

Abstract of the Doctoral Dissertation entitled: "Inventory Management under Conditions of Increased Supply Risk"

The functioning of an enterprise is a complex process involving multidimensional aspects of management. Regardless of the size of the entity, the industry in which it operates, or the scale of its activity, inventory management remains a fundamental operational area. Tangible components such as materials—including raw materials, primary and auxiliary materials, packaging, finished products, research and development outputs, design works, as well as goods—are referred to as inventory. Maintaining an appropriate level of inventory can serve as a buffer in cases of delayed deliveries or market uncertainty concerning products or suppliers. Often, purchasing in larger quantities is associated with lower prices; however, it should result from a balance between the benefits gained and the costs of holding such inventory. The present dissertation is divided into five chapters.

The discussion in Chapter One focused on a literature review in the field of inventory management within enterprises. Various approaches to the function of inventory in a business entity were presented, with attention drawn to the critical importance of inventory management. It was emphasized that while classical methods can be applied, the individual character of each enterprise leads organizations to develop their own inventory management frameworks based on internal analyses, experience, forecasts, and the influence of external factors. Every company places great emphasis on achieving the most efficient inventory management possible, primarily due to its significant impact on the profitability of operations.

An important aspect in this area is inventory level control, as maintaining appropriate stock levels is a necessary condition for sustaining the production process. The chapter also introduced methods of inventory management and models of inventory accumulation.

Chapter Two continues the theoretical considerations in the area of supply-related issues and trends in supply chain management. It presents a perspective on the examined topics primarily through the lens of international literature, while also acknowledging domestic publications. This section provides an in-depth analysis of issues related to sustainable supply chain management, as well as the increasingly relevant concept of supply chain visibility. Additionally, the chapter discusses the subject of closed-loop systems in supply chain management.

Chapter Three presents the methodology of the conducted research. Exponential smoothing models—commonly used in inventory level forecasting within enterprises—were employed, including the Brown, Holt, and Winters models. A more advanced methodological approach involved the application of autoregressive models, such as ARMA (Autoregressive Moving Average), as well as the ECM (Error Correction Model), which belongs to the class of dynamic econometric models.

Chapter Four initiates the discussion on the hypotheses formulated in the dissertation. This section introduces a research of the manufacturing company VentiAir, which is characterized in terms of its business operations and its suppliers, who form a network of cooperating partners. The data used in the analysis is also presented, particularly data concerning turnover, inventory levels, and delivery volumes.

Chapter Five, the final part of the dissertation, is dedicated to the presentation of research findings and calculations. An in-depth literature review in the area of enterprise inventory management and supply chain management, combined with the presented research of the analyzed company, provided the basis for decisions regarding the initially formulated research hypotheses. These decisions were supported by statistical analyses and the results obtained from the estimated econometric models. The final section of the dissertation achieves the intended research objectives by demonstrating the impact of supply disruptions on inventory management in the enterprise. A summary of the entire work is included in the conclusion.

In the theoretical part of the dissertation, an attempt was made to systematize the various approaches to inventory management in enterprises, as presented in both international and domestic literature. It was noted that there exists a significant gap in the literature regarding the analysis of inventory and the description of current trends in supply chain management, as well as related issues closely tied to the research subject.

A review and description of tools available for modeling inventory levels in business entities was conducted. The study presented exponential smoothing models of production, which are among the primary tools used for planning production inventory levels. In addition, more advanced econometric models were proposed for analyzing the obtained data, including autoregressive models such as ARMA (Autoregressive Moving Average), and dynamic models like ECM (Error Correction Model).

The practical part of the dissertation focused on examining inventory dynamics and other data acquired during collaboration with the analyzed enterprise. The results of the conducted research enabled the formulation of conclusions regarding the inventory management decisions made within the company.