Chapter VIII

E-Business Integration by SMEs in the Manufacturing Sector: A Data Envelopment Analysis Approach

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Abstract

SMEs in the manufacturing industry are impacted by enormous changes in their business processes. E-business-related developments have reduced the importance of physical branches and moved towards more sophisticated, e-business-enabled supply chains for products and services. This contribution analyzes the differences in adoption behavior and actual use of e-business applications among 152 investigated SMEs in the manufacturing sector from four countries. Best practice cases of efficient e-business performance, such as in Denmark or the U.S., are identified by deploying a data envelopment analysis (DEA). Leading SMEs in the sample are characterized by a wide range of thoroughly implemented and integrated e-business applications, resulting in higher satisfaction rates.

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Introduction

The diffusion of IT and e-business applications has received broad attention among practitioners as well as academicians (Cooper & Zmud, 1990; Dekleva, 2000; Kiiski & Pohjola, 2002), especially in the context of supply chain management, interorganizational cooperation, and the integration of heterogeneous partners including small- to medium-sized enterprises (SMEs) (Beck, Weitzel, & König, 2002; Beck, Wigand, & König, 2005). Apart from theoretical deficiencies in the field of standardization theory and resulting network effects, there is a lack of comparable empirical data on business networks, especially at the international level. One of the most challenging tasks within and, even more, across industries is the electronic, seamless integration of SMEs within supply chains. This is largely due to the still insufficient diffusion of commonly accepted communication standards and solutions that are capable to provide benefits even to SMEs. In many developed countries, SMEs are regarded as the economic backbone that adds to the relevance of their adoption and usage behavior of e-business standards for economies.

At the same time, SMEs have to cope with a variety of difficulties that usually impede the successful integration of e-business solutions, for example, the existence of an inadequate ERP system, lack of IT know-how, or not-yet-automated internal business processes as a prerequisite to gaining benefits from exchanging business messages electronically (Willems, Hampton, & Ketler, 1997). In the pre-Internet and e-business era, SMEs were often forced by larger business partners to implement certain exchange standards, such as EDI, to communicate with them, disregarding if the SME can also benefit from such efforts or not. Since SMEs are playing a vital role in most supply networks, even large business partners have recognized now that it is important to cooperate with SMEs in a way allowing them to also benefit from supply chain management (George, Wood, & Khan, 2001).

Otherwise, SMEs are often predicted to be more flexible and innovation friendly than large firms when it comes to using new applications to conduct their business more efficiently, for example, in the manufacturing sector. At the same time, SMEs are more restricted in their budget than large firms, and are often not able to vie with large competitors due to the high setup costs of, for example, Web-enabled materials management systems or Web-based shopping systems. Moreover, SMEs have more difficulties in attracting IT specialists for their business. Due to their size, SMEs often cannot benefit from economies of scale; nor do they deploy sophisticated distribution systems in comparison to large enterprises (König, Wigand, & Beck, 2003).

Therefore, SMEs are focusing and evaluating the return on investment of IT spending more carefully and conservatively. In order to convince them to adopt a new e-business solution, it is even more important then for large firms to demonstrate the successful integration and likely success upfront. The systematic difference in perceived usefulness between SMEs and large firms when regarding the same e-busi-
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