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# A mechanism for external competence transfer to improve manufacturing system capabilities and market performance

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## ABSTRACT

This study uses competence transfer theory to establish a mechanism for transferring competences into an organization from the outside. It develops a research framework that describes the impact of communication on a firm's knowledge base and as well as its ability to bring external competence into the firm. Data were collected in the US from 288 manufacturing companies. The mechanism of competence transfer is empirically supported. As the level of transferred competences increase, a firm's manufacturing process competences including process automation, process integration, and process modularity increase. Furthermore, process competences lead to higher market performance.

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## 1. Introduction

The nature of competition in manufacturing has changed dramatically over the last two decades because the business environment is more complex and there are rapid changes in technology and customer expectations (Hsu et al., 2008). A firm's ability to enhance manufacturing system capability and improve market performance is vital to succeed in today's highly competitive global environment. According to Resource-advantage theory (R-A theory) of competition, it is the comparative advantages in resources that result in marketplace positions of competitive advantage (Hunt, 2000). The R-A theory extends the Resource-based theory (RBT) and describes competences as a firm's higher order capabilities that are composed of heterogeneous and imperfectly mobile resources (Hunt, 2000). Competences consist of skills, knowledge, and abilities that reside in a particular function such as research and development, manufacturing, and logistics, or in an asset. Therefore, a firm must be able to capture, transfer, assimilate, and apply competence to occupy marketplace positions of competitive advantage. Firms are looking for ways to continuously develop their competences and protect their sustainability (Chen and Wu, 2007; Koskinen and Vanharanta, 2002).

The R-A theory provides fertile ground for applying competence-based approaches to manufacturing and supply chain management

(Hunt and Davis, 2008). It recognizes the dynamic nature of competence. The competences can be fostered, neutralized, or destroyed by changes in business environment. For instance, the value of resources could depreciate quickly because of changes in consumer tastes or governmental regulations (Hunt, 2000, p. 148). Evidence supporting a dynamic competence perspective at the individual (Koskinen and Pihlanto, 2006), organizational (Soderlund, 2008), and supply chain levels (Prevot and Spencer, 2006) is provided in recent studies. Therefore, firms should have mechanisms or high performance routines inside the firm, which is defined as dynamic capabilities by Teece and Pisano (1994) that allow the firm to update existing competences and add new ones. It is the dynamic capabilities that enable firms to transfer, adapt, and re-configure internal and external competences toward changing environment (Teece and Pisano, 1994; Macher and Mowery, 2009; Yang, 2010). This paper provides an empirical analysis of one type of dynamic capabilities—the external competence transfer mechanism with which a firm can develop and foster manufacturing capabilities.

Although researchers have shown increased interests in competence transfer and development as an important strategic tool to create a sustainable competitive edge, little empirical analyses have explored the manner in which competences are reconfigured and renewed to build manufacturing system capability and improving market performance. There are two specific gaps in the literature. First, the main focus of existing studies is the exploration of internal manufacturing capabilities (Macher and Mowery, 2009; Dangayach and Deshmukh, 2004). These studies do not consider why firms should build external competences and use them to improve manufacturing systems capability and market

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performance. Recognizing the dynamic nature of competence, the theoretical underpinnings of competence development and transfer mechanism should be developed. Specifically, investigation into the impact of internal competences on inter-organizational competence transfer is needed to provide a foundation for understanding manufacturing systems capability development. Second, despite its importance and potential values to manufacturing strategy, critical analysis of the competence development and transfer mechanism for manufacturing has been restricted to case studies. An empirical study designed to validate a competence transfer mechanism would be valuable to extend research on this subject and provide implications to manufacturing practitioners.

This research draws on strategic management and human resource management literature on competence and knowledge management capabilities at individual level within an organization, applying to the context of inter-organizational knowledge management to develop a definition of external competence transfer. Along with R-A theory, we develop and test a model that seeks to illustrate key internal competences and explain how they impact the firm's ability to execute external competence transfer, which, in turn, impacts its manufacturing system capabilities and market performance. This study develops valid and reliable measure of external competence transfer; and it tests the research framework using data collected from 288 manufacturing firms.

## 2. Literature review

### 2.1. Competence

The concept of competence was first introduced by Hofer and Schendell (1978) as “resource and skill deployments that will help the firm achieve its goals and objectives” (p. 25). Lawler (1994) viewed it as compose of the knowledge, skills, and abilities that are associated with high performance on the job. As organizations move away from hierarchical management structures to flatter and more team-based organizations, competences must include team or organizational capabilities, such as process or system capabilities that enhance organizational or business performance (Shippman et al., 2000). For R-A theory, competences are viewed as “socially complex, interconnected, combinations of tangible basic resources and intangible basic resources that fit coherently together in a synergistic manner” (Hunt, 2000; p. 189), which explains the elements of competence as higher order resources.

Recent studies recognized the dynamic nature of competence (Ritter, 2006; Closs et al., 2008). Ritter (2006) suggested three levels of competence at the firm level: operational, ad hoc, and dynamic. Operational level competence focuses on abilities to apply knowledge to build ordinary operational routines; while dynamic level competence emphasizes the ability to adjust competences embedded in routines and behaviors as they build competitive advantages. Other than competences in routines, Ritter (2006) highlighted the facts that ad hoc competence is needed to build flexibility in response to changes in circumstances. Firms need to continuously explore new possibilities and exploit their existing competences. Literature on knowledge management has shown that competences are knowledge-based and learning-based (Yang, 2010; Soderlund, 2008; Savory, 2006). Therefore, some studies have argued that competence should be more than just the use of resources. It is the ability to sustain the coordinated deployment of assets in a way that helps a firm achieve its goals rather than simple combination of knowledge, skills, and assets. Yang (2010) indicated that knowledge should be combined into unique processes at firm level in order to develop sustainable competitive advantage. R&D integration of knowledge from past, market intelligence and

intra-organizational knowledge sharing were identified as knowledge-based competencies. Particularly, Prevot and Spencer (2006) emphasized that competences imply a complex issue of transferring collective knowledge and skill, which include two basic dimensions: the complexity of competence and types of knowledge that make up the competence. Hsu et al. (2008) discussed the inter-organizational resource linkages for upgrading and renewing a firm's exiting capabilities. The focus is on accessing skills and resources of other parties through strategic alliance in manufacturing.

### 2.2. External competence transfer

Not only competences at different levels in the firm but how these competences work with transfer mechanisms and mesh with organizational learning are critical to build competitive advantage. Miles and Snow (2007), in an article on the evolution of supply chain management, commented that “Many observers of today's global business arena agree that new business and organizational models are needed if firms and economies are to fully utilize their knowledge base to continually generate new products, services, and markets” (p. 461). Furthermore, Lavie (2006) proposed that organizational competitive advantage in a networked context requires the consideration of a partner's resources as well as the focal organization's resources. Because the process of competition is recognized as a knowledge discovery process, the generation and exploitation of knowledge is playing a primary role in developing competences. The ability to exploit this knowledge through competence transfer can be an important source of sustainable competitive advantage (Cohen and Levinthal, 1990; Crook et al., 2008). As the success of the firm becomes more dependent on the relationships it establishes outside the firm, the expansion from individual to organizational competences and from intra-organizational to inter-organizational competence transfer seem inevitable.

In this study, competence transfer is defined as a mechanism that allows firms to identify and capture relevant external knowledge and technology for enhancing their resources, skills, and capabilities. A few recent studies have proposed the concept of competence transfer and transfer mechanisms in different contexts. Koskinen and Pihlanto (2006) examined individual competence transfer from old timers to newcomers including knowledge based and socially based competences. They pointed out that old timer's and newcomer's worldviews influence the communications of competences. Depending on competence level, the competence transfer means could be direct education, tutoring and mentoring processes, or learning while doing.

At the organizational level, Soderlund (2008) studied competence transfer through shifting, adapting, and leveraging processes in project management. The key to effective competence transfer is to differentiate between dynamic and operational capabilities and adopt the appropriate learning process accordingly. In the context of supply chain management, Prevot and Spencer (2006) used case studies to explore the field of inter-organizational competence transfer from the buyer's perspective. In order to enable suppliers to develop capabilities, the buyer implements mechanisms to transfer different levels of competence. For instance, reference guidelines and training seminars are used to transfer explicit knowledge-based competences. While socially based competences are transferred using protocols and other socialization processes. Ritter (2006) took a different perspective and proposed five competence communication models based on market orientations. This paper is different from previous studies on competence transfer, which focus on the links between different levels of transfer within a firm, because it builds a mechanism within a firm to support the competence transfer from outside of the boundaries of a firm.

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