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# Detailed Table of Contents

Chapter III reviews how mass customization and product configuration can benefit engineer-to-order companies. The relevant main literature in the area is reviewed to identify the benefits. Furthermore, the challenges of implementing product configuration in an engineer-to-order company are described. Finally, a number of suggestions for meeting these challenges are presented. In addition, a case description is introduced which supports that product configuration can benefit engineer-to-order companies even though there are a number of challenges to be met. The chapter concludes that engineer-to-order companies can certainly benefit from product configuration by improving business process efficiency as well as information quality and ultimately improving the company's competitive advantage.



Chapter IV will elaborate on complexity in supply chains and the implications on supply chain design. It investigates the specific requirements of supply chain processes in terms of flexibility versus standardization, evaluating the feasibility of designing, customizing, assessing, and improving logistics processes within a framework provided by process reference models. Mass customization and, in particular, a configuration approach for financial services will be discussed for their applicability for reducing complexity in a process environment. Process reference frameworks will be used as elements of an "open variant process model". The Supply Chain Operations Reference model defined by the Supply Chain Council as the major cross-industry standard for supply chain management will be discussed for its usefulness and shortcomings in "process mass customization", with a focus on systems implementation.

## Section II
## Frameworks for Mass Customization



Chapter V presents an associative classification-based recommendation system to support online customer decision-making when facing a huge amount of choices. Recommendation systems have been recently introduced to e-commerce sites in order to solve the information overload and mass confusion problem. This chapter applies knowledge discovery techniques to overcome the drawback of conventional recommendation systems approaches. The framework of the associative classification-based recommendation system has been addressed in this chapter. The system analysis, design, and implementation issues in an Internet programming environment are also presented. Taking the advantage of accumulative knowledge from historical data, the efficiency and effectiveness of B2C e-commerce applications are improved.

Chapter VI presents the knowledge-based recommender environment Koba4MS (Knowledge-based Advisors for Marketing and Sales) which allows a flexible mapping of product, marketing, and sales knowledge to the representation of a recommender knowledge-base. In Koba4MS diagnosis, personalization and knowledge acquisition techniques are integrated to provide an infrastructure for the interactive selling of financial services. Those require deep knowledge about the product domain as well as about potential wishes and needs of customers. In this context, sales representatives can differ significantly in their expertise and level of sales knowledge. Therefore, financial service providers ask for tools supporting sales representatives in the dialog with the customer.



Chapter VII proposes a standard-based framework to assist industrial organizations develop interoperability in mass customization information systems. After identifying the major challenges for business and information systems in mass customization, the authors propose an innovative standard-based conceptual architecture for a combined model-driven and services-oriented platform. The chapter concludes describing a global methodology for integration of models and applications, to enhance an enterprise's interoperability in the support of mass customization practices, keeping the same organization's technical and operational environment, improving its methods of work and the usability of the installed technology through harmonization, and integration of the enterprise models in use by customers, manufacturers, and suppliers.



Chapter VIII presents a Web-enabled, agent-based information system model to support mass customized markets. Furthermore, a distributed, real-time, Java-based, mobile intelligent information system is presented. The system introduces four general-purpose intelligent agents to support the entire mass customization process. The adoption of this approach by a semiconductor manufacturing firm resulted in reductions in product lead time (by half), buffer inventory (from five to two weeks), and manual transactions (by 80%). Similarly, the adoption by a leading automotive manufacturer resulted in a 51% total inventory reduction while increasing plant utilization by 30%. These results verify that the successful adoption of this system can reduce inventory and logistic costs, improve delivery performance, increase manufacturing facilities utilization, and provide a higher overall profitability.

Chapter IX concentrates on the role of the supply chain decoupling point. Therefore, this chapter introduces different levels of customization and mass operations as well as three types of mass customization. It argues that in each mass customization type, information systems in upstream and downstream of the decoupling point can be varied. Consequently, information flows in different types of mass customization have been examined. This analysis is an endeavor to organize mass customization information systems across the supply chain; it can also be a useful structure for future researches in this area as well.

**Section III**
**Innovative Information Technology Approaches for Mass Customization**



Chapter X presents a set of scenario-based methods and techniques to support the development of system architectures that are more future-proof, and are also advantageous for mass customization. These methods and techniques have originally been developed for highly-customized professional systems, in particular medical imaging equipment. The chapter introduces mass customization as a business strategy that aims at satisfying, in a timely and cost-effective manner, the various needs of different customers. For that purpose, a system architecture is needed that supports two different kinds of variability: Variability in space provides a range of different products where each addresses the specific needs of an individual customer; and variability in time allows the products to evolve and thus meet new requirements. In defining such an architecture, two issues should be considered. One is how to anticipate the most likely changes in the external business environment, and hence in the customers' future needs. The other is whether the architecture can address these changes effectively



Chapter XI gives an overview on the current research issues in the domain of knowledge-based configuration technology. Knowledge-based configuration systems have made their way into industrial practice. Nowadays, all major vendors of configuration systems rely on some form of declarative knowledge representation and intelligent search techniques for solving the core configuration problem. As the development has not come to an end as, in a world that becomes increasingly automated and wired together, constantly new challenges for the development of intelligent configuration systems arise, this chapter provides a view on future research issues. Finally, this chapter summarizes the state of the art, recent achievements, novel approaches, and open challenges in the field of knowledge-based configuration technology.

Chapter XII draws on the theory of fuzzy cognitive maps to propose a modeling approach for mass customization of services. The proposed model integrates concepts from service quality and customer preferences with business process and IT capabilities models. The model presented in this chapter is, to the best of our knowledge, the only fuzzy service model for mass customization that provides the means to consider the business objectives for service customization, associates them with specific business areas, and suggests opportunities for mass customization. In contrast to other service design and management approaches, the proposed model is dynamic, exhibits flexibility and responsiveness to environmental changes and customizability to specific organizational contexts, and allows the development of planning scenarios.



Chapter XIII introduces a new concept, value customization, to increase the level of customer satisfaction. It presents methodologies and practice for designers to customize value in a service-in-industrial-operation based on the discipline of service engineering. Service engineering aims at creating more value largely by knowledge and service contents rather than just materialistic contents. This chapter addresses the importance of identifying value to be provided with specific customers based on their particular requirements, which has only briefly been discussed in researches of mass customization. In addition, both service activities and physical products can be crucial to realize value. Several further research issues such as general design methods for value customization were also identified.