of interpretations, and therefore, this research takes a holistic view that entails including design resources, design emphasis and design excellence in one research model.

Technology-based firms are generally viewed as key sources of innovation (Autio, 1994; Dolfsma and van der Panne, 2008; Spencer and Kirchoff, 2006; Bollinger et al., 1983) and, even if a common stereotype has to do with the development of ever more technologically advanced 'widgets', technology-based firms also develop new services. Furthermore, technology-based firms are often (albeit

sometimes only stereotypically) seen as bastions of engineering and technological emphasis with little attention paid to design (Okudan and Zappe, 2006; Candi and Saemundsson, 2008). Thus, technology-based service firms are a particularly interesting context in which to study the value of design for service innovation.

Two trends are worth noting when examining innovation in technology-based firms and the role of design, namely *servitization* of products and *productization* of services (Baines et al., 2007). The trend towards servitization has been driven by the realization that services often account for a greater share of profits than products, even in manufacturing firms (Pawar et al., 2009). Servitization commonly requires new business models and new perspectives on ownership as well as new approaches to design, where the focus broadens to include not just the design of physical objects, but also to the design of service experiences. The productization trend is commonly seen in professional service firms, such as software development firms, and also calls for new business models. In these instances firms are faced with the limits to profitability imposed when selling their services based on a 'time and materials' model. These firms strive to find ways to standardize and package their services as products, which can be sold and resold with minimal customization. Here, whereas design might not have been at the forefront during service development, the recognition of the potential importance of design comes up when faced with

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redefining a service as product, which might, for example spur efforts to counteract intangibility with design (Ma et al., 2002; Candi, 2007). Together, these trends of servitization and productization result in a seemingly seamless continuum between products and services, the middle of which is referred to as PSSs (Product-Service Systems), defined as “systemic solutions including products and services” (Morelli, 2003, p. 73). This continuum blurs the boundaries between product design and service design. Nevertheless, research on design as an element of service innovation has lagged behind, with the prevailing emphasis being on design in product innovation.

Existing research on design tends to focus exclusively on engineering design or include a broad spectrum of activities such as architecture, interior design, industrial design, graphic design, styling and branding. To further confuse the issue, some authors use the term design as basically synonymous with product/service development (e.g., Bruce et al., 2007). Drawing on the theory of the experiential view of consumption (Holbrook and Hirschman, 1982), this research views design as distinct from engineering design (or functional design) and defines it to comprise aesthetic design and experiential design (Candi, 2010a). Thus, design is viewed as a distinct part of the innovation process – the part that focuses on aesthetic and experiential concerns. This is in line with Moody's (1984) proposal of a partitioning of product design into engineering design and industrial design. The industrial design concept – being generally associated with the creation of tangible products – is too narrow when considering innovation that can result in less tangible service offerings. Instead, aesthetic and experiential design in the context of services, are together viewed as analogous to industrial design in the product context. Aesthetic design, sometimes referred to as visceral or sensorial design, is design that appeals to the senses (Norman, 2005). Although aesthetic design is commonly thought of as intended to appeal to the visual sense, it also encompasses the design of sounds, textures, tastes and smells. Experiential design, referred to by Norman (2005) as reflective design, is concerned with engendering a reaction within persons through symbols, culture, meaning, and emotional and sociological aspects such as self-image and group membership (Beltagui et al., 2015).

Lado and Wilson (1994) propose a model of competitive advantage grounded in the resource-based view (RBV) that distinguishes four categories of firm resources and capabilities. The first category is managerial competencies, which include capabilities to articulate a strategic vision and empower people to realize this vision. The second category is input-based competencies that encompass physical resources, capital, human resources, knowledge, skills and expertise. The third category is transformational competencies that allow a firm to convert inputs into outputs and includes innovation capabilities. The fourth and final category is output-based competencies, which include tangible and intangible evidence of “efficient and effective utilization or organizational resources” (Lado and Wilson, 1994, p. 708). Applying Lado and Wilson's model, one can propose that design emphasis is a form of strategic vision that can be supported by managerial competencies, that design resources constitute a category of input-based competencies based on knowledge, skills and expertise, that the capability to transform inputs into outputs can be equated with an effective innovation process and finally, that design excellence – embodied in the outputs of design – is an output-based competency.

Building on Lado and Wilson's (1994) model, this work takes a holistic view of design and examines how design capacities/resources (input-based competencies), design emphasis (emphasis on the aesthetic and experiential aspects of services driven by managerial competencies) and outcomes of design (output-based competencies), all existing within the innovation process (transformational competencies), jointly contribute to market performance

(another output-based competency) among technology-based firms engaged in service innovation. The holistic view of design taken in this research constitutes one of its key contributions.

Data collected from 176 technology-based firms at two points in time (one year apart) are used to test relationships using a structural model. The findings suggest that design emphasis contributes more to market performance than the involvement of designers (design resources) in technology-based firms engaged in service innovation. This lends credence to the notion that design in technology-based firms need not be executed or driven by designers – which resonates with the notion of *silent design* (Gorb and Dumas, 1987), defined as design performed by those who are not designers and whose formal role is not design. Design excellence, whether evaluated by design experts external to the firms or the firms' managers, is not found to contribute to performance. Thus, it seems that a technology-based firm's overall stance, or intention, with regard to design in service innovation is most influential when it comes to market performance. The relationships found in the structural model add to our understanding of how design can play a positive role in service innovation in technology-based firms as well as suggesting how these firms might best take advantage of this opportunity.

The rest of this paper is organized as follows. The theoretical background is discussed and hypotheses developed. This results in a research model tested using the methodology described. The findings are discussed followed by implications for theory and practice, and conclusions.

## 2. Background and hypotheses

Research on design as an element of innovation varies a great deal in the definitions of design used and in how design is measured. Design has largely been operationalized in one of three ways (Candi and Gemser, 2010). In the first place, some research uses *design emphasis*, measured in terms of the weight placed on design in the innovation process (e.g., Candi, 2010a). In the second place, some researchers use *design resources* as a measure of design, for example by measuring the time or human resources spent on design (e.g., Gemser and Leenders, 2001; Roy and Potter, 1993; Swan et al., 2005). Thirdly, there is research that focuses on the outcomes of design – or *design excellence* – either as evaluated by customers (e.g., Moody, 1984) or as evaluated by design experts or peers (e.g., Hertenstein, et al. 2005; Platt, et al. 2001). As discussed above, these three approaches correspond roughly to strategy driven by managerial competencies (design emphasis), input-based competencies (design resources), and output-based competencies (design excellence) in Lado and Wilson's (1994) model of competitive advantage. Extant research on design tends to test models that consider only one measure of design. However, it makes intuitive sense to recognize that design emphasis is likely to be driven, at least to some extent, by the presence of design resources, and vice versa. Likewise, design excellence is less likely to spring up of its own accord than to stem, at least in part, from an emphasis on design and the availability of design resources. Overall, with its focus on how design contributes to market performance, this research is aligned with the view that design is a mechanism for value creation (D'Ippolito, 2014).

This research conceptualizes design as a combination of aesthetic design and experiential design. Aesthetic design is relatively easy to understand as it has to do with aspects that can be perceived with the human senses. Experiential design is somewhat more elusive, but no less important, as expressed by Crawford and Mathews (2001, p. 16): “Historically, product features and functions were the primary determinants of value in business. Build a better mousetrap, and the world will beat a path to your door. Today,

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