

Chapter 14

Knowledge Transfer in Product-Based Service Design

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ABSTRACT

Recently, manufacturing companies have been moving into product-based service businesses in addition to providing the products themselves. It is not easy for engineers in manufacturing companies to create new service businesses. In order to design product-based services more effectively and efficiently, systematic design methods suitable for the service businesses have been proposed, which provide design processes, checklists, and patterns. However, inexperienced designers still feel difficulties because they cannot understand the meaning of the checklists and patterns. In this chapter, the authors propose knowledge transfer in product-based service design, in which structured design cases are used to understand and utilize the checklists and patterns in the service design method called DFACE-SI.

1. INTRODUCTION

Many manufacturing companies have tended to integrate services into their core product offerings in light of the ongoing transformation from a traditional industrial society to a knowledge-based society. This transformation to product-based services is one of the issues of utmost urgency for manufacturing companies especially in the recent era of fierce global competition. There are three main reasons for product-based services within this context:

1. **Value co-creation with customers (customer requirements):** Customers require a value creating process (e.g., driving) with a product, and do not require the product itself (e.g., a car) in societies where commodities have already spread to some extent (Vargo & Lusch, 2008).
2. **Product differentiation from competitors (company requirements):** Services can provide continuing value to customers and earn revenue through a life cycle of products (e.g., proactive maintenance by remote monitoring). The servitization of product-based

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businesses is important for manufacturing companies to avoid confrontational price competition.

3. **Correspondence with environmental issues (social requirements):** Circulatory societies are required to solve environmental issues. Transitions from providing products themselves to providing functions of the products through rental and leasing services can make it possible to satisfy customer's requirements with fewer resources.

However, engineers who have been designing products for a long time encounter difficulties when they try to design services. This is because their skills, mental models, design processes, and organizations have been built up and optimized for product design and not for services. They need systematic methods of design and tools for more effectively and efficiently designing product-based services. Thus far, several methods and tools have been proposed for product-based services in which service design frameworks (charts, checklists, patterns, and procedures) have been introduced.

These design frameworks have been extracted as codified knowledge from the knowledge transfer viewpoint by condensing knowledge gained from experience in past service design projects. Although they are useful for experienced service designers, they may be insufficient for inexperienced designers. Inexperienced designers may only superficially understand the meaning of these frameworks because of they are limited receptors of knowledge. In other words, their absorptive capacity is limited (Cohen & Levinthal, 1990) and it is consequently not easy for them to use these frameworks. In these situations it is effective to link the design frameworks (codified knowledge) with past real design cases including tacit knowledge. By reading cases related to frameworks, engineers can vividly imagine opportunities and difficulties with their service design. We have developed a method of designing product-based services, called DFACE-SI (Define, Focus, Analyze, Create

and Evaluate Service Innovation) (Uchihira et. al., 2008). This paper expands DFACE-SI from the knowledge transfer viewpoint, in which design cases are utilized in collaboration with design frameworks, especially checklists and patterns.

This chapter is organized as follows. Section 2 discusses knowledge transfer model in design, and we propose knowledge transfer process in service design method DFACE-SI in Section 3. Section 4 discusses related works, and Section 5 gives our conclusions.

2. KNOWLEDGE TRANSFER IN DESIGN

There has been a lot of literature on knowledge transfer within the knowledge management context (Eisenhardt & Santos, 2002). Transferred knowledge can be classified into two categories of product and process knowledge (Kubota & Taura, 1996). Although there has been much research on the transfer of product knowledge including technology transfer, there has been little research on process knowledge transfer. This paper focuses on design process knowledge. Here, three approaches to knowledge transfer in the design process are discussed including checklists, patterns, and cases that are used in methods of service design.

- **Design Checklist:** Checklists are ordinarily used in design reviews. Stage gate and phase review methods are popular approaches to management for new product developments, which have been constructed based on extensive analyses of past cases. Cooper and Edgett (1999) presented a stage gate method customized for service sectors where each gate had a checklist. Behara and Chase (1993) applied quality function deployment (QFD) into service design. Here, the service quality measurement framework (Servqual) was used as a checklist to evaluate services.

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