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ISO 9000 and supply chain efficiency: Empirical evidence on inventory and account receivable days

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ABSTRACT

ISO 9000 is the most popular and widely adopted meta-standard for quality and operational improvements in manufacturing supply chains. However, few studies have quantitatively examined its impact on supply chain efficiency. In this paper we measure the material and cash flow efficiency of ISO 9000 certified firms in terms of inventory days and account receivable days. We analyzed changes in these time-based efficiency indicators prior and after ISO 9000 implementation in 695 US-listed manufacturing firms. We found that ISO 9000 certified firms shortened the number of inventory days by 3.68 days 1 year after ISO 9000 implementation. They showed continuous improvement and shortened the number of inventory days by 8.75 days (8.29% shorter) 3 years after certification. Account receivable days and overall operating cycle time also showed similar significant reductions after ISO 9000 implementation. The results reveal that ISO 9000 adoption helps improve the material and cash flows in manufacturing supply chains.

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1. Introduction

Due to globalization of the world economy, organizations are looking for international standards that foster easier trade and reduce trade barriers linked to national standards (Boiral, 2003). ISO 9000, a meta-standard for quality management (QM), has become such an international standard that serves as a key selection criterion for supplier selection (Curkovic and Handfield, 1996; Goffin et al., 1997). Since its introduction, ISO 9000 has become the passport to global business (Uzumeri, 1997) and a basic requirement for government tenders in many countries. It diffuses along the supply chain due to customer pressure or government policies (Corbett, 2003; Corbett and Kirsch, 2001; Guler et al., 2002). Most practitioners believe that ISO 9000 certified companies provide timely responses and high quality supplies,

rendering them more competitive in their supply chains. Moreover, previous research has found that there is a direct relationship between QM practices and supply chain performance (Flynn and Flynn, 2005).

Although much research has been conducted on the organizational impacts of ISO 9000, most of them were survey-based studies with subjective data, producing few conclusive results. Some previous empirical works suggested that ISO certification has little benefit for operational efficiency (Corbett and Kirsch, 2001; Terziovski et al., 1997) and mixed impacts on financial performance (Corbett et al., 2005; Terziovski et al., 2003; McGuire and Dilts, 2008). These findings are at odds with the global phenomenon of rapid diffusion of business certifications. The number of ISO 9000 certified companies has been rising over time, sustaining an annual growth rate of about 20%. Other industry specific QM standards, such as QS 9000, TL 9000 and ISO 13485, have been developed to meet growing demands for meta-standards in the automobile, telecommunications and medical devices industry sectors. Suppliers of raw materials and components in

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these sectors need to pursue the corresponding certifications to attain competitive advantages.

Through standardization and systemization as a result of ISO 9000 adoption, the operational procedures of the adopting company should be more efficient. Many companies perceive that implementing ISO 9000 can improve operational performance. Despite the perceived benefits of operational efficiency improvement, a number of critics argue that the extra documentation efforts required by ISO registration are time-consuming, and ISO adoption provides no real benefits to business performance (Aarts and Vos, 2001; Heras et al., 2002; Terziovski et al., 1997).

The aim of this study is to provide empirical evidence on the impact of ISO 9000 on the material and cash flows of certified companies with a view to knowing whether ISO 9000 certified firms become more efficient nodes in their supply chains. We carried out an event study analysis and compared ISO 9000 certified with non-ISO 9000 certified firms by controlling industry type, firm size and pre-certification performance. We compared changes in inventory days, account receivable days, and overall operating cycle time of each sample firm with those of a portfolio of control firms that fitted our matching criteria.

2. Literature review

ISO 9000 was developed by the International Organization for Standardizations (ISO) in 1987. The number of ISO 9000 registered sites has increased dramatically since its introduction. The number of registered sites reached 776,608 at the end of 2005, a jump of 17.6% from the previous year. ISO 9000 underwent a major revision in 2000, whereby the new version emphasizes continuous improvement of quality (Castka and Balzarova, 2008). The number of ISO 9000 certified sites dropped during the transition period when the old standard of ISO 9000:1994 was phased out, but increased dramatically after the introduction of the new version (Fig. 1; Table 1).

ISO 9000 is the most popular meta-standard with a focus on operational efficiency. Through standardization

and continuous improvement in processes and procedures, ISO 9000 is meant to help improve operational efficiency throughout the organization (Rao et al., 1997). Most researchers (Hill, 1996; Spreha and Helms, 1995) believe that ISO 9000 improves quality and overall efficiency in organizations, and enables them to make uniform products and to have a competitive edge, resulting in greater customer satisfaction and market share.

Most of the early studies on ISO 9000 were focused on the perceived benefits of ISO adoption by surveying practitioners (e.g., Buttle, 1997; Rao et al., 1997; Terziovski et al., 1997). The majority of these survey studies found that ISO 9000 adoption improves operational and marketing performance. However, little empirical work has been done using objective data to substantiate these claims. Until recently, Naveh and Marcus (2005) and Corbett et al. (2005) used objective data and event study methodology to analyze the operational impact of ISO 9000. Nevertheless, Corbett et al. (2005) only used data from 1990 to 1997 and did not focus on time-based efficiency, while Naveh and Marcus (2005) did not examine the impact of ISO adoption on operational performance. Martinez-Costa et al. (2008) used a combination of survey and objective data from Spanish companies to study the impact of ISO 9000 adoption and TQM implementation on operational performance, but failed to distinguish the impact between them. This study fills the existing gap by investigating the impact of ISO 9000 on adopting firms' time-based efficiency and its implications for supply chain efficiency, based on objective data that cover the period of 1990–2005.

3. Hypothesis development

Supply chain efficiency is one of the most important performance dimensions in contemporary manufacturing. Supply chain efficiency does not only refer to overall supply chain cost, but also lead-time performance (Yeung et al., 2008), delivery promptness (Li and O'Brien, 1999) and inventory level (Kojima et al., 2008). The timeliness of

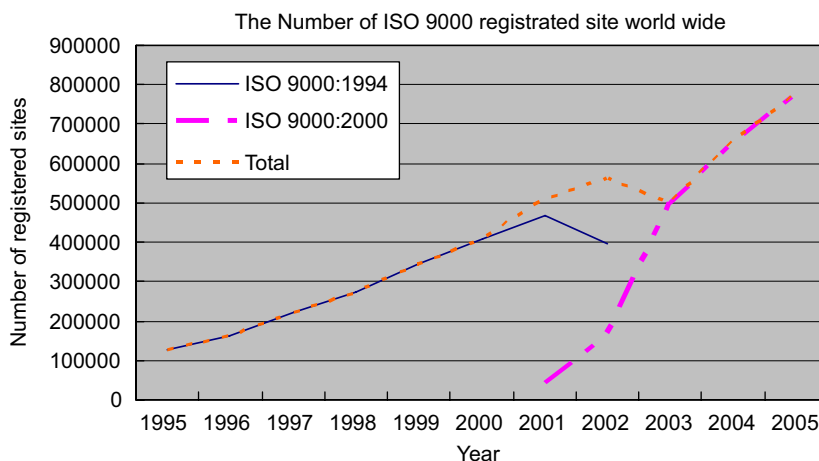


Fig. 1. The growth of ISO 9000 worldwide.

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