



Understanding the knowledge accumulation process—Implications for the adoption of inventory management techniques

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ABSTRACT

Knowledge maturity models are used to identify the stages of the evolution process and assess the management attributes when improving the inventory management practices and adopting more sophisticated inventory management techniques. The management attributes are (1) technical tools, (2) skills, (3) roles and responsibilities and (4) performance measurement and incentives systems. The management attributes that are related to each other are identified for development stages. Two case companies are analyzed with the model. The model is found useful in assessing the current situation on inventory management practices, identifying the development focus areas and prioritizing the development effort.

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1. Introduction

Any researcher who has been involved in projects that study inventory management in practice must have observed that, despite all the theory available, the inventory management techniques in use in companies are often very elementary. What might be behind this obvious contradiction between theory and practice? Possible reasons that come to mind are that the benefits of inventory management techniques are not clearly seen and/or the techniques themselves are perceived difficult to learn and use. If the benefits cannot be demonstrated, other, more profitable, development projects get the priority. It is true that it is not easy to show a direct connection between inventory management and the firm's performance (Vastag and Whybark, 2005), although there is some evidence for a positive relationship in the long perspective (Chen et al., 2005). However, besides direct financial benefits, it has been claimed that the adoption of inventory management techniques may have positive side-

effects, so called knock-on effects, on the use of other management techniques, which in turn may lead to better performance (Vastag and Whybark, 2003). Therefore, it would be ideal to develop approaches which could show the improvement gap as well as the improvement path for adopting inventory management techniques.

Although the benefits could be shown, the adoption of management theories into practice is not always straightforward and easy. In their research on the implementation of management practices Vastag and Whybark (2003) found that firms learn through their business and trade contacts rather than through management literature, consultants or academics. This claim poses a serious challenge for academic researchers to provide new means of transferring research-based management knowledge into practice: how could we improve and speed up the adoption of new knowledge? If we look at the present situation concerning supply chain and inventory management, the problem is not lack of data and tools, but rather lack of knowledge of how to use them. As Shapiro (2001, p. 25) puts it: 'barriers to integrated supply chain management are organizational, not technical'. It means that we have technological solutions, i.e. various analytical tools, but what we need are new organizational

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solutions, i.e. redesigning of processes and revising of measurement and incentive schemes to promote the utilization of new technologies. This new situation also creates a need to reconsider the roles and skills of the people in the new processes. As a matter of fact, we believe that the failure to see these organizational and managerial aspects has been the main reason for the slow adoption of supply chain and inventory management techniques in many companies. We use this proposition as a starting point for searching for new ways to facilitate and speed up the adoption of new techniques, especially in the area of inventory management.

Inventory management techniques comprise here a variety of tools and working practices to handle the uncertainty of the demand and/or the product and service offering in the supply chain, ranging from simple rules-of-thumb to scientifically validated models. They represent a reasonably unambiguous subset of supply chain management techniques easy to identify and evaluate as to their sophistication level in different environments.

The aim of this paper is to get deeper into the conditions suppressing and promoting the adoption of inventory management techniques. In our search for approaches that take organizational and managerial aspects into consideration, we have concentrated on the research of technology management, which has produced several models on the adoption of complex practices in organizations. We assume that the adoption of inventory management techniques can be evaluated with similar models to deepen our understanding of the process of adoption. Consequently, the adoption of inventory management techniques can be accelerated. On the basis of our search, we have decided to use a stage model, described in the following sections, for our purposes. This approach has led us to the following research questions:

1. Can we identify different stages of knowledge in inventory management?
2. Can we operationalize the general stages to support the adoption of inventory management techniques in the implementation processes of inventory models in practice?
3. Can we identify organizational aspects that need to be considered to support the adoption of inventory management techniques?

The paper is organized such that in the next section a brief review of the relevant technology adoption models is given, and as a synthesis a framework of technology adoption is introduced. After that, two case studies are described and analyzed utilizing the framework. Finally conclusions are drawn from the cases, and the applicability of the framework is discussed.

2. Research design

To achieve understanding of a complex phenomenon occurring as development of daily work concerning inventory management, and to demonstrate it to the reader, the empirical part of this study utilizes the

development history and future plans of two case companies. The first case company represents large-scale manufacturing with multiple global manufacturing facilities and sales organizations. The second case company is a regional specialized technical retailer.

The case study method emphasizes a qualitative, in-depth study of one or a small number of cases (Larsson, 1993). Compared to approaches with a larger number of observations and quantitative data, the case approach gives some definite advantages when studying a complex phenomenon happening gradually in a period counted with years. Firstly and pragmatically, it can give results in an acceptable time-frame. Secondly, it can be applied in a situation where the boundaries between the phenomenon and the context are not clearly evident (Yin, 1989). Ellram (1996) states that a case study can contribute to the theory in two ways: the multiple-case approach represents replications that allow development of a rich theoretical framework, while a single case represents a critical case to test a well-formulated theory. This study represents a case to test a formulated theory. According to Yin (1989), a formulated theory development prior to the collection of data is essential to provide guidance as to what data to collect, but the long-term involvement and observation of the researchers in the development process of inventory management in the case companies has also contributed to the development of the framework.

When studying a development process of a complex issue, long-term participation in the development work of the case companies has the advantages of the action research approach over more 'hands-off' ones. As Gummesson (2000) lists, firstly it provides the possibility to closely observe an organization in a way that would not be possible for outsiders. Secondly, it ensures the direction of research to be of guaranteed managerial relevance, as the company management is closely involved in the research effort in progress. Thirdly, it indirectly generates close relations and common understanding, which makes it possible for the researcher to revisit the company when he is no longer directly involved. In this study the researchers have used earlier observations of several inventory management development projects where they have been involved in both companies, for the last ten years, to formulate focused, semi-structured interviews to verify the earlier observations and to gather new information. This way the interviews with the people responsible for inventory management development could be carried out efficiently. In addition to the case studies, because neither of the case companies represents leading environments in inventory management techniques, the inventory management adoption process in grocery wholesales and the retailing sector has been studied from public sources as a benchmark of best practices.

3. Knowledge maturity framework

There are various models describing the organizational adoption of innovations, which can be used to study the adoption of, for instance, various tools and techniques (and roughly speaking, also new related knowledge), such

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