Chapter 34
Inventory Management, a Decision Support Framework to Improve Operational Performance

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ABSTRACT

Enterprise Resource Planning systems have been introduced to support the efficient and effective execution of business processes. In practice, this may not fully succeed. This also holds in particular for inventory management (IM), which forms a part of supply chain management. Within this research, by analyzing the IM business process theoretically, eleven potential benefits are indicated. Next, by using a Business Intelligence approach, key performance indicators (KPIs) are selected to measure the performance of IM sub-processes. Integration of these approaches yields an IM performance decision support framework that can be used to obtain a generic, coherent picture of the fundamental IM processes in an organization. In addition, by tracking and analyzing KPI measurements, adequate decisions can be prepared towards the improvement of the operational IM performance. The proposed framework is validated using experts' opinions and a comparative case study. The experts' comments yielded a list of top-10 KPIs, based on the measurements of which a set of quick wins can be determined. The case study results show that some of the identified potential benefits are also observed in practice. Future research may reveal that comparable performance improvements are possible in other IM environments (and even in other supply chain domains) based on similar decision support frameworks.

INTRODUCTION

Over the past decade, the Enterprise Systems (ESs) industry has proven to be an enormous growth market (Gable, 1998; Kumar & Van Hillegersberg, 2000). The broad adoption of ESs by the business world is sometimes considered to be the most important development in the corporate use of information technology during the 1990s (Davenport, 1998; Gable, 1998; Kumar & Van Hillegersberg, 2000). Related to this, the ES market has become a billion dollar market for quite some time already (Klaus et al., 2000; Umble et al., 2003). Annual growth rates up to thirty per cent as observed in the last decade illustrate the rapid growth and significant size of the current ES market. Enterprise Resource Planning (ERP) applications are an example of an ES. ERP packages usually aim to integrate the key business processes, a goal that is typically achieved based on suitable information technologies (Beheshi, 2006; Gupta, 2000; Wier et al., 2007). Consistent, correct and in-time information provision to all members of the organization can be considered as the key enabling characteristic of ERP systems next to the intensive automation of administrative activities. Modern ERP systems tend to include Business Intelligence (BI) functionality as well. To do so, data as available in their databases is usually collected in big data warehouses, then analysed and aggregated, and finally visualized to enable improved business decision-making.

The expectations of ERP are generally quite high: the vendors claim significant improvements in efficiency and effectiveness with their ERP packages (Johnson & Pyke, 2001). For example, organising the internal logistics using ERP software is supposed to improve related business processes and, due to its integrated nature, to create better performance (Davenport, 1998): production times would be shortened, stock levels lowered, and customers' satisfaction enhanced. Improved performance in its turn is expected to yield higher returns and better competitive advantage. How-

ever, to what extent all these claims hold often remains unclear since only a limited number of researchers focused on expressing the benefits gained with ERP in precise quantitative terms (Hunton et al., 2003; Klaus et al., 2000).

Considering the currently available literature on the specific business processes related to inventory management (IM) (Hendricks et al., 2007), (Kleijnen & Smits, 2003), (Gunasekaran et al., 2001), (Fawcett et al., 2007), (Lee & Billington, 1992), we discovered that only a limited number of relevant metrics is mentioned. As an example, the well-known Balanced Score Card (BSC) (Kaplan & Norton, 1992) is sometimes used to create a business intelligence tool for monitoring different aspects of IM. However, a clear prescription or guide describing how to determine what precise metrics should be included in the BSC is not available. Besides the BSC, only limited attempts are made to structure performance measurement of inventories. The Supply Chain Council developed a supply chain performance measurement reference framework named SCOR (SCC, 2006) that provides some ideas about what to measure. Their framework typically takes a strategic supply chain perspective, which is not suitable for the operational measurement of IM. Furthermore some attempts have been made to structure the measurement of performance in terms of different levels (e.g., Gunasekaran et al., 2001). They made an attempt to structure performance metrics into three levels: strategic, tactical and operational. None of these literature references however provides a good overview of the coherence between different performance metrics and it seems that a BI-inspired framework through which this insight can be gained is highly needed.

Based on these considerations, we postulate that there is a need to develop a decision support framework that explains the coherence between the operational activities of a company, hereby focusing on the company activities related to IM (which implies that we do not consider the full supply chain). The framework should also include

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