
Preface

This book is about running modern industrial enterprises with the help of computer-based information systems.

Enterprise resource planning (ERP) is the core of business information processing. In most companies, an ERP system is the backbone of the information systems landscape. All major business processes are handled with the help of this system, and most business transactions are recorded in the ERP system.

Supply chain management (SCM) looks beyond the company's borders, taking into account that companies are increasingly concentrating on their core competencies, leaving other activities to partners who have more expertise. With the growing dependency on the partners, effective supply chains have become as important for a company's success as efficient in-house business processes.

This book is organized as follows: Chap. 1 introduces the general topic, including concepts of business processes and important planning and control tasks of an industrial enterprise. Chapters 2 and 3 discuss the major stages in the evolution of enterprise resource planning: material requirements planning (MRP) and manufacturing resource planning (MRP II). While MRP just focuses on the planning of end-product demand and material requirements to satisfy this demand, MRP II deals with the temporal side of production: scheduling manufacturing orders while taking the production capacities into account.

Essential concepts of enterprise resource planning and core business processes supported by ERP systems—such as procurement, order fulfillment, and production—are discussed in Chap. 4. The notation of event-driven process chains (EPCs) is used to illustrate the process flow. While Chap. 4 explains enterprise resource planning and ERP systems in general, Chap. 5 shows how the general concepts are implemented with the help of a particular ERP system—SAP ERP.

This system is widely disseminated across the world. Its vendor, SAP AG, is the world-market leader in enterprise resource planning software. Screenshots exemplifying major steps of the core business processes were taken from our SAP ERP installation and included in the chapter. In this way, the reader can understand how the business processes are actually carried out “in the real world.”

Chapter 6 discusses the ERP implementation process. Since an ERP system is “standard software,” made for a wide spectrum of businesses, the main challenge here is to adapt the “standard” to the individual company’s needs. While the problem statement sounds simple, the solution is extremely complex, requiring companies to spend years in the preparation and implementation.

Chapter 7 highlights the IT environment of enterprise resource planning in the factory: manufacturing execution systems (MES), complementing enterprise resource planning with planning and controlling functionality for the shop floor, and engineering information systems. The latter ones, in particular the so-called *CAX systems* (computer-aided design, computer-aided manufacturing, etc.), are outlined because they have important interfaces with enterprise resource planning.

Chapters 8, 9, and 10 are dedicated to *supply chain management*. Chapter 8 introduces the motivation for SCM and the main issues of coordination and cooperation. A common modeling technique for intercompany business processes, the SCOR model (supply chain operations reference model), is presented, and major tasks of supply chain management on the strategic, planning, and execution levels are discussed.

Chapter 9 is about SCM data structures and advanced planning approaches. Supply chain management requires additional data structures, beyond those known from enterprise resource planning. *APS (advanced planning and scheduling)* solutions to typical SCM planning problems are explained. Due to today’s powerful computers, APS methods such as linear optimization are increasingly found in SCM systems.

In Chap. 10, a practical solution supporting supply chain management, SAP SCM, is outlined. The core of this system is the so-called *advanced planner and optimizer (APO)*. As the name suggests, this module provides advanced planning functionality, including optimization. A number of screenshots from SAP SCM have been included that illustrate selected problems and solutions computed by the APO.

Finally, Chapter 11 outlines current and future trends that are expected to have an impact on future ERP and SCM systems, such as software-as-a-service (SaaS), cloud computing, and ERP on demand. Another major impact will probably come from the so-called Internet of Things (IoT), based on RFID (radio frequency identification). RFID applications are already influencing not only business operations but also our private lives.

This book is not only the author’s achievement but has been made possible through the work of other people. I am particularly thankful to Elvira Fleischer for creating most of the figures; Olga Stawnicza for carrying out many business transactions in our SAP University Alliances installation of SAP ERP and SAP SCM, to create the screenshots included in this book; Dr. Anke Gericke for contributing several screenshots from the BOC Technologies’ ADONIS and ADOlog suites; Prof. Dr. Markus Nüttgens for his comments on my event-driven process chains; Dr. Michael Muschiol for his help regarding engineering information systems; and Sarah Van Horne for proofreading, revising, and improving my manuscript.

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