Preface

Supply and logistics chain management is a growing concern in today’s competitive business environment. Without efficient and effective supply and logistics chain it is almost impossible to achieve competitive business environment. The success of a supply chain also often very much depends on the product development strategies such as Engineer-to-Order, Assemble-to-Order, Make-to-Order, etc. The focus of ETO product development strategy is highly focused on customized product design and development, where customers can directly participate in the design process to get their chosen products. It is therefore, critical to concentrate supply-chain management especially focused on customized product’s development and delivery. The characteristics of companies that are adopting ETO strategy can be described in terms of their markets, products and the internal processes. All such features can be categorized in the context of current trends in supply-chain management. The products as developed through the ETO projects are usually complex in nature and there exists uncertainties of markets. These uncertainties can be reduced through integrating marketing and supply chain with other business processes design and manufacturing.

There is a growing concern among ETO companies in all sectors to find ways to reduce costs, shorten product development times and manage risk. The transactions between companies in supply chains are characterized to reduce costs, risk and lead-times associated with business processes. The business process as approach to describing the ETO production scenarios helps to identify the nature of relationships between customers and suppliers. The ETO production scenario is particularly complex, which is involved in many different types of supplier relationships. The importance of classifying supply chain’s relationships according to particular products and markets has been widely addressed in the supply-chain literature. The supply-chain management for ETO systems suggests to improve the interface between product development activities and the supply chain. To improve overall supply chain strategy it is necessary to deal with the information management system that can help manufacturers in a project supply chain reduce their demand uncertainty. Especially, this information management system may help manufacturers to reduce the stock of finished goods. Implementation of information database may explore the potential of utilizing web and product identification technologies to overcome logistical challenges of a project supply chain. Information management system also can help companies from using an identity-based system for tracing, tracking and control of project deliveries.

The work presented in this book focus towards the manufacturing companies producing customized products following ETO production scenario. From this book, the companies can be benefited to revisit their existing ETO strategies and find out the limitations or bottlenecks of their existing ETO strategy. Not only the manufacturing organizations but the researchers in the field of supply chain and logistics sectors, especially dealing with ETO scenarios will also be benefited from this book through getting an up-to-date research works in the field. Academicians and researchers can consult different chapters of
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this book to get an insight knowledge and expertise in the field of ETO based supply-chain management strategy and lead their current research towards an innovative pathway.

There are 11 chapters of this book. Each chapter contains standalone information to be suitable for managing efficient supply chain strategy in an organization or within a collaborative business network. These chapters’ highlights will be very much useful to the business and research communities to identify the needs and suitability to execute efficient logistics and supply-chain management. The brief summary from each of the chapters is highlighted at the following paragraphs.

Chapter 1 outlines the benefits of information systems that can be used as the enabler to manage an ETO supply chain. It describes the ETO business strategy which is gaining more and more popularity within market segments. This strategy promotes customisation through offering custom-tailored product. In ETO, strategies are often having to rely on the combined design capabilities of the entire value chain in order to satisfy customer demands. Because of extended relationship between customers and business partners within the value chain, it becomes very important to maintain such a relationship and store the valuable information or data within the database systems. The information systems can be leveraged to streamline the communication process and improve data exchange between the members of the value chain. This chapter will examine how information systems can support the ETO supply-chain management and identify some of the issues involved. This chapter also articulates the scalability and knowledge management within distributed and reconfigurable supply-chain management.

Chapter 2 describes the improvement of the communication system between internal public and customers of an industrial establishment. This improved communication process supports internal processes such as recruitment, selection, motivation and development of an industrial establishment along supply-chain management. In this chapter, the authors analyse the communication channel that is to be to maintain the talented employees within a company and be able to attract new customers while maintaining the old ones and satisfy their needs. This relationship management between business stakeholders helps industrial communities to face the continual challenges from the external environment, such as globalisation, liberalization, new technologies, etc. It also supports to open new business opportunities through improved organizational performance by enhanced human factor and higher customer satisfactions. The enhanced human factor is analysed describing issues like: communication, recruiting, attracting, retaining, motivating, developing employees under the impact of new technologies. This strategy supports performance-generating factor in obtaining a competitive advantage along supply chain, human factor and business competitiveness. The up-to-date communication channels such as E-Communication, E-Supply Chain, E-Recruitment, E-Development is also discussed within the scope of this chapter.

Chapter 3 highlights a communication network that is analysed for achieving sustainable supply chain. This sustainable supply chain ensures competitive advantage for the manufacturing firms. An ETO product development strategy is adopted in order to explain this communication network. This proposed communication channel enables to the implementation of efficient and effective product-development support processes in the quest of achieving shorter product development lead-times and higher return on investments (ROIs). Engineer-To-Order (ETO) product capacity projects such as large electric machine, huge centrifugal pumps, diesel/natural fuel power plant engines, steam turbine, boiler, ship, etc., have challenges concerning their long product-development lead-times. The challenges as confronted by the enterprises can be effectively and efficiently managed through the communication network or flow of technical communication among the main stakeholders for complex / new product-development.

Chapter 4 explains the collaborative modelling that can be applied to improve supply-chain management, especially within the construction supply chain. It is believed that the presented collaborative
modelling contributes to the improvement of global construction supply chain network. This chapter especially reports on some of the challenges faced by the construction industries in order to maintain their supply network successfully. One case example as taken from the department of environmental affairs (DEA) headquarters in South Africa is outlined in this chapter. Qualitative interviews were conducted within five professional bodies, which were part of the construction supply chain team that completed the DEA project in South Africa. Research findings show various challenges within the construction supply chain. These challenges necessitate the use of collaborative means of managing the various phases of the supply chain. The research outcomes as elaborated within this chapter also found that the use of collaborative models such as Public-Private Partnership (PPP) can prove rewarding when stakeholders involved in a project have an understanding of the model and its dynamics. This chapter contributes to the use of PPP collaborative models in construction project delivery in South Africa.

Chapter 5 presents the innovation diffusion within the European ceramic tile industry supply chain network. This research work follows Nelson’s primary typology of enterprises based on a characterization of their technical change process (bulk commodities; complex systems producers; and chemical product’s producers). This chapter highlights a case study on the innovation diffusion in the European tile industry based on the analysis of its manufacturing process and supply chain. The producers of ceramic tiles, the machinery producers and the frits and glazes’ producers fit each of Nelson’s categories. Furthermore, the European ceramic tile industry is clustered in two southern European regions: Emilia Romagna (Sassuolo – Italy) and Valencia Region (Castelló de la Plana – Spain) with a different configuration of the type of predominant companies within the cluster but also regarding surrounding clusters. This relative specialization, the interactions between surrounding clusters, and the strong interlink supplier-producer between both ceramic tiles clusters make the study of the innovation diffusion in the European ceramic tile industry supply chain an interesting case.

Chapter 6 articulates a systematic methodology for modelling and synthesis of supply chain networks using high-level Petri’s nets. A supply chain is represented as a discrete event dynamic system. Petri nets have been successfully introduced as an effective tool for describing control specifications and realizing the control in automated supply chain processes. The use of high-level Petri’s nets is proposed to formulate event-related rules commonly seen in supply chains and analyse cause-effect relationships between events. The extended net representation of the productive task flows can provide more synthetic specifications for consistent management and control of supply chain systems by a top-down refinement methodology. Software implementation is described to simulate and control real supply chain processes.

Chapter 7 highlights the production capacity planning and scheduling models in terms of supply-chain management. It explains that an application of a standard enterprise information system standard enterprise information system standard enterprise information system standard enterprise information system standard enterprise information system (SAP, proAlpha, Baan, etc.) need difficult adaptation, especially for conditions of small or medium enterprises (SMEs), and the price of that system is relatively high. Therefore, the proposed capacity planning model is much more suitable for the conditions, requires and demands of SMEs. A case example is highlighted in this chapter where the specifications of production processes of the case company are: combination of discrete and continuous processes is connected to a supply chain (KANBAN) with its mother company. This connection defines the level of some chosen products in the expedition warehouse by the end of a month. For the above-mentioned reason, it had to be designed the new original production logistic system.

Chapter 8 is concerned with the management of risk and resilience within a collaborative business network. It defines the general risks as collaborative business partners are faced during executing their business network. Without proper resilience and mitigation plans the benefits of the business network
cannot be achieved. This chapter also discussed the benefits of forming the business network within companies as well as the challenges as faced, they faced within the network. To execute such a business network not risks free but always facing some problems for its continuation successfully. In such situation, it is necessary to formulate risk mitigation plan and strengthens the resilience within a business network. The objective of this chapter is therefore, to identify and sharing risks within the collaborative business network and proposing necessary mitigating plan and resilience for it. In this research, a framework is also highlighted that provides a structural approach for identifying and assessing potential risks and resilience in business networks and their possible impacts on different levels of collaboration.

Chapter 9 deals with the supply chain design approaches for dual demand management strategies. This dual demand management strategies are designed simultaneously for both engineer-to-order and make-to-order business scenarios. This research has been inspired from the window manufacturer, which manufactures and distributes vinyl windows to meet new construction and replacement/remodelling sector demand. One case example is presented where the case company manufactures windows based on make-to-order strategy for new construction projects and at the same time builds replacement windows to individual customer specifications in very small quantities to be used for replacement in homes. This study proposes to separate products based on demand management strategy and develop different supply chain networks for each group. The basic idea is to design bigger facilities for high volume (make-to-order products) as transportation cost per unit is reduced due to economies of scale whereas to place smaller and more facilities for low volume engineer-to-order products to be closer to the clients where it may not feasible to carry a only few products over long distances.

Chapter 10 is described the hybrid supply chain strategies in wind business. The objective of this chapter is to increase the understanding of possible supply chain models and their fit and the most effective configuration in a typically engineer-to-order sector, namely the wind business. The findings from this research work argue the pertinence of a Hybrid Supply Chain model combining elements of the Lean, Agile and Leagile paradigms upstream and the Project Management paradigm downstream in the case of a Wind-Turbine Manufacturer. From the research outcomes, it is found that depending on the complexity of the market and supply diversity, multiple decoupling points emerge. Through the presentation of the Wind-Energy Supply Chain case, it is found that for effective management of a global supply chain characterized by a high number of references and multiple technologies, it is necessary to mix different manufacturing paradigms in order to provide a quick, agile and competitive response to the customer.

Chapter 11 is identified physical and digital integration strategies of electronic device supply chains and their applicability to ETO supply chains. The growth in the manufacture and distribution of electronic devices presents a source of continuing innovation. Electronic devices are products that integrate physical forms (i.e. hardware) and virtual forms (e.g. software) to deliver value to customers. These forms are very different from a product design and supply chain perspective, but nevertheless, they need to work closely together in order to create value for the customers. For electronic device manufacturers. It is important that processes are in place to facilitate the seamless integration of both forms throughout the engineering, production, distribution and support stages of the product life-cycle. This chapter examines the role of physical and virtual supply chain innovation strategies in electronic device supply chains by exploring the commonalities and differences between the design, manufacturing, and distribution models of digital and physical elements. It also explores to what extent such as strategies that could be employed for engineer-to-order (ETO) supply chains.

The supply-chain strategy and ETO product development scenario have emerged as a major supply chain structure and is set to become an increasing importance, as more customised products are de-
manded across a range of industries. This book has presented a comprehensive research works the ETO synthesising literature relating to supply-chain management. It explains the ETO based supply chain, which has been characterised as having completely customised production dimension. Various strategies for the ETO sector have been presented in this book. Relationships between the supply-chain network, ETO production approach and information management have been explored in this book. By analysing these different strategies as highlighted in this book will be useful to provide a base for thinking about ETO based supply chain systems. The presented works will be beneficial to developing a comprehensive definition of ETO supply chains and developing tailored strategies for the ETO supply chain and logistics network.