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THE ROLE OF OUTSOURCED MANUFACTURING IN AUTOMOTIVE INDUSTRY SUPPLY CHAIN

The objective of this paper is to provide an overview of the major trends taking place in the automotive supply chain, with an emphasis on the outsourced manufacturing suppliers, and the relationship between manufacturer and suppliers. It is not a comprehensive report, but rather an informed view of the issues and an overview of the behavior of the players, both manufacturers and suppliers in the automotive supply chain.

Keywords: automotive supply chain, outsourced manufacturing, platform sharing.

Цзіньпью Лі

РОЛЬ АУТСОРСИНГОВОГО ВИРОБНИЦТВА В ЛАНЦЮЖКУ ПОСТАВОК АВТОМОБІЛЬНОЇ ПРОМИСЛОВОСТІ

У статті представлено огляд основних тенденцій розвитку в ланцюжку автомобільних поставок з основним акцентом на постачальників з аутсорсингом виробництва і взаєминами між виробником і постачальниками. Описано основні проблеми і представлено огляд поведінки ключових гравців у даному секторі, як виробників, так і постачальників в ланцюжку поставок автомобільної промисловості.

Ключові слова: ланцюжок автомобільних поставок, аутсорсинг виробництва, спільна платформа.

Рис. 2. Табл. 2. Літ. 11.

Цзиньпё Ли

РОЛЬ АУТСОРСИНГОВОГО ПРОИЗВОДСТВА В ЦЕПОЧКЕ ПОСТАВОК АВТОМОБИЛЬНОЙ ПРОМЫШЛЕННОСТИ

В статье представлен обзор основных тенденций развития в цепочке автомобильных поставок с основным акцентом на поставщиков с аутсорсингом производства и взаимоотношениями между производителем и поставщиками. Описаны основные проблемы и представлен обзор поведения ключевых игроков в данном секторе, как производителей, так и поставщиков в цепочке поставок автомобильной промышленности.

Ключевые слова: цепочка автомобильных поставок, аутсорсинг производства, общая платформа.

1. Introduction. The automotive industry has a well-developed system of outsourced manufacturing that is defined along a distinctively multi-echelon supply chain. In general, the roles of outsourced manufacturers are narrowly defined within the echelon, and exclude the provision of 3PL services.

The automotive industry can best be described as a "producer-driven" supply chain with multilayered production systems organized hierarchically into tiers. Governance structure of an automotive supply chain has changed somewhat during the last 2 decades. Previously, subsidiaries of transnational assemblers developed local supply networks. Today, original equipment manufacturers (OEMs) and Tier1 suppliers tend to form parallel global networks based on the global lead sourcing/follower supply model.

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The transnational OEMs are the major players in coordinating production networks, including their backward and forward linkages. OEMs are the key economic agents because they have the power to exert control over backward linkages with raw material and component suppliers, and forward linkages into distribution and retailing. Vehicle assemblers are putting immense pressure on the supply chain, reducing margins to such an extent that it is becoming difficult for component manufacturers to sustain their strategic investment levels.

Apart from cost reductions, assemblers are also making increasing demands for enhanced productivity, quicker delivery times and time to market. In order to improve the overall efficiency of their operations, assemblers are now taking an active role in specifying production and quality systems of their suppliers. This has been prompted in no small part by innovations in internal production flow and quality assurance such as just-in-time production (Womack, 1991; Fujimoto, 1999) which necessitates close integration of production schedules, logistics and quality procedures between OEMs and their suppliers.

Simultaneously, component manufacturers are being encouraged by OEMs to invest in information technology (IT) to support assemblers' own e-business initiatives. There is a global trend towards greater collaboration between vehicle assemblers and component manufacturers in design, research and developing components. This signals a move from the sequential and arm's-length pattern of relationships that existed previously between assemblers and their component suppliers. For example, over the last few years, assemblers have shifted more of the responsibility for product design and production to their 1st tier suppliers. These new sourcing patterns have replaced traditional supply chains and revamped the relationships that OEMs have historically had with their suppliers. In many cases, producer-driven value chains are being driven by 0.5 and 1st tier suppliers rather than OEMs.

2. Generic Automotive Supply Chain. A generic automotive supply chain has for its primary raw material vendors, chemical manufacturers, steel mills, aluminum plants etc. Secondary raw material vendors are suppliers of accessories, such as nuts, bolts, batteries, tiers etc. OEMs are engine manufacturers. Automobile manufacturers design, assemble and market the automobile. Automobile dealers are retailers that consumers visit for buying and servicing their automobiles. You can see the generic structure of automotive supply chain in Figure 1.

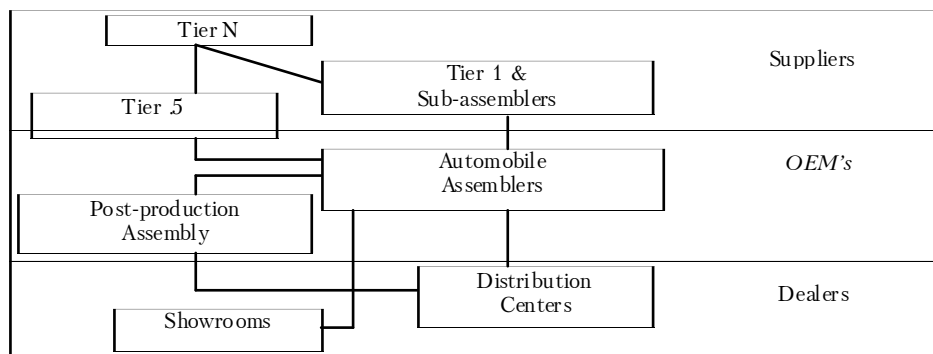


Figure 1. Generic structure of automotive supply chain (author's)

The concept of Tiers 0.5, 1, 2, and 3 suppliers is as follows: Tier 0.5 and Tier 1 are characterized by the need to manage suppliers at Tier 2 and would produce and supply components directly to automobile manufacturers. Tier 2 is characterized by the need to obtain good forecasts and preferably to practice vendor-managed-inventory (VMI) system with its customers, Tier 1's. Tier 2 would manufacture some of the simpler individual parts included in a component produced by Tier 1. Tier 3 and 4 would mostly supply raw materials. Synchronization of the automotive supply chain network is achieved through coordination, primarily, of (a) replenishment schedules that have been passed on through the echelon, from dealer onwards to automobile manufacturer, OEM, accessories manufacturer, and raw materials supplier, and (b) commitments made on capacity utilization between various members in the supply chain echelon (Figure 2).

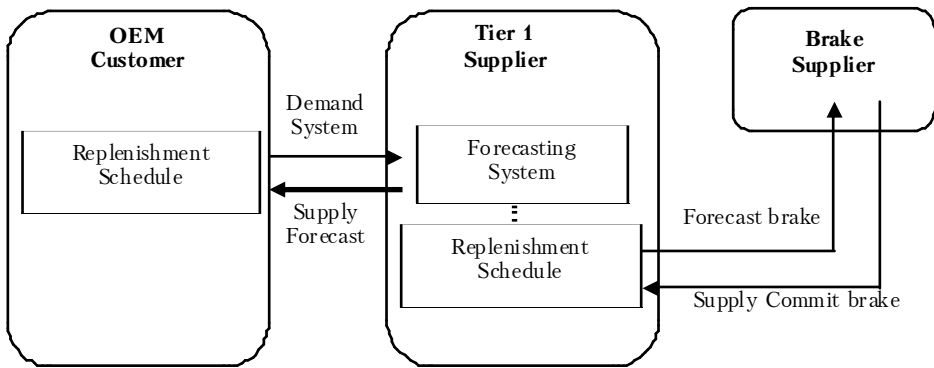


Figure 2. Synchronization of the automotive supply chain (author's)

The growing status and importance of suppliers in the automotive supply chain is influencing their structure, as shown in Table 1. New direct suppliers are becoming large global firms, which are either specialist in complicated systems, or integrators of simpler subsystems. They become substantially responsible in the design and engineering of systems mentioned above and coordinating the supply chain for manufacturing and assembly.

Table 1. Supplier Characteristics (author's)

	Raw Material Supplier	Standardizer	Component Specialist	Integrator
Market Presence	Local/ Regional/ Global	Global	Global/ Regional	Global
Main Capabilities	Material engineering Process engineering	Research, design and engineering Assembly/ supply-chain management	Research, design and process engineering Manufacturing in varied technologies	Product design and engineering Assembly/ supply-chain management
Types of Components or systems	Steel banks Aluminum ingots Polymer pellets	Tires ABS Electrical Control Unit (ECU)	Stampings Injection molding Engine components	Interiors Doors Chassis

Studies by the international motor vehicle program (IMVP) suggest a whole new following configuration and their roles (Veloso et al., 2000): Raw material supplier is a company supplying raw materials to OEMs and their suppliers. Standardizer is a company setting standards on the global basis for a component or system. Component specialist is a company designing and manufacturing a specific component or subsystem for a given vehicle or platform. Integrator is a Tier 0.5 supplier capable of designing and integrating components, subassemblies and systems into modules shipped or placed directly by suppliers in the automotive manufacturers' assembly plants.

The new configuration of automotive supply chain means restructuring with companies actively engaged at some of the levels, as mentioned above. The important aspect is role. Companies should identify their positioning strategy and derive a coherent set of actions through the critical development and production dimensions.

3. Developments in outsourcing automotive production. The need for information exchange is created and driven by the need for shortest time-to-market. Major automotive manufacturers such as DaimlerChrysler AG, Ford Motor Co. and General Motors Corp. have the total of \$500 mln to found Covisint in February 2000, which connect the global automotive industry. It integrates data from various sources to provide people with the right information at the right time, and on the technology of their own choosing. This unprecedented joint effort aims to weave together back-end systems from automakers and suppliers to create a web-based exchange to automate time-consuming and costly chore of acquiring direct materials, parts and sourcing contracts from suppliers. Even though the Covisint was developed initially to connect the global automotive industry, it has been continually modernized to solve current business problems organizations are facing today, such as healthcare industry.

Suppliers are driven to provide integrated modules rather than merely components. Global competition is compelling the automobile industry to break away from traditional production structures so that complete modules and systems are being outsourced. A supplier must be prepared to assume full responsibility for a particular system. This means handling projects, largely and independently, from development through to delivery to the car manufacturer's assembly line. Large suppliers, such as Krupp Hoesch Automotive GmbH, with its extensive development, parts production, assembly and logistics know-how, have the edge here. The current underutilization of capacity of many automotive plants is acting as a brake on the placement of system's orders. This will change with economic recovery. For instance, Krupp Hoesch Automotive is already working on a large number of system projects. Platform sharing has been driven so that automakers are reorganizing their vehicle portfolios around product platforms and car modules. This leads to a smaller real physical difference between models (Table 2).

Table 2. Platform Sharing

Maker	Platform	Vehicles	Annual Production Volumes (mln of units)
VW	A	Audi A3, Audi TT, Skoda Octavia, Seat Toledo, VW Golf	1.4
GM	Mid-Range	Buick Century/Regal, Chevrolet Lumina/Monte Carlo, Oldsmobile Cutclass/Intrigue, Pontiac Grand Prix	0.9
Fiat	178	Palio, Palio Weekend, Siena Strada, Minivan	1.0
Ford	F	F Series, Super Duty, Expedition, Lincoln Navigator	1.2

4. Case Study. Fiat's "World Car" concept is one of the most ambitious standardization examples. The global outsourcing model being implemented by Fiat Auto represents the following double challenge:

1. To find suppliers offering the best combination of costs, quality and service worldwide.

2. To standardize all the parts on the 5 "Project 178" models in every production and assembly plant.

This is a more ambitious goal than the one set by other car manufacturers, who themselves use global suppliers' selection processes but also adapt models to various markets. While the latter represents a partial and therefore simpler globalization strategy, Fiat Auto's project reaches far wider by aiming at global optimization. On the whole, the lesson of "Project 178" can be summarized as follows:

1. The idea of managing an automotive supply chain in a more centralized and competitive manner, taking advantage of competitive pressure stemming from globalization and of "information transparency" stemming from information technology is interesting, and its positive effects should be further investigated.

2. OEMs seek to keep control over supply chain without direct investment (complexity, cost and risk reduction), focusing on core activities and capabilities. Suppliers, in turn, benefit from having greater overall volumes. This situation favors partnerships and long-term relationships between global OEMs and global first tier suppliers. In this respect, there are incentives for cooperation between car manufacturers and their suppliers, since innovation and cost control will become the ultimate performance drivers and sources of values.

3. Although the logic of global sourcing could suggest that it is possible to switch, in practice this is not true since the quasi-rents (Klein, Crawford and Alchian, 1978) associated with investment firms and specific transactions (Williamson, 1985) remain high. The "voice" option (asking the supplier to improve its performance in order to match more competitive terms) compared to the simple "exit" one (switch to another supplier) (Sako and Helper 1995, 1998) remains valid since it allows avoiding decisions that could seem useful in the short term but are inefficient in the medium term. It also protects client's (be it OEM or first tier) reputation, thereby preserving the element of trust in partnership (Lamming, 1993).

4. On the whole, Fiat's global sourcing, while putting competitive pressure on suppliers by means of worldwide information transparency on prices, quality and service, works as a performance improvement stimulator within OEM-first tier suppliers partnership relationships ("voice" mechanism), rather than a pure and simple supplier-switching device ("exit" mechanism). In Fiat's case global sourcing does not contradict partnership relationships between OEMs and first-tier suppliers.

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