

## Inventory Management in a Corporation Context

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### Abstract

*Inventories and inventory management are integral parts of companies' supply chain and logistics activities. This study focuses on the elements of efficient inventory management. The study analyses how the corporation environment affects inventory management and the potential challenges in this type of context. The study is based on literature findings. Based on the study's results, the importance of reliable inventory data, documented inventory management practices and unified inventory management organisation are vital for ensuring a corporation-level efficiency. The study findings can be used as a reference for inventory management development projects in corporations.*

**Keywords:** Inventory, inventory management, corporation, supply chain management (SCM), logistics

### INTRODUCTION

Inventories are frequently seen as cost centres which act as buffers in supply chains and temporary places for storing items (Richards, 2018). Inventories influence the business as logistics costs are several percentages of the revenue of construction and retail firms, and inventory costs form roughly 50 % of the overall logistics costs (Solakivi et al., 2018). In other words, inventories have a direct effect on the supply chain and logistics efficiency (e.g., Lummus & Vokurka, 1999; Silver, Pyke & Peterson, 1998).

Tersine (1984) and Richards (2018) describe different inventory types like supply, raw materials, work-in-progress (WIP), maintenance and spare parts inventories. Although inventories cause costs for companies, they still have reasons to exist. The general reasons for stocking are often related to, for example, achieving the economies of scale, balancing the supply and demand and controlling the uncertainty in the markets (Krajewski, Malhotra & Ritzman, 2019).

When considering the basis of inventory management questions like “What items should be stocked?”, “Where the items should be stocked?” and “How much and when the items should be ordered?” arise (Muckstadt & Sapra, 2010). In addition, three elements rise from the literature to form the basis for efficient inventory management and its development: supply chain and materials management for achieving overall efficiency (e.g., Lambert, Stock & Ellram, 1998; Silver et al., 1998), information systems for allowing real-time data and knowledge-based management (e.g., Faber, de Koster & van de Velde, 2002; Weske, 2012), and the organisation of management and personnel for controlling and developing the inventory process (e.g., Lee & Dale, 1998; Yingling, 1997).

With these factors in mind, this study aims to analyse efficient inventory management in a corporation context. Especially a diverse corporation environment provides a large variety of needs that should be met, and naturally more challenges can emerge due to this more complex environment than in a single inventory and company context. The above described objectives of the study can be condensed into the following research questions (RQs):

- RQ1. What are the elements of efficient inventory management?
- RQ2. How does a corporation context affect inventory management?

The study begins by presenting relevant literature related to efficient inventory management, i.e. supply chain and materials management, information systems and organisation of management and personnel. After that, the effects of corporation context related to inventory management are analysed, and the study findings are discussed and concluded.

## **RESEARCH METHOD**

This study is based on literature findings. The focus of the literature search was to identify the elements of efficient inventory management. After the initial research problem formulation and literature search through relevant databases, such as Scopus and Google Scholar, it was decided that the literature analysis should focus on supply chain and materials management, information systems and organization of management and personnel. To improve practical relevance of the literature study, an empirical study was designed and planned in conjunction with the literature analysis. The literature titles were chosen to support the upcoming empirical study. The objective was to develop a comprehensive literature-based theoretical framework that can be utilised by the practitioners.

## **LITERATURE**

### **Supply chain and materials management**

Cooper, Lambert, and Pagh (2001) describe Supply Chain Management (SCM) as the integration of business activities from suppliers to end users. Van Weele (2010) highlights that the initial objective of SCM is to satisfy or exceed the needs of the end user. Materials management is, respectively, according to Arnold, Chapman, and Clive (2008), a coordination procedure for planning and controlling material flows. Lambert et al. (1998) describe the basic elements of materials management as follows: anticipating materials requirements, sourcing and obtaining materials, introducing materials into the organisation and monitoring the status of materials as a current asset. All these activities should be linked into organisational goals and strategy (Lambert et al., 1998).

SCM and materials management are strongly related to each other as SCM requires both materials and information management (Naim & Towill, 1994). Regardless the supply chain, two basic elements can be found: receiving and shipping materials (Lee & Billington, 1993). It is important to understand that problems in managing supply chains and materials appear easily as wrong-sized inventory levels and overall inefficiency (Lambert et al., 1998; Lee, 2002), and as mentioned, inventories themselves cause costs (Tersine, 1984; Krajewski et al., 2019). Hence, these activities should be optimised.

The need for storing can be evaluated by conducting an ABC-analysis which highlights the fact that different items require different controlling strategies (Chu, Liang & Liao, 2008). Braglia, Grassi, and Montanari (2004) present that, for example, items with high demand and value should be stored or acquired by utilising Just-in-Time (JIT) method in order to minimise the inventory costs. By exploiting JIT-philosophy, the need for own storing is basically zero as the items are supplied in the right time for right targets, but due to the risk of delivery failure own safety stock in certain situations is compulsory (Krajewski et al., 2019). Users' demands, the reliability of the supply chain and the relationship between the firm and the supplier all have effects on which controlling strategy to implement and what is the real need for storing. These strategies include, for example, storing in the company's own facilities or letting the supplier take care of inventory activities. (Wallin et al., 2006)

Maintenance spare parts controlling strategies differ from others because of their different nature (Kennedy, Patterson & Fredendall 2002; Puurunen, Majava & Kess, 2014). Criticality, value, part speciality and demand should be all taken into account when choosing the right control strategy (Huiskonen, 2001). Huiskonen (2001) continues that the relationship between suppliers and other actors in the field should be deepened by utilising, for example, common inventory pools for spare parts with high value and criticality but often very low demand. A good example of co-operation with suppliers are consignment stock and Vendor Managed Inventory (VMI) where in both cases the supplier participates in company's storing and inventory management (Lakra & Bedi, 2014).

Naturally, the operative work conducted by the inventory personnel is very important in order to keep the inventory itself in shape and organised. Van den Berg & Zijm (1999) describe the inventory process as follows: receiving, stocking, order picking and shipping. This operative work should include, for example, regular manual inventory verification where the items are manually counted in order to correct inventory record (Kang & Gerswin, 2005).

### **Information systems**

As the competition increases, the importance of information systems in controlling and improving processes grows (Lee, 2002; Weske, 2012). Systems that allow to control inventory levels, such as Warehouse Management System (WMS) and Enterprise Resource Planning (ERP), make it possible to optimise inventory levels and material flow (Faber et al., 2002). In addition, the use of information systems has increased the overall efficiency of supply chains remarkably (Cachon & Fisher, 2000).

Whereas WMS is a system for controlling inventory process (Faber et al., 2002), ERP allows even broader approach as it offers a large variety of new ways to make business and increase the integration inside the company (Krajewski et al., 2019). Furthermore, Umble et al. (2003) state that the benefits of using ERP is not only limited on industrial companies as it can be utilised in any firm that wants to optimise their operations.

Automation of ordering through ERP decrease inventory levels and the amount of orders made (Krajewski et al., 2019). This kind of activity is possible by setting lead times, safety stock, Reorder Points (ROP), Economic Order Quantity (EOQ) and maximum inventory level into the system variables (Wen-Yong, Ying & Bing, 2011). The data provided by information systems helps the management in decision making and allows a knowledge-based management instead of making intuitive decisions (Jääskeläinen & Luukkanen, 2017; Strijbosch, Heuts, R.M.J. & van der Schoot, 2000). For aiding the decision making, Key Performance Indicators (KPI) are created to measure the variables that are the most important for the success of the company (Parmenter, 2007). KPIs are essential when the organisation wants to recognise the factors that are most important for developing inventory management practices (Johnson & McGinnis, 2010), and it can be generalised that information systems and data provided have a very big weight when developing business processes in an organisation (Zairi, 1997). It should be remembered that sub-optimisation of different processes should be avoided (Yingling, 1997). This supports the acquisition and utilisation of common ERP for the organisation in order to achieve the transparency and maximum business efficiency.

### **Organisation of management and personnel – Business Process Management**

Business Process Management (BPM) is a systematic approach which enables to analyse, develop and control processes (Lee & Dale, 1998). In essence, BPM is a tool for fulfilling the cultural change in an organisation related to the considered process (Zairi, 1997). Dumas et al. (2013) continue that BPM focuses on controlling and developing value-adding activities as a whole instead of concentrating on single processes.

To make BPM possible, Yingling (1997) presents the needed organisation and people in three different levels: at the heart of the management system is the management team, second level consists of department teams within the organisation and the outer level is formed by the key business process teams. BPM itself is implemented in five steps: identify key processes and related goals, define key-cross functional business processes, form teams and develop a charter, develop measures and continuously manage the process (Yingling, 1997). The systematic approach is vital for success (Lee & Dale, 1998; Yingling, 1997; Zairi, 1997). In the last step, PDCA-method (also known as Deming circle) discussed by Sokovic, Pavletic, and Kern Pipan, (2010) is suitable as the development work requires continuous monitoring and examination by conducting regular meetings within the development team (Yingling, 1997).

The key business process team's job is to supervise and manage the inventory process, as they are responsible for ensuring that the process is managed and performed accordingly and as mentioned, sub-optimisation should be avoided (Yingling, 1997). It should be remembered that common policies and goals related to overall business and inventory management result in decreased costs and bigger profits and therefore support the business (Kannan et al., 2013; Thomas & Griffin, 1996).

### **DISCUSSION**

This study focused on inventory management in a corporation context. Literature findings on the elements of efficient inventory management provided the framework for the study. In this section study findings are discussed.

Inventory management challenges in a corporation context can be found in three categories according to the literature findings: supply chain and materials management, information systems and organisation of management and personnel. The corporation context adds more unique requirements for inventory management as the number of different stakeholders grows, environment expands and more demands emerge, which makes the inventory management more complex. In this context, the importance of common data, processes and corporation-level inventory management people are highlighted.

Inventories have a direct influence on supply chain and logistics activities (Lummus & Vokurka, 1999; Silver et al., 1998) and therefore they impact the whole business. In the corporation context, all inventory types presented by Tersine (1984) and Richards (2018) often exist and as a result the reasons for stocking are extensive in order to satisfy the different needs within the corporation. As the environment and needs expand, the importance of supply chain and materials management, information systems and organisation of management and personnel grows. Common materials management practices and rules presented by Lambert et al. 1998 and Van den Berg & Zijm (1999) must be documented and standardised. Also, in cases where the inventory data is insufficient, knowledge-based management and decision making is challenging. As a result, ABC-analysis presented by Chu et al. (2008) can be difficult to execute and therefore, optimisation of inventory levels based on exact data may be impossible.

To achieve common goals such as decreased overall costs and bigger profits (Kannan et al., 2013; Thomas & Griffin, 1996) the need for harmonisation of inventory management practices is instant. This may require corporation level instructions for handling materials in the inventories and adopting 5S method (i.e. Sort, Set In order, Shine, Standardise and Sustain) project for improved organisation and standardisation. In addition to 5S, the use of visual control could be considered (see e.g. Majava, Haapasalo & Aaltonen, 2019; Majava & Ojanperä, 2017). These improvements would also enable reducing the number of inventories and combine the items stored in them. In addition, a systematic approach is vital for success. Furthermore, efficient BPM (Lee & Dale, 1998; Yingling, 1997; Zairi, 1997) may require a re-organization of inventory activities. With re-organisation and new organisational structure focused on developing and executing operative inventory management, the set objectives would be easier to achieve in some cases.

Finally, the ultimate goal in modern inventory management should be a data-driven organisation, which can be enabled by common ERP, definition of inventory processes and creation of inventory focused management. As the corporation context demands more exact information in order to achieve knowledge-based management instead of making intuitive decisions (Jääskeläinen & Luukkanen, 2017; Strijbosch et al., 2000), the needs for ERP and generic development work are obvious.

## **CONCLUSIONS**

Inventories have a remarkable effect on companies' businesses as they affect the overall supply chain and logistics efficiency. As inventories themselves add costs, the inventory optimisation is vital in order to minimise costs but at the same time ensuring a suitable service level.

In this study, literature findings were analysed to understand the elements of efficient inventory management. In a corporation environment, any shortages in these elements become more visible. Without common inventory data, the collaboration between the companies inside the corporation related to inventories and their use is challenging to execute. If different stakeholders inside the corporation utilise other companies' inventories, the transparency and common rules for controlling the inventories

should exist. If this is not achieved, it can lead to subjective decision making and non-uniform operative work in the inventories.

In addition to conducting inventory management case studies in various type of contexts and business sectors, the potential future research could focus on analysing development work in corporations' supplies inventories and its business effects.

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