Preface

Management Innovations for Intelligent Supply Chains belongs to *Advances in Information Systems and Supply Chain Management series* book project. There are five sections and 16 chapters in this book.

SECTION 1: SUPPLY CHAIN GOVERNANCE AND RELATIONSHIPS

Section one consists of four chapters. Chapter one, entitled "Relational Attributes in Supply Chain Relationships," is written by Sweety Law, Jacques Verville, and Nazim Taskin. The objective of the chapter is to examine the relational attributes underpinning supply chain networks, which linked firms need to manage on an ongoing basis. In examining the connections, which are different from transaction-based connections, this study measures the effects of face-to-face communication, trust, involvement, job title, and sales volume on performance. The hypothesized relationships are mostly supported and provide nuanced insights into relational attributes that affect supply-chain relationships and performance. These attributes are the basis for creating relationship intensity, magnitude, and history, described as collaborative facilitators that can enhance performance. All levels of management have a role to play in how the relational attributes are applied and managed. Senior leadership such as CEOs may need to play a larger role in trust development and involvement maintenance, while mid-level and line managers may need to engage in more face-to-face communication in maintaining trust and collaboration intensity.

In Chapter two, Gøril Hannås and Otto Andersen demonstrate "B2B Relationships in Modern Times: Implications of Relation-Specific Information Systems on Governance Forms." In the IT era, the traditional tenets of TCE are being challenged by the economic transformations of information technology. Inter-organizational information systems (IOS) have profoundly transformed business practices in B2B relationships, but it still seems to have had a minor impact on theoretical and empirical works within transaction costs economics (TCE). Most mainstream empirical studies from a marketing and strategy perspective still adhere to governance conceptualizations and measurements developed more than 20 years ago, despite the fact that vertical coordination in modern times has changed dramatically since this concept was first subjected to theoretical and empirical research. The change in vertical coordination practices is largely attributable to how IT has enabled new ways of collaboration and communication in modern B2B operations. The implication of this is not only efficiency gains, but severe contributions to competitiveness, as well as new forms of governance issues. The latter is especially true when IOS and adjacent processes are customized for certain coordination and capability purposes between business partners.

Several research calls have been made to validate governance theories on IOS, but the focus has taken many directions, and the boundaries drawn around organization studies and IT impede the development of a more integrated research approach towards the intersection of these fields. Although transaction cost economics has been accredited as an important theoretical framework to prescribe how business-to-business relationship should be organized, the theoretical grounds of TCE has not fully recognized how increasing investments in IT – especially the customization of such - have led to profound changes in the content and form of modern B2B relationships. The emerging literature within inter-organizational information systems (IOS), has, on the other hand, been criticized for its wide focus and lack of theoretical framework, by taking several directions to address issues related to the inter-organizational phenomena of IOS.

The theoretical development of transaction costs economics stand to benefit from the perspectives of modern business transformations – as manifested by the increasing levels of systems integration between firms. The authors address this issue by discussing the needs for establishing a hybrid research area, to improve the body of knowledge on the interaction of technological systems and institutional behavior. In particular, the authors contribute to the discourse by demonstrating how the traditional concept of vertical coordination needs to be modernized by an *electronic* coordination dimension. Furthermore, how relation-specific IT investments as a group should be studied separately from other relation-specific investments, to support theory development on new forms of inter-dependence and electronic governance forms.

In Chapter three, Mohammed Laeequddin, B. S. Sahay, Vinita Sahay, and K. Abdul Waheed provide "Supply Chain Partner's Perceptions of Trust and Risk: The Perspectives of UAE Printing and Packaging Industry." Over many years, researchers from social science and management have argued that to develop sufficient trust between potential supply chain partners, a useful starting point is to develop strategies for encouraging perceptions of trustworthiness. Conversely, marketing theorists and practitioners have called for strategies by industry that aims to reduce risk perceptions for successful relationships. However, it is not clear in the literature which perception is more significant; trust or risk and from which perspective. Identification of such factors plays an important role in supply chain design and operation to decide whether the supply chain members should strive to develop trust perceptions or reduce risk perceptions in relationship. This chapter has identified the common perspectives of trust and risk perception to address the issue of which perception is more significant from each perspective. Results of a survey of supply chain member's trust and risk perceptions of the printing and packaging industry in the United Arab Emirates are presented.

Honggeng Zhou offers "An Empirical Test of the Information Processing Theory" in Chapter four. According to the propositions in the information processing theory, the chapter tested the relationship between task uncertainty and three organizational design strategies, i.e. creation of lateral relationships, investment in information systems, and creation of self-contained tasks. The information processing theory (IPT) argues that the need for information processing increases as the task uncertainty increases. Among the four design strategies the IPT suggests, creation of slack resources and creation of self-contained tasks are used to reduce the need for information processing. Investment in information systems and creation of lateral relations are used to increase the capacity of information processing. Creation of slack resources is not a preferred strategy, because it is usually costly. Therefore, the chapter focused on the relationship between the other three design strategies and task uncertainty. Data from 125 North American manufacturing firms were used to perform the analysis. Business environment uncertainty was

employed to measure task uncertainty. Sourcing practice and delivery practice measured the creation of lateral relationships, while information quality measured the investment in information systems.

Also, just-in-time production and human resource management measured the creation of self-contained tasks. Regression analysis showed that business environment uncertainty has significant positive influence on sourcing practice, delivery practice, information quality, just-in-time production, and human resource management. While the information processing theory was proposed more than thirty years ago, the chapter empirically extends the relevance of the information processing theory to today's supply chain environment. In today's supply chain management world, information technology has been playing more and more important role. Companies globally are connected with internet and collaborating efficiently in order to produce good products. As the uncertainty in business increases, information sharing helps reduce this uncertainty. As predicted by the IPT, the information processing capability will probably increase as the uncertainty in the business world continues to increase. As an important theory in information system management, the information processing theory still plays an important role in today's supply chain management. This chapter provides a timely contribution to both academia and practitioners in terms of understanding the information processing theory and how to apply this theory in daily business environment.

SECTION 2: TRANSPORTATION MANAGEMENT

Section two presents transportation management with four chapters. In Chapter five, Álvaro García Sánchez, Miguel Ortega-Mier, and Roberto Arranz provide "Discrete-Event Simulation Models for Assessing Incidents in Railway Systems." In this chapter, the authors present a discrete-event simulation environment for analyzing railway systems in detail. With the developed tool a case study applied to a railway line in Spain is presented. This environment has been developed in Witness (commercial simulation software) which has proved to be effective and efficient for the purpose of the authors' approach. The result is not an ad-hoc simulator for a particular railway line, but a set of modules which can be seen as the building blocks for creating simulation models. The code within each module is self-contained to a great extent, so that its verification, maintenance, etc. allows the developer to use, reuse and upgrade models easily, provided that he or she is a proficient Witness developer.

Some modules correspond to actual elements in a railway line, such as stations, parking, sections (which are the stretches of trails in between traffic lights), and crossings. For example, when a train enters a module, the speed, routing, et cetera of this train is based on the code of that module until the train exists that module. Modules contain variables which link them. Basically, every module has the information on where to push trains as they leave that module. Other modules are those containing some common elements to which the rest of the modules refer. These modules contain also some basic functions which are invoked across different elements in different modules. The models developed with these modules incorporate a great level of detail. The two major contributions in this sense are how the traffic lights and passengers' behavior are modeled. Traffic lights change colors according to how trains advance along the system. Trains accommodate their speed to those colors. When incidences occur (such as breakdowns), this is of great importance, since traffic lights highly condition how the system performs.

The second major contribution is how passengers' behavior is modeled. Arrival patterns for passenger change overtime, so that peak and valley hours can be modeled along with the destinations for passengers' trips. The logic that modules contain allows gathering information as to average duration of trips so that different policies for managing the system can be assessed. A case study for a line in the

communing network in the area of Madrid (Spain) is given. In particular, when a short breakdown occurs two policies are compared: either stop all trains and keep them from advancing or let them advance as much as they can, according to traffic lights. Several factors are considered to asses those two policies.

Patrick Hirsch shows "Minimizing Empty Truck Loads in Round Timber Transport with Tabu Search Strategies" in Chapter six. In Central Europe, transportation accounts for an estimated 30% of the total costs of round timber and is therefore an essential element of cost. The ongoing liberalization of markets opens up new supply and demand areas for round timber. As a consequence the transportation activities increase. Hence, it is necessary to develop new sophisticated planning algorithms for round timber transport in order to support decision makers. Up to now, only few authors presented quantitative approaches to solve optimization problems in the forest-wood supply chain. This chapter is a valuable contribution to close this gap.

The underlying optimization problems are described in detail and the tactical and operational decisions are highlighted. The reader gets a detailed overview of the different planning stages in round timber transport. The chapter is focused on the operational problem of finding a cost-efficient routing of log-trucks. The introduced Timber Transport Vehicle Routing Problem (TTVRP) deals with a heterogeneous fleet of log-trucks, time windows, weight limits on the road network, and tour-length as well as capacity constraints. Since the transport tasks are predetermined, the objective is to minimize the empty truck movements. Five different Tabu Search based algorithms are implemented to solve the TTVRP. They are combined with an initial solution heuristic and a post-optimization heuristic. The algorithms are tested in extensive numerical studies with real life data. The solver software Xpress is used to verify the solution quality of the presented heuristic methods.

As the results show, the presented algorithms work very well with respect to solution quality and computing time. Especially the dynamic Tabu Search with an alternating strategy (TSAS_dyn) seems to be a suitable method for solving TTVRPs. This method was newly developed for this research work and is described in detail. TSAS_dyn can also be applied successfully to other kinds of Vehicle Routing Problems (VRP). In their current research the author and his colleagues proved that TSAS_dyn is also a promising method for solving rich VRPs in the optimization of home health care services and state-dependent Vehicle Routing Problems with Time Windows (VRPTW) in container transport. This chapter is a valuable source of information for practitioners, students, and researchers working in the area of optimization in the forest and wood processing sector. Additionally, the introduced methods can also be adapted for other research areas in vehicle routing, since they seem to be very promising.

Chapter seven, entitled "Solving Vehicle Routing Problems Using Constraint Programming and Lagrangean Relaxation in a Metaheuristics Framework," is written by D. Guimarans, R. Herrero, J. J. Ramos, and S. Padrón. An important component of many distribution systems is routing vehicles to serve customers. The Vehicle Routing Problem (VRP) provides a theoretical framework for approaching this class of logistic problems dealing with physical distribution. Nevertheless, in most of the application cases none of the classical VRP variants can represent uniquely the real problem. In this scenario, it becomes evident the need of developing new methods, models, and systems to give support to the decision making process. Hybridization has become a very promising strategy in designing and developing improved metaheuristic solution methods, because of their heuristic nature, greater flexibility, and less strict mathematical formulation. A hybrid metaheuristic method combines structure and efficiency advantages from different principles and approaches, and often provides a highly flexible and efficient tool in solving difficult combinatorial optimization problems.

The authors introduce in this work a hybrid methodology to solve the VRP. This methodology has been specially designed for being flexible in the sense that it can be used, with minor adaptations, for solving different variants of the VRP present in industrial application cases. Different technologies are used to achieve the desired flexibility, efficiency, and robustness. Constraint Programming (CP) has been chosen as the modelling paradigm to describe the main constraints involved in the VRP. CP provides the pursued flexibility, since adding side constraints present in most real application cases becomes a modelling issue and does not affect the implemented search methods. Lagrangean Relaxation (LR) is used for minimizing the total travelled distance, providing the required efficiency. Moreover, the use of LR permits reducing the computational complexity of the process and therefore reduces the required computational time to solve the VRP.

The authors achieve the desired robustness by embedding these techniques within a Variable Neighbourhood Search (VNS) framework. The VNS is a metaheuristic which exploits systematically the idea of neighbourhood changes both in the search process to find a local minimum, and in perturbation phase, to escape from the corresponding valley. Although it is an extended method, there are few examples of its application to the VRP. The introduced work is aimed to help filling this gap. The authors have successfully applied this methodology to solve both benchmark problems and real application cases. In the first case, they have obtained remarkable results for many instances of different sizes and have improved some best-known solutions. They are currently working on improving the computational times by applying efficient techniques. On the other hand, they have scaled this methodology up to cope with industrial-size problems, obtaining competitive results and solutions that are currently applied.

Chapter eight, "Optimizing Routes with Safety and Environmental Criteria in Transportation Management in Spain: A Case Study," is written by Javier Faulin, Fernando Lera-López, and Angel A. Juan. Nowadays, there is an increasing concern across the world about the environmental impact of business management decisions, many of which affect the transport and logistics sectors. This has led to detailed analysis of transport externalities, which in turn has given rise to the concept of sustainable mobility. The object of logistic management is to optimise the whole value chain of the distribution of goods and merchandises. There are many algorithms to optimise the distribution process related vehicle routing problem inside the global management of the supply chain. The objective function of that problem usually involves distance or profits, but in this chapter, the authors also take into account safety and environmental costs. These terms cover all of the various environmental and social impacts that are generated by business logistic activities. The authors understand as externality in an economic activity an impact on a party that is not directly involved in that activity. The environmental externalities generated by transport activities in Europe have a tremendous impact on the economy of every European country. Concerns have focused on road transport as the primary mode of freight movement and the largest source of freight-related CO_2 emissions in developed countries. Road freight, moreover, generates 30% of the external costs of transport activities. It is therefore important to incorporate these ideas and concerns in the daily route management of real companies by searching for high-quality routes to offset environmental costs. Such routes will be classified in this chapter as sustainable routes.

Moreover, this chapter analyses route-building using variants of traditional algorithms (Clarke and Wright, 1964; Mole and Jameson, 1976) for the Capacitated Vehicle Routing Problem, including the implementation of new costs in addition to classic ones such as distance travelled or delivery expenses. These new costs relate to the introduction of new safety regulations in vehicle loading and unloading, as well as the assessment of the environmental damage caused by logistic activities. Safety costs are easier to estimate than environmental costs, because the former are closely related to very well-known safety

measures, while the latter require complex computations to obtain monetary estimates of the negative environmental impact of transport and logistics.

Thus, the main purpose of this chapter is presenting a new methodology in the management of companies in relation to their distribution activities. The authors call this methodology ASEC (Algorithms with Safety and Environmental Criteria). These considerations raise the value of the global objective function, but permit a more realistic cost estimate that includes not only the internal costs involved in the problem but also the related externalities. Finally, the authors discuss several promising solutions to real case using the new ASEC methodology.

SECTION 3: INVENTORY AND LOGISTICS MANAGEMENT

Section three consists of three chapters. In Chapter nine, Susanne Hohmann and Stephan Zelewski discover the "Effects of Vendor-Managed Inventory on the Bullwhip Effect." The bullwhip effect in supply chains is a long known phenomenon. In literature you will find investigations on the bullwhip effect that cover simulation, business games and qualitative as well as quantitative approaches. Nevertheless the bullwhip effect is still one of the main reasons why supply chain management is not working efficiently. Therefore, the authors add another chapter on a known subject but choosing a well-based approach on the bullwhip effect and combine it with a field-tested method as vendor-managed inventory is. This chapter focuses on a quantitative approach which is, however, different from existing literature and therefore presents a new contribution to the research on the bullwhip effect which lies in the exact quantification of the bullwhip effect and the effects of vendor-managed inventory.

The authors start their investigation with a model that represents the behavior of *each* supply chain member. The supply chain ideally consists of the producer, the wholesaler, the retailer and the consumer. Based on this model they show how the main causes of the bullwhip effect, demand distortion and misperceptions of feedback, will affect the efficiency of the supply chain. As a result of this model they are able to exactly quantify the extent of the bullwhip effect for each supply chain member without any measure taken against the bullwhip effect. This is the basis for further investigation on how successful vendor-managed inventory will be to reduce the bullwhip effect.

As a next step the authors include vendor-managed inventory in the model that reflects the behavior of the supply chain members; the quantitative model is adjusted to the new situation in which vendor-managed inventory is taken as a measure against the bullwhip effect. Once again, the authors analyze the extent of the bullwhip effect for each supply chain member. They are hence able to exactly quantify the success of vendor-managed inventory for each part of the supply chain which is new in literature. As a further approach they show the efficiency of vendor-managed inventory reflecting several forms of supply chains, with and without wholesaler. With the presented model, the extent of the bullwhip effect can be predicted. A managerial implication could be to use this ability to analyze the efficiency of the supply chain. The technique of modeling and quantification of the counteraction of the bullwhip effect allows the optimization of the supply chain with regards to the described causes of the bullwhip effect.

In Chapter ten, R. Rajesh, S. Pugazhendhi, and K. Ganesh introduce "Genetic Algorithm and Particle Swarm Optimization for Solving Balanced Allocation Problem of Third Party Logistics Providers." This chapter deals with the balanced allocation of customers to multiple third party logistics (3PL) warehouses. The allocation problem generally deals with clustering of customers so as to achieve minimum total resource viz. cost or time. But the real challenge arises when it is required to strike a balance between

the allocation of customers while also minimizing the total cost or time. The problem of allocating customers to warehouses is considered with the objective of minimizing the maximum shipping cost incurred among the set of warehouses along with a balanced allocation of customers to warehouses. An algorithm based on Genetic Algorithm and Particle Swarm Optimization procedure is proposed and the performance evaluation is conducted on a large number of randomly generated problem sets. The proposed algorithm based balancing allocation model can be expanded to include the multi-objective functions considering transportation cost, transit time and distance between two sites to tackle the balanced allocation problem with greater efficiency.

Albert Wee Kwan Tan, Arun Kumar, and Balan Sundarakani deliver an "Analysis of Reverse Logistics Operations for a Computer Company" in Chapter 11. This chapter describes an empirical study of companies based in Singapore who use reverse logistics operations to support their Asia-Pacific operations. Findings from this study, the first of its kind in Asia Pacific, increase the understanding of the various reverse logistics practices used to sustain key industries operations in the region. Some general practices and barriers were identified by the authors as well as other interesting findings relating to reverse logistics planning and operations in Asia.

The data collected by the authors revealed some new insights for reverse logistics in Asia. First, short product life cycles cause companies to use air transportation to cut down the transportation time. For industries characterized by relatively short product lifecycles, such as consumer electronics and IT, delays in processing of return flows can be expected to have a significant negative impact on value recovery, making it even more important for companies in this segment to pay attention to their return processes. The authors have proposed to set up a regional reverse logistics center in Asia Pacific so that all returns can be transported within a short distance to cut down time and costs. Second, as most companies do not yet measure the extent of their reverse logistics activities, the exact value of reverse logistics activities is difficult to determine in financial terms. It is still an afterthought process that receives little attention in Asia.

Third, there are certainly ample opportunities for companies in Asia Pacific to offer reverse logistics services to leverage on economies of scale accordingly to the authors. For example, a one-stop regional reverse logistics provider can provide customer in Asia Pacific an integrated reverse logistics operations and can also provide proper advice how to best approach this in the most efficient and cost effective way. Lastly, reverse logistics is a growing business in the Asia-Pacific region and Singapore being one of the logistics hub in Asia, could well position itself to be the hub for supporting Asia Pacific after-sales operations in some of the industries accordingly to the authors. It is therefore useful to conduct further study on the key reasons for companies with reverse logistics operations based in Singapore how they add value to their Asia Pacific operations.

SECTION 4: MANUFACTURING SYSTEMS

Section four consists of two chapters. Chapter twelve, entitled "Solving a Bi-Criteria Hybrid Flowshop Scheduling Problem Occurring in Apparel Manufacturing," is written by Jairo R. Montoya-Torres and Fabián Vargas-Nieto. Real-life decision-making problems in business are difficult to solve in practice. They cannot be solved in an exact manner within a reasonable amount of time and are hence classified as NP-hard problems. Using approximate algorithms is the main alternative to solve this class of problems. Such solution approaches can be categorized as either dedicated heuristics or meta-heuristics. The former

are problem-dependent and are designed to solve a particular problem. The latter are procedures that represent a more general class of approximate algorithms applicable to a large variety of optimization problems. They are intended to solve instances of large size by implementing strategies aimed to reduce the solution space or to explore it efficiently. These algorithms are in fact on the intersection of several fields: artificial intelligence, computational intelligence, soft computing, mathematical programming, and operations research. Most of the meta-heuristics mimic natural metaphors to solve complex optimization problems (e.g., evolution of species, annealing process, ant colony, particle swarm, immune system, bee colony, and wasp swarm). With the improvement of computing performance in the past 20+ years, meta-heuristics have been are more and more popular in different research areas and industries.

The chapter studies the problem of scheduling production activities for a realistic industrial process. Production scheduling is one of the hard optimization problems found in real industrial contexts for which several meta-heuristic procedures have been successfully applied. Generally speaking, scheduling is a form of decision-making playing a crucial role in manufacturing and service industries that deals with the allocation of resources to tasks over given time periods and its goal is to optimize one or more objectives. Among the various types of scheduling problems, flexible or hybrid flowshop scheduling is one of the most challenging. The flexible or hybrid flowshop scheduling problem is known to an NP-hard optimization problem since it is a combination of the parallel machine and flowshop scheduling problems, which are both known to be hard combinatorial problems, except for strongly restricted special cases. The NP-hardness of the flexible flowshop problem implies that is not possible to find exact (optimal) solutions to large-sized instances in reasonable computational time. The problem studied in the chapter is taken from a company belonging to the apparel industry, where textile labels are manufactured through the process of thermal transfer. The problem is modeled as a flexible flowshop with two stages. The objectives are the maximization of system productivity (or minimization of makespan) and the minimization of the number of production orders with late delivery. A bi-objective genetic algorithm is proposed. Experimental study was performed using real data from the enterprise. Since validation results carried out by the authors showed the efficiency and effectiveness of the proposed procedure. They also designed a decision-aid tool which is actually being used at the enterprise, allowing improvement of key performance metrics.

Mehmet Savsar contributes “Modeling of Hybrid Production Systems with Constant WIP and Unreliable Equipment” in Chapter 13. Material flow control is one of the main problems in production and supply chain systems. In production systems, material flow can be controlled by a purely push, a purely pull (just-in-time), or by a combination of push-pull control approach. One type of push-pull method is to control only the last stage of production during part withdrawals to trigger the production at the first stage. While the final stage is operated according to demand with a pull mechanism, preceding stages are operated according to a push system of control. This type of material flow control in a production system is referred to as hybrid material flow control. WIP levels are limited in hybrid systems and production output rate is very susceptible to equipment failures. In order to establish suitable WIP capacities between the stages of production, it is essential to consider equipment failures and maintenances when analyzing a production line by appropriate models and tools.

In this chapter, the author develops a discrete iterative mathematical model, which is utilized to study and analyze behavior of a push-pull hybrid system with unreliable equipment at any stage. The iterative model is incorporated into a computer simulation program to determine the optimum WIP capacities at intermediate stages as well as the best number of kanbans at the last stage. The simulation process incorporates a three-stage procedure which allows the user to enter a set of data describing the system

under study, simulate the system iteratively until selected statistical criteria are satisfied, obtain the output, and apply specific recommendations for productivity improvement until satisfied production output is achieved. The simulation model is very useful in estimating line productivity under specified operational conditions for realistic production systems. It allows line designers or operational engineers to evaluate effects of storage capacities, line length, process time variability, demand variability, and repair/maintenance policies on productivity of a system. Line productivity can be significantly improved.

Since the simulation model uses an iterative discrete model, all possible combinations of WIP capacities and kanban levels have to be evaluated to determine the optimum WIP levels, which maximize the production output rate. When the procedure is applied to typical production lines, computational time is acceptable. However, computational time becomes excessively large when analyzing production lines with large numbers of stages and buffer capacities. One of the challenges to this problem is to incorporate a specific search algorithm into the simulation model to reduce the search domain by eliminating combinations, which have no contribution on improving line productivity. This will reduce the computational time significantly and make the procedure usable for much longer lines.

SECTION 5: INDUSTRY STUDIES

Section five has three chapters. In Chapter 14, B. S. Sahay, Vikram Sharma, and G. D. Sardana detail the "Supply Chain Management Practices of Indian Automobile Industry." In this chapter, the authors have introduced the current state of Indian automobile industry which is trying to make its presence felt globally. The automobile industry is a major contributor to India's economy. The Indian automobile manufacturers face stiff international competition in the wake of all major US and European car manufacturers entering the Indian market. There are many other significant challenges being faced by the Indian automobile supply chains, which have been clearly brought forth in this chapter. The objective of the chapter is to identify trends in Indian automotive supply chains and to find out how far the Indian automotive sector is from the dream of a "global enterprise." The current state of supply chain practices in Indian Automobile Industry has been discussed in detail. Trends in demand forecasting, inventory management, warehousing and distribution, as well as manufacturing management have been introduced. Logistic management and supplier management practices have been studied, and recommendations have been made for each of the facets ranging from outsourcing to product development and design.

Today's competition is no longer limited between individual business houses but among entire supply chains. The chapter is an indicator of the fact that if Indian automotive companies have to achieve the "global enterprise" status, they have to improve in all the areas of supply chain. They have to align their business strategy with the supply chain strategy to increase the profitability and shareholders' value. In the contemporary scenario, specific supply chain management practices need to be adopted to improve operational efficiency and profits. This chapter presents the current status of Indian automotive supply chains. For this, data was collected by conducting a nationwide survey. The chapter highlights some major problems plaguing the Indian automotive supply chains and finally, presents some recommendations that are potentially useful to bring Indian automotive supply chains at par with global industry leaders. Thus, the chapter will be useful for all not only academicians but the practicing managers as well.

Leslie S. Hiraoka emphasizes "Reconfiguring Supply Chains for a Global Automotive Industry" in Chapter 15. The rise of the *Pax Americana* was a tectonic power shift that elevated the United States to an industrial superpower due largely to the economies of scale, mass production, and mass marketing

of the automobile that were conceived and implemented by Detroit's Big Three automakers following World War II. An equally important transition occurred when the Japanese automakers reconfigured their supply chains that enabled their successful transplanting of small-car production from Asia to North America in the aftermath of the Arab oil embargo of 1973-74. Critical for this movement of Toyota to Kentucky, Nissan to Tennessee, and Honda to Marysville, Ohio, was the building of enduring supply chains using both Japanese and American suppliers in the New World that gave them a competitive edge in taking market share away from the Big Three U.S. car companies.

The rise of the rest of the world, especially China and India, now challenges the leading carmakers of the United States, Japan, and Germany to make another massive shift away from making and selling motor vehicles in developed economies to rapidly emerging markets where a new environment demands the reconfiguring of supply chains, assembly operations, and global marketing plans that will enable the manufacturing of low-cost affordable cars for first-time buyers. Attention to cost-cutting, waste reduction, and continuous improvements will again become the basis of hybrid just-in-time (JIT) systems that supply subcomponent and key component parts to assembly plants located throughout the world. This will require long-term investments in major parts makers as well as the monitoring of their subcomponent manufacturers and subcontractors to ensure that quality, production, and cost controls are maintained. JIT manufacturing and lean inventory levels together with advanced cross-docking and backup capacity in the event of supply disruptions will be needed to smooth shipments over great distances and balance far-flung production cycles. Car and parts makers will also form global alliances in order to satisfy the investment requirements of host countries and lead to the development of the required expertise needed for operating in foreign markets with limited infrastructure and industrial development, volatile exchange rates, and competition from local and foreign producers.

In Chapter 16, Sanjay Sharma and Sanjaysingh Vijaysingh Patil propose "Development of Holistic Framework Incorporating Collaboration, Supply-Demand Synchronization, Traceability and Vertical Integration in Agri-Food Supply Chain." If one throws light at the Maslow's hierarchy of human needs, physiological need - food constitutes major portion at the bottom of the needs pyramid above which lies the need of safety, love & belonging, esteem, and self actualization. The current study therefore focuses on the agri-food supply chain and has done excellent contribution by introducing the concept of agriculture universe and the agriculture framework and also by suggesting the empowerment of farmers and bringing out the best from farms. Agriculture sector, service sector, industry sector, and transport sector are the key pillars of any economy, but as stated earlier food grain - agriculture sector always has more importance over the others. The food grains are produced at farm lands and reach to the consumers via food supply chains of varying lengths, most of the time making non-value added movement and passing through an increased number of agencies that is the key reason of increased prices of food commodity. The private firms are implementing the concept of lean supply chain and maximizing the businesses whereas the government agencies might have little lack of control over the management of food supply chain as far as the complexities are concerned. With the increased advancements in information technology, private businesses are making enhanced use of various IT tools to increase productivity whereas the food grains are wasted in go-downs and don't reach to the needy besides increased food prices. The question is if the private enterprises are using the IT tools effectively then why not use of such tools can be made to effectively coordinate the food supply chain management.

This chapter proposed the framework for optimizing food supply chain. The key idea of this chapter is - when the bottom of the Maslow's needs triangle is fulfilled, major amount of problems including violence and terrorism also around the world might cease. This chapter rightly focuses on the agriculture

sector and food supply chain management. This chapter believes that out of the all indicators of gross domestic product (GDP), agriculture productivity is the healthy indicator of economy and stability of any country. If one looks at the increase in violence and terrorism all over the world over last two decades, the agriculture productivity seems to have been declined globally. The divide between agriculture sector and service sector is increasing; the number of agencies along the chain length is increasing. This added to the increased supply chain costs and ultimately to the increased prices of food grains. The present chapter studies the elaborate literature on this and suggests the framework that will monitor and trace the whereabouts of the food grains from farm to consumer. The concept known as agriculture universe and agriculture framework has been proposed for agri-food system. The basic purpose of the universe and framework is to synchronize supply and demand, storage, and distribution of the agri-food via minimal distance network. Agriculture universe also includes the farmer's credit policy and the idea of empowerment of farmers. The entire movement and storage of the food grains might be traceable via Radio Frequency Identification (RFID) and electronic data interchange (EDI) system. The proposed framework is thus a unique idea and will be effective in eliminating wastages and other malpractices involved.

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