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Managing inventories in global sourcing contexts: A contingency perspective

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ABSTRACT

One of the key problems of global supply chains is how to keep inventories low. Even if there is an evidence that supply chain management tools can help in this direction, an under-investigated point is how companies in different contexts experience the effects of global sourcing and the outcomes on their material inventory level. Based on a model proposed by (Golini and Kalchschmidt , 2011, *Int. J. Prod. Econ.* 133 (1), 86–94.) the aim of this paper is to verify whether different companies – in terms of contingency variables – experience different impacts of globalisation and supply chain management on the material inventory level. In this work, several contingency variables were selected from the literature i.e., company size, product complexity, type of production, type of purchases, number of suppliers and number of suppliers per item. The results show that when considering groups of companies characterised by different contingent variables, the relationship between globalisation, supply chain investments and material inventory levels is valid only for some groups, whereas it loses its significance for others.

1. Introduction

Driven by market standardisation, openness of borders and improvements in transportation and communication technologies, globalisation has become an increasingly relevant phenomenon in the last decades. To exploit the advantages of globalisation (e.g., low cost labour, resources, access to new markets) and to respond to growing competition, companies have increasingly expanded their supply chains beyond national borders (Hülsmann et al., 2008; Kotabe and Murray, 2004; Skjott-Larsen and Schary, 2007). This expansion has made it critical to understand how companies behave when they purchase globally. Global sourcing can lead to higher costs for buyers due to logistics costs, transportation and higher inventory levels (Tan, 2001). Supply chain risks can also become more relevant, thus reducing the willingness of companies to move away from local suppliers (Stratton and Warburton, 2006). Cultural distance can also be a limitation in some cases, leading to higher transaction costs (Hartmann et al., 2008). These are some of the reasons that global sourcing is still not broadly adopted (Cagliano et al., 2008; Trent and Monczka, 2003) and its effects on performance are not completely straightforward (Kotabe and Omura, 1989; Steinle and Schiele, 2008).

One of the problems companies face when dealing with global sourcing is how to keep inventories low (Narasimhan and Mahapatra, 2004). As a matter of fact, longer distances increase the consignment lead times and variability; thus, companies might have to keep higher material inventories to avoid stock-outs and production stops (Bygballe et al., 2011; Han et al., 2008; Harris, 1913; Stratton and Warburton, 2006).

To limit this problem, companies can invest in supply chain management. Generally speaking, supply chain management implies collaboration with suppliers to make the supply chain more efficient and/or responsive (Fisher, 2003; Sheth and Sharma, 1997). One of the benefits is usually reduced or better allocated inventories, as happens, for example with just-in-time techniques (e.g.Adair-Heeley, 1988). Different types of supply chain management investments are usually adopted in global sourcing contexts, such as information sharing and other coordination systems (Nassimbeni and Sartor, 2007; Trent and Monczka, 2003).

In this literature stream, Golini and Kalchschmidt (2011) provided evidence that, in the manufacturing industry, it is possible to almost fully moderate the negative impact of global sourcing on material inventory levels through supply chain management investments (SCMI). In their work, they find that global sourcing increases material inventory levels; however, companies adopting global sourcing have a higher adoption of SCMI, which, in turn, reduces material inventory levels. Ultimately, the total effect of global sourcing on material inventory levels is very low (Fig. 1).

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The proposed model was tested using survey data collected in 2005 from almost 500 companies operating in the assembly industry in different countries all over the world. However, Golini and Kalchschmidt (2011) did not consider the specific characteristics of the context in which companies operate. We thus aim to extend the Golini and Kalchschmidt (2011) model by including contingency variables.

As a matter of fact, understanding under which conditions companies will obtain higher benefits by increasing collaborations with global suppliers is important for different reasons. Among these, implementing SCMI usually represents a significant cost, therefore, it is important to invest only in those situations in which there is higher need and these investments can be more effective.

We therefore aim to verify whether the Golini and Kalchschmidt (2011) model holds for different groups of companies, which are defined on the basis of a set of literature-based contingencies. In particular, the identified contingent variables are: company size, product complexity, type of production, type of purchases and number of suppliers. Because these variables cannot be traced back to a unique grand theory, we consider this paper to be an exploratory analysis in line with other contributions performing similar contingency analyses (e.g. Shah and Ward, 2003). Moreover, we will also verify whether the model proposed by Golini and Kalchschmidt (2011), based on data collected in 2005, still holds using data collected in 2009. This is useful to show whether it is still possible to reduce the impact of global sourcing on inventories through SCMI.

The remainder of the paper is structured as follows. In the next section, the concept of global sourcing is described, the literature on the relationship between global sourcing and inventory levels is reported and the most relevant contingent variables and their effects are presented. Next, the research method and the empirical analysis are described. Subsequently, a discussion of the results is provided, and, finally, we draw conclusions and suggest potential avenues for future research.

2. Literature review and research propositions

2.1. Global sourcing, inventories and supply chain management

Global sourcing can provide several advantages to companies, including lower procurement prices, new technologies, knowledge or higher-quality products (Bozarth et al., 1998; Frear et al., 1992; Monczka and Trent, 1991; Nassimbeni and Sartor, 2007). However, fiscal aspects (e.g., taxation or currency), trading agreements between countries, access to new markets, shorter product development processes and product life cycles, or even company image, can also be motivating factors (Frear et al., 1992; Nassimbeni and Sartor, 2007).

However, it is not always easy to exploit such benefits due to the difficulties that arise when sourcing globally (Dornier et al., 2008; Handfield, 1994; MacCarthy and Atthirawong, 2003). Geographical distance causes longer and more variable lead times because multiple means of transportation are used. Moreover, for the sake of efficiency (e.g., to fill containers), batches ordered from distant suppliers have to be larger than those from domestic suppliers. Furthermore, global sourcing carries specific issues related to lower knowledge of the suppliers and possible infrastructural deficiencies in developing countries (Meixell and Gargeya, 2005). Finally, there can be major risks of supply chain disruptions, political instability in sourcing countries or exchange price fluctuations that can undermine global sourcing profitability (Carter and Vickery, 1989; Dornier et al., 2008).

Therefore, in a global sourcing setting, companies typically use inventories as a shield for supply variability and disruption (Hendricks and Singhal, 2005; Stratton and Warburton, 2006). This, however, can be particularly costly and difficult to sustain, especially in periods when companies face financial constraints (Guariglia, 1999), such as today's. Alternatives to overcome the problem include sharing inventory risks with suppliers (Lai et al., 2009) or more generally applying SCMI to reduce inventories (Krause et al., 1998; Tan, 2001; Watts and Hahn, 1993).

As previously mentioned, Golini and Kalchschmidt (2011) provide an effective synthesis of the problem. The results of this paper provide evidence for a relevant negative impact of global sourcing on inventory performance that can be partially reduced through the adoption of proper SCMI that act as mediator variables. As a matter of fact, globally sourcing companies that have implemented SCMI have inventory levels that are comparable to those of locally sourcing companies. However, globally sourcing companies that have implemented few SCMI efforts have the worst inventory performance of the entire sample.

The model by Golini and Kalchschmidt (2011) was built using 2005 data, but, despite the rapid changes at the global level, we expect the model to hold also using data collected in 2009. In fact, recent literature supports the finding that global sourcing causes higher inventory levels (Holweg et al., 2011) and SCMI helps keep inventories low (Fawcett et al., 2008). Therefore, our first research proposition is:

RP1. The model by Golini and Kalchschmidt (2011) *holds using 2009 data in that the sign of the relationships among global sourcing, inventories and SCMI remains the same.*

The same model by Golini and Kalchschmidt (2011) included different types of SCMI.

Entering into the detail, the practices advocated to be more beneficial for inventory reduction are those related to supply chain coordination. These investments can be grouped into two categories: information sharing and system coupling (e.g., Cagliano et al., 2003; Frohlich and Westbrook, 2001).

Information sharing pertains to exchanging information about inventory levels, production plans and forecasts with suppliers. This practice requires the standardisation of the information technology infrastructure; thus, its adoption has been significantly fostered by the diffusion of Internet-based tools (e.g., Caniato et al., 2009). System coupling is deployed with suppliers' processes, such as just-in-time (JIT), collaborative planning forecasting and replenishment or vendor-managed inventory, with the objective of achieving faster product flows with fewer inventories (e.g. Power, 2005).

Investments, both in information sharing and system coupling, aim to better coordinate the material flows among suppliers and customers with beneficial effects on inventories also in global supply chain contexts (Babbar and Prasad, 1998; Trent and Monczka, 2003). However, when suppliers are closer, it is easier to make such investments with higher pay-offs. For example, JIT is based on frequent, fast deliveries and small batches, a condition that can be difficult to obtain in a global sourcing context (Handfield, 1994). Thus, even if it is possible to achieve efficiency through global JIT, this improvement cannot be compared to what can be gained at the domestic level (Das and Handfield, 1997). Therefore, in global contexts, information sharing is usually adopted more often than system coupling (Trent and Monczka, 2003). However, the more distant suppliers are, the more difficult is to share information due to cultural and technological barriers and the possible lack of mutual trust (Hartmann et al., 2008; Ives and Jarvenpaa, 1991; Nassimbeni and Sartor, 2007).

Because of this general difficulty in performing supply chain coordination with global suppliers, several authors have focused on supply organisation and the strategy that a company should