Delivery Reliability in Machinery and Equipment Industry: A European Study

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ABSTRACT

European machinery and equipment manufacturers face multiple logistical challenges in their daily business. Interacting in complex non-hierarchical production networks and thus living with the consequences of a lack of transparency, temporal instability, or imbalanced share of market power finally leads to an inadequate OEM’s delivery adherence which in many cases can be traced back to suppliers’ late deliveries. This paper presents a framework for improving delivery reliability in non-hierarchical production networks by applying market mechanisms. Knowing the financial consequences of a supplier’s belated delivery provides useful information which can be applied in terms of financial incentives. The framework is supported by the results of a study which has been conducted by the authors throughout German, Spanish, and Italian machine tool manufacturers and their suppliers.

Keywords: Customer-Supplier Relationships, Delivery Reliability, Machinery and Equipment Industry, Non-Hierarchical Production Networks, Supply Chain Management

INTRODUCTION

Non-hierarchical production networks describe a today’s common business environment of the machinery and equipment industry, one of the backbones of the European economy. Each production company is facing multiple and dynamic customer-supplier-relationships.

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This complex situation leads to highly volatile, instable and non-transparent market conditions and wasteful turbulences in the entire production network. This is resulting in a delivery reliability of usually less than 65% within the European machinery and equipment industry generating an estimated loss of efficiency of 1 billion Euros per year. Besides additional costs the missing delivery reliability entails poor customer satisfaction and increased lead times.
compromising the competitiveness of individual companies as well as the entire machinery and equipment industry (Gunasekaran, 2000; Ghobadian, 1996; Reinhart, 2006).

The concept described in this paper addresses the industry of European machinery and equipment manufacturers. This highly specialized industrial sector accounts for 10.9% of value-added in European manufacturing (178 billion €) and employs about 3.5 million people (EUROSTAT, 2008). The typical machine manufacturer acts as a prime contractor for his customer and coordinates all relevant activities from development of specific parts or components to coordinating order specific networks of several hundred suppliers and partners worldwide in order to create a highly specialized and complex product consisting of thousands of parts, components, and modules (VDMA, 2008).

The logistic performance of enterprises in machinery and equipment industry has to adapt permanently to changing market conditions. Whereas in times of oversupply a quick delivery is the successive factor, during high market demands the ability to deliver is critical for the business (Jones, 2005). For example, finding suppliers in other European regions in times of high market demands will not be that easy, as due to the highly interlinked markets within Europe, order entries (as the economy itself) within individual countries rise and fall simultaneously. Furthermore bottlenecks regarding specific supplier goods are not concerning only one producer but generally occur as a phenomenon of the entire European network (e.g., delivery problems with cast parts just before the current crisis). Therefore general market information delivers important indicators for the supply chain coordination of a manufacturer in this industry.

Hence coordination occurs as the big challenge. This handicap is being hampered by a very heterogenic IT-landscape with approximately 250 different enterprise resource planning systems (ERP-Systems) within Europe (Schuh, Kampker, Narr, Potente, & Attig, 2007). That is the main reason why most ordering or purchasing processes are conducted manually via fax, telephone or email (Voegle & Zeuch, 2001). With regard to the number of components of a machine it takes enormous effort for the purchase department to place and negotiate orders. Thus parts are usually ordered without validation of individual standard replacement times. Only a small number of components (usually the A-parts) are monitored and tracked manually by agreeing on delivery dates with suppliers, by negotiating of penalties and bonus for differing delivery dates and by manually monitoring the order status on a regular basis via telephone, fax or email. However, this approach is very time consuming and can only be applied to a limited number of parts (normally less than 5%) with regard to limited manpower in procurement departments. Thus parts with invalidated standard replacement times can become very critical as delays are usually not identified in advance. Consequently the supplier decides on the sequence of assembly or assembly completion based on his own capacity utilization which in the end might lead to failed delivery times on the manufacturer’s side.

The manufacture’s problem originates in missing participation in the decision making process (Schuh, Gottschalk, & Hoehne, 2008). Usually the manufacturer has no information about the current order status which gives him the role of a reacting authority (e.g., re-scheduling). Therefore only one missing component can be responsible for a total assembly stop. This leads to turbulences within the production process as quick countermeasures in a fire-fighting mentality have to be identified, usually delaying subsequent orders. Delay will first propagate to the consecutive partner/customer and then to the entire supply chain due to strong cross-linkage and mutual time dependencies. This is the focal point for initiation of turbulences to the network.

**BACKGROUND**

The issue of poor delivery reliability is addressed within the publicly funded research...
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