AN INTER-ORGANIZATIONAL SYSTEM APPROACH FOR STRATEGIC SUPPLY NETWORK MODELING

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Abstract:
Dynamic identification and selection of strategic supply networks are complex tasks which cannot be executed manually and therefore require the support of modern inter-organizational IT infrastructures. Existing ERP (Enterprise Resource Planning) systems need to be extended by business components which provide functionality to form multi tier value networks. This functionality is based on a demand propagation methodology allowing a focal company to send out a demand to a potential network of partners. By splitting this demand into sub demands the network of suppliers is identified, which is able to fulfil the original demand of the focal company.

In many industries, companies are faced with enormous pressure caused externally by changing market conditions but also internally by finance and cost control (Burtler et al., 1997; Österle, 1995). In order to compete companies have to increase their organizational flexibility to manage throughput as well as to reduce cost (Malone & Laubacher, 1998; Pine, Victor, & Boynton, 1993; Tapscott, Ticoll, & Lowy, 2000). One way to accomplish this is by concentrating on core competencies while outsourcing supporting products and services to business partners (Angeli, 2002). In some branches, like the automotive industry, manufacturers have decreased their vertical integration significantly over the last years (VDA, 2003). They have formed value networks with their partners not only for sourcing production factors but also for joint research and development purposes. It is obvious that forming and handling these value networks is a complex task which cannot be done manually. Modern inter-organizational IT infrastructures are necessary to support the creation and management of these corporate networks (Albani, Winniewisser, & Turowski, 2004). Current ERP systems build the fundamentals for the management and controlling of value networks. But there is a lack of functionality to support dynamic identification, evaluation, and qualification of competent partners.

This paper is intended to reduce this gap by extending on previous work, which provides the methodical foundation in the field of identification and evaluation in the domain of strategic supply networks and which gives an overview on an inter-organizational system approach for this business domain (Albani & Muessigmann, 2005).

STRATEGIC SUPPLY NETWORK MODELING

Reducing the vertical integration in a company increases the dependencies on partners supplying goods and services and elevates the level of uncertainty the company is confronted with. In order to mitigate the risk involved with this uncertainty, companies have to extend their view from controlling direct suppliers (suppliers in tier-1) to managing complete networks of partners. This involves activities for identifying, evaluating and selecting qualified networks and extends existing methods and processes as provided by Supplier Relationship Management (SRM) tools (Albani, Muessigmann, & Turowski, 2005). Based on operational data gathered with ERP systems and information collected from external sources (e.g. Internet data bases) additional IT components are necessary to provide automated support for these additional Supplier Network Management (SNM) functions forming an inter-organizational system for the management of strategic supply networks.

FUNDAMENTALS ON INTER-ORGANIZATIONAL SYSTEMS

An inter-organizational system is defined as a network based, distributed information system implementing cross-company functions. It allows the collaborative service provision in value networks and supports the handling and operation of inter-company business processes. By facilitating the potential of modern IT-Infrastructures an inter-organizational system increases the efficiency and effectiveness of inter-company collaboration. Furthermore it increases the flexibility of the value network in reacting on changing market conditions (Kambil & Short, 1994; Malone, Yates, & Benjamin, 1987).
Strategic supply networks can become complex structures spanning many companies over several levels or tiers. A simple example is illustrated in Fig. 1 where a supply network (grey nodes) fulfils the demand of an OEM (Original Equipment Manufacturer) who acts as a focal or controlling company.

Fig. 1 Example for a strategic supply network

In order to support the OEM in identifying, evaluating and selecting the best suited supply network an IT infrastructure is necessary to perform the necessary functions and provide the required data (Albani & Müssigmann, 2005). It is assumed that every node runs an ERP system to process its business. This ERP system collects operational data from the direct suppliers (nodes in tier-1). Business components are identified which extend the ERP system providing functionality for strategic supply network modeling as shown in Fig. 2.

Fig. 2 Component model for strategic supply network modeling

A demand request, either from the supply network or from the own (in this case being the OEM) ERP-system, is triggering the identification component to seek for adequate sources (the node’s own capabilities and suppliers) building appropriate sub-demands and sending them to the supply network. The identification process may find more than one external source (suppliers or supply networks) being able to fulfil the demand. In this case the evaluation and selection component calculates a ranking list of sources and selects the best suited one. The data collection component
is used to provide information on possible sources. The collaboration component controls this supply network modeling process and the communication component is used to interact with the network of suppliers.

A prototype system was build which implements the identification component in order to prove the practicability of this strategic supply network modeling approach (Albani, Bazijanec, Turowski, & Winnewisser, 2004). Furthermore a conceptual approach for the integration of this model into a commercially available system architecture is illustrated in Fig. 3 using the Enterprise Service Architecture (SAP ESA) from SAP.

![Fig. 3 Integration of strategic supply network modeling into SAP ESA](image)

The SSNM (Strategic Supply Network Modeling) components are attached to the architecture by using the Integration Services of the Netweaver product portfolio. Based on these integration services a composite application can be formed to provide the extensions described above.

**REFERENCES**


