



Potential of electronic trading in complex supply chains: An experimental study

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Abstract

Electronically supported, innovative transaction processes may lead to efficiency gains and cost reductions enhancing the operational effectiveness. Electronic trade systems improve coordination between buyers and sellers and increase transaction efficiency by raising the operational effectiveness. An increased operational effectiveness compared to competitors may provide companies with a competitive advantage.

Prerequisite for realizing efficiency gains is the appropriate process organization of electronic processes for a given market situation and thus the embedment into the given market scenario. The paper shows an exemplary market with small and medium enterprises (SME) with a comparatively high level of complexity and inefficiency where electronic trading could benefit participating enterprises. The benefits derive from improved transaction efficiency by using an embedded electronic trade system, which is shown in experiments by comparing traditional transaction processes with electronic processes in an SME market. The experimental results show major gains in transaction process efficiency for both buyers and sellers in electronic trading. The experiments further covered the support of multimedia elements like interactive media in online negotiations, as negotiations and personal communication are important for specific transaction types. The level of excellence was best for video support.

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1. Introduction

The migration of traditional transaction and trade processes to electronically supported and

innovated processes may lead to efficiency gains and cost reductions and enhance the operational effectiveness (e.g. Davenport, 1993; Gunasekaran et al., 2002). Consequently, electronic trade systems (ETS), introduced into markets in the mid 1990s, seemed to provide large benefits for industry sectors and enterprises (e.g. Kaplan and Sawhney, 2000; Barua et al., 2000).

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ETS mostly addressed the issue of lowering costs related to exchange processes, also referred to as transaction costs (e.g. Williamson, 1975). As transaction costs usually occur at the exchange of goods and services between enterprises, a reduction can provide a company or a supply chain with a competitive advantage by increasing the operational effectiveness as opposed to competitors (Porter, 2001). Transaction processes with or between small and medium sized enterprises (SMEs) may be inefficient due to the specific characteristics of these markets. Consequently, markets and supply chains with large SME proportions seemed to be a particularly promising target for electronic trading solutions. Cost reductions and efficiency gains by streamlined transaction processes were considered realizable. Besides, ETS addressed benefits like access to new markets or new customers for sellers via the new channel.

Antipodal to the estimated benefits is the current adoption and usage of ETS. Market participants of SME markets showed a low willingness to adopt electronically supported transaction processes. Experts favored traditional transaction processes via telephone and fax to electronic trading as they perceived efforts of navigating and typing in an electronic trade system and the needs of process reorganization as high. Additionally, they were worried about the loss of personal contact and high investment costs (Schiefer and Hausen, 2001). As applications for electronic trading may be used in an application service provider solution, investment costs are relatively low. The major obstacle seems to be the resistance for organizational change, which strengthens the need for a discussion of realistic potential benefits, which show an impact on operational effectiveness.

However, the analysis the survey results in the given SME market context showed that market participants did not generally reject electronic transaction support, but stressed the need for a differentiated discussion about the organization of electronic exchange processes and the benefits of electronic commerce to overcome the obstacles seen by experts. The disfavor and perceived obstacles may be also the result of the mostly weak adaptation to market requirements and the failure of most current systems (e.g. Hausen and

Schiefer, 2002). This supports the evidence that the adaptation to market characteristics and the embedment into the market is a critical success factor for ETS (Fritz et al., 2004). As expressed in the negative valuation of electronic trading in general by the managers of SME enterprises, it seems to be a critical issue to identify the level and type of multimedia support in electronic transactions in order to best support transactions. Therefore, the technology and possible multimedia options have to match the process and market environments (e.g. Jahng et al., 2000).

The objective of this paper is to show that appropriately organized and embedded electronically supported transactions in complex SME market situations and supply chains can be more efficient than traditional transaction processes. Efficiency benefits as a major factor influencing the operational efficiency may be the basis for competitive advantages for SME companies. The paper will present experimental results comparing traditional and electronically supported transactions. In addition, the paper will show how interactive media may support the electronic transaction process. As application environment that reflects best the situation on complex SME markets and supply chains, the agrifood sector was taken as example.

The paper's organization is as follows: Section 2 discusses reasons for inefficient transactions in SME industries and outlines options for improved efficiency and competitiveness from electronic trading. Section 3 briefly outlines a conceptual framework for the development of electronic trading systems adapted to the characteristics of a market to embed the system. A model for the evaluation of efficiency benefits through electronically supported transactions is discussed in Section 4. Section 5 focuses on the experiments and explains the experimental design applied to the evaluation of the efficiency of electronic trade systems. Presentation and discussion of the experimental results follow in Sections 6 and 7.

2. Options from electronic trading for complex SME environments

Transactions are exchange activities between companies composed of processes within and

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