Chapter 60
Analyzing an Impact of Industry 4.0 on Logistics and Supply Chain

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ABSTRACT

The chapter presents an impact of Industry 4.0 transformation on logistics and supply chain management. Logistics and later supply chain management discipline has gone through a number of changes in the last 50 years, namely transition among mass, lean, agile, resilient, and green. All of them are paradigm changes as each significantly reshapes the orientation of the discipline in the source of competitiveness, risk concern, customer services, productivity, process management, externalities, costs, and other aspects of the disciplines. The author presents findings gained in the exploration of these fundamental changes and provides a comparison with a previous change of paradigm. The chapter proposes a transformation that the company supply chain system has to go through to re-establish its competitive position at the time of Industry 4.0. The chapter provides a case study of 3PL perception of Industry 4.0 based on in-depth interviews conducted among the major global 3PLs operating in the Czech Republic.

INTRODUCTION

Supply chain management (SCM) is a discipline formulated in the early 1990s as a reaction to fundamental changes in logistics. The extension of logistic processes beyond company boundaries became a novelty of the past. Traditional logistics processes such as inventory management and transportation failed to provide a competitive advantage and therefore, besides these logistic processes SCM encompasses the following processes today:

- **Supply Chain Design:** (SCD) is a strategic discipline that defines total supply chain for each product starting from the initial supplier and ending in the final customer. In addition, it formulates processes, business partners and service levels that lead to customer satisfaction within the scope defined by delivery term (INCOTERMS).

- **Demand Planning:** (DP) was operative within the sales and marketing department but is increasingly embedded into supply SCM to integrate the sales market situation and logistic processes. The purpose of this process is to create company sales plan based on both internal and external factors e.g. inputs from sales (historical sales), marketing (promotion events), financial department (budgets and cash flow), production (production capacity), product engineering (product lifecycle), material management (stock level), procurement (supplier shutdowns), legislation (changes of taxes and regulations), weather, customer habits etc. by using quantitative and qualitative methods.
- **Production Planning:** (PP) sets a plan based on DP outputs, work-in-process and stock of finished goods to meet customer demand. SCM is accountability for production planning due to the necessity for a closer integration of PP and logistic processes to easily cope with market changes and customer requirements.
- **Supply Planning:** (SP) provides a plan of replenishment in accordance with the demand and production plans and delivery terms agreed with suppliers. The plan is an exact schedule of replenishment in push oriented strategy or a parametrization of replenishment system in pull oriented strategy.
- **Material Management:** (MM) represents replenishment process that is organized either according to a fixed plan in push or to actual consumption in pull strategy. MM is a traditional logistic process.
- **Warehousing:** (W) is a process of storing and manipulation of goods in a different form to balance supplying and production or sales process.
- **Production:** (P) is traditionally out of scope of SCM but the reduction of stock and extension of make and assembly to order leads to mutual dependency of production and logistics process. Hence, P is increasingly a common part of SCM processes.
- **Transportation Management:** (TM) covers the organization of transport, planning of roots, dispatching and fleet management. Shrinkage of customer order batch sizes increases the importance of TM in SCM. Frequent deliveries of low volumes raise the need for better integration of TM, P and MM on the process and IT level.
- **Distribution:** (D) is a process of planning and organizing of finished goods flow across warehousing and distribution facilities.
- **Packaging:** (Pkg) is a process design, sourcing, inventory management and organization of reverse flows.
- **Customer Service:** (CS) incorporates communication with customers, resolution of customer complaints about deliveries, monitoring and evaluation of logistic performances to customers.

The purpose of SCM is to link, integrate and manage the processes and necessary sources that are employed to satisfy the customer by bringing appropriate added value by means of single or multiple supply chains. The linkage quality derives from business trust among supply chain partners, set processes and implemented technology hardware and software enabling collection, processing, storing, and reporting of data on real-time bases.

SCM enhances overall performances by three fundamental drivers:

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