André Kroneberg[1] & Bengt Ramberg[2]

The Future Role of Shipping in Global Automotive Supply Chains

Abstract

Traditional automotive supply chains are contrasted to the way automotive supply chains may be organised in the future in order to discuss the changing role of shipping companies. A shipping company's core capabilities, business relations and service portfolio define its role.

In the next few years, the traditional shipping companies may have to evolve from highly specialized, asset-based operators into operators with significant systems capability and possibly logistics management and alliance capability as well. Now seems to be the right time to start preparing for a future radically different from the situation today.

The paper draws upon an extensive research project carried out by Wallenius Wilhelmsen Lines (WWL). WWL is one of the world's largest vehicle and ro/ro transportation and logistics companies with an annual turnover reaching 1.5 billion USD. The WWL fleet consists of more than 60 large vessels.

Introduction

Today, automotive logistics is characterised by globalisation and intensified competition. Already, just five giants – GM, Ford, DC, VW and Toyota control 70% of the market. Industry and financial analysts estimate that the value of supply chain inventory in the automotive industry is 10-15% of annual sales. This inventory level has a strong impact on the bottom line and auto manufacturers are now trying to reduce the order to delivery time by interacting with their customers and suppliers in new and radical ways.

A high degree of outsourcing, new Business-to-Business (B2B) solutions and electronic marketplaces are driving innovative inbound and outbound logistics. Traditional shipping companies are faced with a number of threats and opportunities as they set sail for the future. Based on a comparison between traditional and prospective supply chains in the automotive industry, the changing role of shipping companies is discussed.

[1] André Kroneberg is Senior Research Engineer, MARINTEK, N-7450, Trondheim, Norway.
E-mail: andre.kroneberg@marintek.sintef.no, Tel: + 47 92 83 67 42; Fax: + 47 73 59 57 76.
[2] Bengt Ramberg is Vice President, Wallenius Wilhelmsen Lines, N-1324, Lysaker, Norway; and Lecturer with Norwegian School of Management. E-mail: bengt.ramberg@2wglobal.com, Tel: + 47 67 58 44 26; Fax: + 47 67 58 40 80.

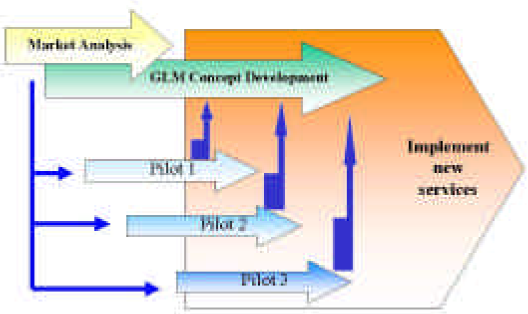
The role of a shipping company is defined by its:

- Core capabilities, e.g. operation of ships and systems capability (Reve 1990).
- Business relations, e.g. relations characterized by high or low relation specific investments (Reve 1990).
- Products and services, e.g. basic sea transportation, additional or extended services such as pre-delivery inspections and logistics management.

The paper draws upon an extensive research project carried out by Wallenius Wilhelmsen Lines (WWL). WWL is one of the world's largest vehicle and roll-on/roll-off (ro/ro) transportation and logistics companies with an annual turnover reaching 1.5 billion USD. The WWL fleet consists of more than 60 large vessels.

The goal of the WWL research project was to develop a global logistics management strategy for the company. A number of studies have been performed addressing broad industry trends as well as specific logistics needs and requirements of key customers (pilots). In Figure 1, the methodology as applied by WWL is illustrated. In the figure, GLM is short for Global Logistics Management.

FIGURE 1
WWL Methodology



For a thorough description of the methodology as presented above, please refer Kroneberg and Ramberg (2001).

In chapter 2, the traditional role of shipping companies in automotive supply chains is briefly discussed. In chapter 3, the future role of shipping companies is discussed with a basis in two major trends affecting the automotive supply chains, namely the rapid growth in outsourcing of logistics and the growth in new B2B solutions and electronic marketplaces. In chapter 4, conclusions are given together with suggestions for further research.

The traditional role of shipping companies

In 2000, 60 million vehicles (i.e. cars) were produced on a global basis. 8 million vehicles were subject to deep-sea movements. A few large operators (e.g. WWL, NYK, MOSK, K-Line and HUAL) offer tonnage for transportation of such vehicles. Most of the tonnage is highly specialized and referred to as Pure Car Carriers (PCC). Since cars are characterized as volume cargo, PCCs have many decks and a large deck area. In addition to PCCs, some of the operators have Pure Car Truck Carriers (PCTC) and the more flexible Roll-on/Roll-off vessels (Ro/Ro) with some strengthened and moveable decks. The Ro/Ro vessels are capable of transporting high and heavy (e.g. agricultural machinery) as well as break-bulk cargo (e.g. forestry products) in addition to cars and trucks.

The operators negotiate contracts directly with the car manufacturers. Most of the contracts are long-term contracts with time horizons ranging from two to five years. In some of the trades, operators co-operate in order to offer a higher frequency and thereby a better service. Some of the trades are regulated by the liner conferences (permitted anti-competitive agreements). Refer Kroneberg (1999) for an introduction to liner conferences and their advantages/dis-advantages.

Traditionally, the operators have offered a port-to-port service. In addition, some of the operators offer discrete, mostly stand-alone, transaction-based additional services such as trucking and pre-delivery inspections. Until the operators work closely with a single shipper to plan and tailor an integrated delivery process in the most cost effective manner possible they are functioning as a transport provider and not really as a logistics company.

With a basis in the discussion above it is evident that the traditional role of shipping companies is characterized by the following:

- Core capabilities: Operation of specialized tonnage port to port.
- Business relations: Stable, direct and long-term relations towards clients.
- Products and services: Port to port service with some stand-alone, additional services (e.g. pre-delivery inspections).

In the traditional supply chains, the shipping companies enjoy stable external conditions due to few operators, specialized tonnage, high entry barriers, regulated trades and personal relations towards key clients. This picture, however, is about to change. The car manufacturers are currently redefining the rules of the game by entering into new and innovative co-operations with logistics suppliers in order to reduce order to delivery time and optimize their supply chains.

The future role of shipping companies

There are two major trends affecting the way future automotive supply chains may be organized.

Firstly, a high degree of outsourcing is driving innovative inbound and outbound logistics managed by actors such as UPS, Ryder and Schenker. Secondly, the emergence of new B2B solutions and electronic marketplaces is affecting the relations between the actors in supply chains. In the next sections, each of the trends is analyzed further in order to draw some implications for the future role of shipping companies.

Outsourcing of logistics

In the US, Gross expenditures managed by third party logistics service providers were 45,4 billion USD in 1999 (Armstrong & Associates 2000). On their website, Armstrong & Associates has indicated 56,4 billion USD for 2000, corresponding to a yearly growth in the outsourcing of logistics exceeding 20%.

The outsourcing trend is also highly present in the automotive industry and is driven by a new breed of logistics companies emerging with sophisticated systems capability. These companies are regularly referred to as 3PLs and 4PLs. A *3PL* acts on behalf of shippers and may possess some assets, especially distribution or transport equipment. 3PLs have the ability to manage broad cross-functional processes, e.g. order fulfillment. Normally payment is directly from shippers in the form of management fees and performance incentives. A *4PL* is a non-asset (few or no transport, equipment or distribution facilities) based entity to oversee and manage a wide variety of 3PLs and traditional providers engaged by large global shippers. 4PLs are expected to possess a comprehensive overview of logistics and its separate functions, understand the supply chain and specific industry sectors, have process re-engineering and consulting capabilities, and regularly employ state of the art technology and systems tools. Compensation is likely to be a combination of management fees, performance incentives and profit sharing with the shipper (Kroneberg & Ramberg 2001).

Historically, the 3PLs and 4PLs have been targeting inbound logistics and to a certain extent assembly and manufacturing operations. The entrance of the 3PLs and 4PLs into outbound automotive logistics started February 2, 2000 with the Ford/UPS alliance in North America. The alliance aims to optimize speed, precision and reliability of Ford’s distribution network.

The most extensive alliance is probably the one between CNF and General Motors (GM). December 13, 2000, GM and CNF said that they would form a joint-venture logistics company called Vector SCM, which may eventually take over control of GM's entire $6 billion annual transportation and logistics spending. Ultimately, Vector SCM will function as GM's 4PL managing all aspects of GM's supply chain including coordination among all 3PLs engaged by GM. Harold Kutner (VP, GM) says that ”All the providers that are now with GM will be transferred to VECTOR”.

The common goals of the new alliances between auto manufacturers and 3PLs/4PLs seem to be improvement of speed and reduction in order to delivery time. In order to tailor the supply chains, the global manufacturers have also started working heavily against the antitrust exemptions. A recent example of this trend is the U.S. Ocean Shipping Reform Act (OSRA) from 1998, which permits cargo owners to negotiate one on one contracts with carriers. OSRA has the potential to build long-term partnerships between shippers, ocean carriers, seaports, domestic carriers and ocean transportation intermediaries and thereby meet the tailored logistics need of their client base and help reducing the order to delivery time.

Today, 24 days from ordering to delivery of a car is a miracle of production planning, scheduling and delivery. The industry vision, however, is a 3-5 Day Car. To meet the target the entire automotive supply chain must be redesigned (e.g. reduce product options, design for postponement and flexible manufacturing, introduce new distribution practices and so on). Ford is presently working towards a 15-day production schedule and is testing its plan with the Mustang at its Dearborne, Michigan assembly plant. Only five years ago, in 1996, it took more than 50 days to get a customer-ordered Mustang (Kroneberg & Ramberg 2001).

The new actors clearly represent a threat to the traditional ocean operators. They could easily come between the car manufacturer and the shipping company thus interfering with the direct relations that exist between the parties today. Further, the 4PLs have significant system and optimization capabilities thus challenging the operational, asset-based shipping companies.

E-Business

New B2B solutions and electronic marketplaces are emerging providing not only benefits related to cost-effective transactions, but also the potential for more efficient supply chains due to increased connectivity and visibility.

A prerequisite to becoming either a complete full service logistics provider or playing a major role in emerging supply chains is possessing systems integration capabilities. New supply chain packages such as i2 and Manugistics offering optimisation and simulation-based planning, scheduling and modelling are enabling companies to move away from pure transactional systems. In theory, they enable integrated pull supply chains and complex trade-offs may be modeled at levels of detail that were computationally prohibitive a few years ago (A.T. Kearney 1999).

It is important to understand that for the promises of e-business to become reality, systems of all channel players, manufacturers, dealers, distributors, inland carriers, freight forwarders, governments, and foreign processors must integrate with each other. For a buyer-supplier relation-ship this means that the supplier must be able to feed the buyer’s systems with understandable data. For the supplier such integration may be quite complex, as the customers ask for unique services. The fragmentation in information systems requirements is truly a huge challenge and it is important to avoid “lock-in” due to huge investments in specialized, or relation specific systems. On the other hand, the emergence of Application Service Providers (ASPs) with a logistics scope (e.g. ShipLogix.com, 3Plex.com) and open standard communications (web-based) could make closely integrated partnerships easier to achieve.

Web-based communication and ASP-based software will allow smaller companies to use advanced logistics systems based on monthly license fees rather than paying up front. Shiplogix.com is an example of an ASP offering logistics software including electronic request for quotation, routing guide, tender/acceptance, track and trace, mode/shipment optimization, delivery appointment scheduler, invoicing and reporting.

In the ASP market, opportunities for the flexible and lean logistics providers could emerge while the major providers with significant system “lock-ins” could be threatened.

In the next few years, significant reductions in order to delivery time will partly be enabled by the new supply chain packages as referred to above. Radical reduction in order to delivery time will put enormous pressure on all actors in the supply chain. The traditional role of the pure ocean operators is threatened. The vision of a 5-Day Car will significantly challenge all ocean operators. The time at sea, depending on the market distance from manufacturing plant, is in the range of 5-35 days. The 5-Day car does not permit such a sea leg. In the future, ocean operators may need to look into other ways of transporting; module based, half fabrics, platforms instead of finished vehicles, and even air transportation, at least for the high-price market segments (Kroneberg & Ramberg 2001).

For less critical or commodity items, common standards help companies maintain flexibility of supplier or channel choice (A.T. Kearney 1999). The new electronic marketplaces frequently apply such standards, with COVISINT being the paramount example in the automotive industry. In May 2000, COVISINT was established by Daimler Chrysler, Ford, General Motors, Renault and Nissan. COVISINT is a global industry exchange aiming to avoid multiple, costly and complex solutions by improving connectivity and visibility. Some of the benefits expected from the COVISINT partners are (Weiss 2000):

- An electronic marketplace (connecting sellers and buyers globally).
- Supply chain collaboration/ synchronization (reduces inventory and cycle time, enables faster constraint visibility and resolution).

The future role

With a basis in the two trends discussed in the previous sections, some implications for the future role of shipping companies may be drawn.

The *core capabilities* of a shipping company may be extended from port to port operation of specialized tonnage to also include:

- Systems capability: If the ocean operators become sub-suppliers, or alliance partners to 4PLs like UPS and Vector SCM, they have to provide systems capability.
- Logistics management and alliance capability: If the ocean operators manage to become 3PLs for manufacturers in niche trades, they have to develop logistics management capabilities as well as alliance

capability in order to identify, choose and manage potential partners.

The *business relations* of ocean operators may change in two directions depending on whether the operator becomes a sub-contractor or a 3PL. In some of the trades controlled by 4PLs, the business relations may change from stable, direct and long-term relations into relations characterized by:

- No direct, personal contact with clients. Client relations are managed by the 4PLs.
- Performance levels will determine the award of business – as opposed to personal relations playing an important role today.

In some of the trades where ocean operators are likely to play a major role in the supply chain (e.g. by becoming a 3PL for the manufacturer) the business relations may take a different form:

- The ocean operators have to develop a solutions-based mindset and work closely with the customer to plan and tailor an integrated delivery process in the most cost effective manner possible.
- The ocean operators will also have to invest heavily in systems meeting the specific customer requirements. The relation specific investments will increase. A possibility for reducing the relation specific investments could be found in the ASP market.
- The relations would no longer be governed by a price mechanism only. Management fees, performance incentives and profit sharing with the shipper are all relevant mechanisms in the governance of such relations.

The *service portfolio* of the shipping companies may not change if the sub-contractor and commodity scenario emerges. However, a significant reduction in rates could be expected. If the shipping companies manage to achieve logistics contracts they must be prepared to extend their traditional services by offering:

- Door to door solutions, including for instance transportation, warehousing, cross-docking, labeling, tracking, tracing and order fulfillment.

Extended services as described above are only achievable if the core capabilities and business relations are extended and changed as described previous in the section.

Conclusions and further research

The paper contrasts traditional automotive supply chains to the way automotive supply chains may be organized in the future in order to discuss the changing role of shipping companies. A shipping company’s core capabilities, business relations and service portfolio define its role. Extensive research carried out by Wallenius Wilhelmsen Lines provides the basis for the findings reported in the paper.

The paper argues that the role of traditional shipping companies will change due to an outsourcing of logistics triggered by auto manufacturers’ need to optimize global supply chains with respect to speed and order to delivery time. Further, the new B2B solutions and electronic marketplaces are key requirements for the new and innovative alliances being formed. In Table 1, the traditional and prospective roles of shipping companies are summarized.

TABLE 1
The Future Role of Shipping in Global Automotive Supply Chains

Role attribute	Traditional role	Future role
Core capabilities	Operation of specialised tonnage port to port	Sub-contractor: Systems capability 3PL: Logistics management, alliance and systems capability
Business relations	Stable, direct, long-term	Sub-contractor: Dynamic, indirect, short-term 3PL: Tight interaction with key customers, relation specific investments, incentive/performance-based rewarding
Services	Port to port with some discrete additional services	Sub-contractor: Port to port, commodity product 3PL: Total door to door solutions

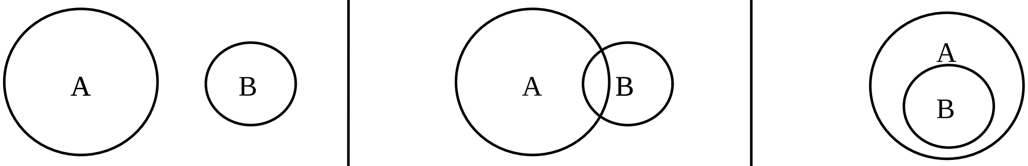
In the next few years, the traditional shipping companies may have to evolve from highly specialized, asset-based operators into operators with significant systems capability and possibly logistics management and alliance capability as well. Now seems to be the right time to start preparing for a future radically different from the situation today.

The findings reported in the paper could benefit from further research rooted in an extended theoretical frame of reference. How can Agency Theory (Eisenhardt 1989), Transaction Cost Economics (Williamson 1975, 1985) and Industrial Network Theory (Mattson 1987, Håkansson and Johanson 1992) help us increase and refine our understanding of alternative developments of the role of ocean carriers?

In Figure 2, a possible framework for such analysis is given based on Kroneberg (2000). In this framework, three different forms of co-operation are identified as market, alliance and integration, each with different governance mechanisms.

The framework as outlined in Figure 2 could be supplemented by theoretical contributions related to the strategic core of a company (Reve 1990, 1996, Falkenberg 1996, Haugland 1996).

FIGURE 2:
Governance mechanisms and characteristics of transactions/relations



Market	Alliance	Integration
Governance mechanisms:	Governance mechanisms:	Governance mechanisms:
• Price	• Trust	• Authority (e.g. ownership)
• Explicit contracts	• Implicit contracts	• Explicit/implicit contracts
Characteristics:	Characteristics:	Characteristics:
• Short term relations	• Long term relations	• Long term relations
• Measureable activities	• Complex activities	• Structured activities
• Low uncertainty	• Medium/high uncertainty	• High uncertainty
• Low asset specifity	• Medium/high asset specifity	• High asset specifity

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