Chapter 6
Complementary Resources, Web-Based Applications, and the Development of Web-Enabled Supply Chain: A Case Study of Paint Supply Chain

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ABSTRACT
The purpose of this chapter is to enhance our understanding of how web-based applications and complementary resources can work together to create competitive advantages in supply chains. This chapter is organized as follows. First, this chapter introduces the theoretical background of complementary resources. Then, it moves on to report a preliminary result of secondary data analysis that explores the role of complementary resources to the development of web-enabled supply chains. Lastly, this chapter reports a case study that focuses on identifying: 1) the complementary resources that influence the successful implementation of web-based applications for supply chain management, and 2) the degree to which certain types of complementary resources function to support the successful implementation of web-based applications.

INTRODUCTION
The complexity of managing supply chain has increased and became an essential element to which firms need to pay extra attention due to the escalated expectation from customers and globalized supply network. As a result, the development of a supply chain which can effectively match supply and demand is not an option but is a necessity for firms...
to achieve competitiveness. With the emergence of Internet technology, firms begin to recognize web-based applications as an important medium for improving the effectiveness of matching supply and demand.

It was estimated that there were 97 million Internet users worldwide at the end of 1998 and the revenues from on-line businesses reached to $7.8 billion (International Data Corporation, 1999). These same sources predict that the number of estimated worldwide Internet user to be 1.4 billion by the end of 2008 and the projection for on-line business revenues (B2C and B2B) is $13.6 trillion by 2012 (International Data Corporation, 2008). These statistics reflect the increasing need of utilizing various web-based applications in developing competitive supply chains launched on Internet.

With the widespread adoption of web-based applications built on Internet infrastructure in managing supply chains, many studies report performance improvements in various areas such as cost reduction (e.g., Croom, 2000; Robinson et al., 2005), increased responsiveness (e.g. Frohlich and Westbrook, 2002; Auramo et al., 2005), and financial performance (Dehning, et al., 2007). Some studies also report that firms have created a competitive advantage by implementing web-based applications in supply chains (e.g., Alt, et al., 2001).

Nevertheless, not all firms appear to be leveraging the capability of web-based applications to the same extent. From a study of the savings achieved by using web-based applications in a specific case of buyer-designed machine parts, Emiliani and Stec (2002) report that the actual savings are less than expected. In addition, Lynagh et al (2002) report that 40% of firms in the logistics service industry that implemented web-based applications consider their web practices to be either “very ineffective” or “somewhat ineffective.”

These inconsistent reports raise an important question. Why, in some cases, does the effort of implementing web-based applications seem to fail whereas, in other cases, it generates a competitive advantage? Resource-based theory provides a framework for augmenting our understanding of the effects of web-based applications on supply chain competitiveness. Resource-based theory emphasizes the role of heterogeneous resources and the capabilities of firms in explaining competitive advantage (Barney 1991; Peteraf, 1993), and has the potential of explaining the different results that have been reported.

According to resource-based theory, web-based applications per se are not a source of competitive advantage because they are readily available to all firms in a competitive factor market. Resource-based theory suggests that firms need to utilize resources and capabilities unique to them, so called ‘complementary resources,’ in order to gain competitive advantage from implementing information technologies (Clemons and Michael, 1991; Wade and Hulland, 2004).

Several studies have explored the role of complementary resources in the implementation of information technologies prior to the introduction of web-based applications (e.g., Neo, 1988; Hansen and Wernerfelt, 1989). However, little research has been done to provide insights into precisely how these resources are utilized to support the implementation of web-based applications in supply chains.

The contribution of this study is to enhance our understanding of how web-based applications and complementary resources can work together to create competitive advantages in supply chains. This chapter is organized as follows. First, this chapter will introduce the theoretical background of complementary resources. Second, this chapter reports a preliminary result of secondary data analysis that explores the role of complementary resources to the implementation of web-based applications in developing web-enabled supply chains. Lastly, this chapter reports an exploratory case study. The case study identifies the specific set of complementary resources and the degree to which certain types of complementary resources
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