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Development of organizational models for cross-company transport bundling

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Abstract

Continuous cost pressure causes companies to move production sites to low cost countries. Although production costs decline, logistic costs are negatively effected. Individual companies with limited shipment volumes do not have access to cost efficient and highly productive transport networks. Multi-modal, cross-company logistic models are one approach to open up the potentials of transport networks for companies.

In the past similar approaches failed due to insufficient target and benefit structure of participating partners and missing organizational incorporation. This paper focuses on the critical success factor of cooperative logistic models concerning organizational aspects as well as forms and specifications of cooperation models. Therefore determining characteristics of logistic models and their specifications and dependencies among themselves are identified. Specific possibilities of organizational authorities for the cooperation are defined including contractual relationship.

Keywords:

Logistics, Organization, Organizational model, Transport bundling, Cooperation, Coordination, Cross-company

1 INTRODUCTION

In the last few years many car manufacturers and component suppliers have set up new production sites in or moved existing locations to the Automotive Region Eastern Europe (AREE) not just to take advantage of the emerging market there but also because of the low wage costs [1].

These new production sites, which were established partly with the intention to transfer operations from existing Western European facilities or in order to provide a necessary growth of capacity, supplier and customer structures of the parent plants, were often just copied. Approximately two

thirds of suppliers as well as customers of Eastern European Tier 1 suppliers are situated in Western Europe [2].

The trend towards relocation has shown that the exchange of goods leads to new demands and challenges for transportation and logistics. At an economic level, one of the main areas of focus for logistics in this context is how to plan and manage transport capacities to cope with the transport flows and the related planning and management of logistics networks for goods, services and information [3].

Particularly transit countries like Austria suffer from increased traffic volume between the new and the old European Union countries with constantly rising environmental and infrastructural burden. Further, rising labour costs in Eastern Europe make it necessary to focus on efficient logistic processes. It was proven that the logistics costs of Eastern European production sites are often marked higher than their sister plants in Western Europe [4].

The limited volume of shipment often prevents individual companies from accessing cost-efficient und highly productive transportation networks. Intermodal, cross-company logistics models for regional transport bundling is a useful approach to access the great potential. In the past similar approaches failed because of unsatisfactory consideration of targets and benefits of the involved partners and missing anchoring within the organization. In the course of the research project Trans Austria the economic and environmental potential of cross-company logistics models was proven. Despite of overall advantages in the logistics system the cooperative approach is not beneficial for all involved parties and benefits are distributed unbalanced [5]. A substantial challenge in cross-company models poses the allocation of savings between the partners. Consequently the definition of responsibilities and rules – the organizational aspect of defined models - is a critical success factor for the realization.

2 CROSS-COMPANY LOGISTIC MODELS

The currently applied logistics processes, especially for the specific needs of individual enterprises in automotive industry do not appear optimal from a holistic point of view. Deficits might emerge as direct transport running far under capacity, use of small transportation carriers, less-than container load (LCL) with long running times or multiple handling steps as well as bad transportation tariffs due to small quantities. High stocks and capital tied up are results of this inefficiency. Flexibility is reduced since small changes of usual order cycles lead to additional trips. Since many companies have a similar source-drain-behaviour the potential of cross-company bundling to optimize transport efficiency is high.

2.1 Logistic networks

There are various approaches for cross-company logistics models that conform to the general network model of logistics [6]. These models represent networks transporting rights, goods, finance and information where spatial, quantitative, informational and temporal differences as well as company boundaries are crossed. Parameters defining the structure of a logistics network are paramount [7]:

- Number, locations and functions of source points (= loading locations, making goods available),
- Number, locations and functions of target points (= unloading locations, points of reception, utilization of goods),
- number, locations, functions of connections or nodes between sources and targets.

The **basic structure** of transportation links can be represented either as **direct connection** ("point-to-point" transport) in its simplest form (single-stage, uninterrupted transport chain) or as a **multi-stage system** with preliminary leg, main leg and subsequent leg with transshipment terminals where the network nodes serve as consolidation terminals where the flows of goods are collected and/or as break-bulk terminals where the flows are in turn distributed [7].

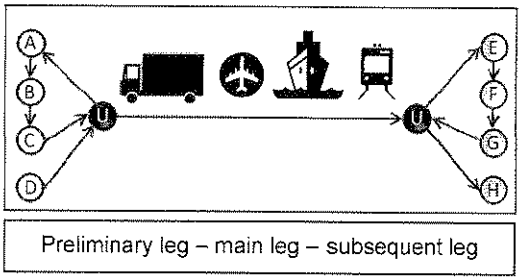

Fig. 1: Integrated structure

This multi-stage transportation chain is further divided into

- **Broken transport**, where the load units are broken up and if necessary recombined and where interim storage is usual, and,
- **Combined transport**, which is performed without any change to the transport container. In addition, integrated systems also include,
- **Piggyback transport**, where the complete transport means, or a part thereof, is shipped (roll on-roll off/swim on-swim off, bimodal semi-trailers etc.), and,
- **Container transport**, which, as the name indicates, carries the transport container.

The mixture of logistics systems made up from the given basic structures is decided in the logistical network structure. The processes are designed when the logistical capacities are superimposed on this.

The **logistical capacity** can be subdivided into transport capacity, warehousing capacity and information capacity

In addition to the basic structure of the systems, the speed of traffic flowing between the individual points in the system must be taken into account [8]. The network strategy is also based on geo-economic considerations such as the long-term development of customer demand or the development of the required delivery time.

Summing up, the criteria logistics costs, supply service, adaptability, susceptibility to interference, transparency and time for planning and establishment of the system are important in the moment of developing and evaluation logistic models.

2.2 Consolidation of shipments and potentials of consolidation

Logistical cooperation between different companies is characterised by the bundling of transport volumes. Bundling, also referred to as consolidation, happens when transport volumes are combined to form larger transport batches in order to lower transport unit costs and the unit costs of incoming goods at the target point or of outgoing goods at the source point.

The starting points for the scenarios for transport bundling are the individual parameters of the logistical network structure. The following forms may thus be used:

- **Source**-point bundling often following the principle of the "milk run" (the shipments intended for a particular destination are collected from several places of shipment, from neighbouring places of shipment or from a shipment region and processed together),
- **Target**-point bundling (shipments from one place of shipment intended for several destinations or for a delivery region are processed jointly and transported together) and,
- **Transport bundling**, where shipments are collected and delivered in one tour.

Further forms of bundling can be **inventory bundling** or **temporal bundling**, and **vehicle bundling** and **transhipment point** or **transit terminal bundling** as forms of spatial bundling.

In principle chronological and regional consolidation can be distinguished. Chronological consolidation means postponement of shipments to bundle more volume for one transport. Regional consolidation uses synergies in collection of volumes at different sources or bundling to different target-points.

Overall every bundling type must meet the requirements of savings through consolidation of synergy effects to cover higher transport costs, operation costs of handling points or longer distances of time frames in comparison with direct relations.

The research project Trans Austria showed examining 7 companies in the region Timis that cross-company transport bundling can reduce logistic cost by 15 percent. Considering the environmental impacts the bundling and shift of transports to railway cut fuel consumption in half and reduces emissions by 40 percent [5]. To succeed in overcoming the disadvantage of reduced competitiveness due to higher lead times of products, from the end of production to delivery at customer plant, an organizational effort has to be made.

3 ORGANIZATIONAL REQUIREMENTS OF CROSS-COMPANY LOGISTICS MODELS

As can be derived from the term "cross-company", such logistics models require the co-operation of several enterprises. By the term of "co-operation" "an act or instance of working or acting together for a common purpose or benefit" is understood [9]. The determining cooperative characteristics were defined by Wojda [10] as:

- Content of service provision
- Cooperation volume
- Type of partner
- Number of partners
- Location of partners
- Privity of contract
- Organisation/Information structure and culture
- Financing

Herby the parameter value is dependent on the form of cooperation and there are interdependencies between the factors. Content of cooperation and volume of service provision are derivates from the arranged cooperation goals. These parameters set the complexity for organisation structures and contracts.

3.1 Mode of operation of given cooperation approaches in logistics

In today's economy existing cooperation approaches can be classified. Common is the differentiation in arrangement of cooperation in relation to the value chain.

While the close cooperation between logistic service providers (LSP) and industry is known as vertical cooperation, cooperation between businesses at the same level of the logistic chain is called horizontal [10]. Cooperation between logistic businesses is not new, since hauliers started with freight alliances in the early 30ies [11]. Later on the focus was on regional traffic. These cooperation forms are used mainly in city logistic concepts. Within the city logistic concept cities strive for central optimization of transports, where already in 1999 analysis concerning the point of implementation showed that over 30 cities had at least started planning activities of these concepts [12].

Since horizontal logistic cooperation between businesses are scarcely implemented, hauliers networks and diverse city logistic approaches are references to well functioning cooperation forms.

Essential characteristics of cooperation regarding organisational and information structure is the level of centrality in disposition. While centrally scheduled cooperation need a hierarchy and a consistently defined target system, peripheral cooperation forms are characterized by market relations and individual goal definition. Regarding interaction between cooperation partners with each other and with other business partners, the juristic design of the contracts is from fast relevance.

3.2 Development of organisational models

The identified cooperation approaches show the diversity of possible specifications and cooperation goals and tasks. Therefore no generally accepted design for organisation models for cross-company logistic networks can be given; rather a framework for the development of logistic models which includes the most important requirements will be visualized.

Assumptions for planning are derivates from the requirement portfolio of suppliers in the region Timisoara for cooperation partners:

- Neutrality in handling or priority of jobs.
- Confidentiality regarding the given data.
- Joint definition of rules and regulations and processes.
- Definition and implementation of interfaces (IT requirements).
- Availability of contact person or local contact point.
- Fair cost-benefit distribution.

Taking these requirements and the general tasks of planning, producing and controlling the logistic performance of all partners into account leaves the question of how the coordination function can be fulfilled. Essential is the coordination between consolidated transport demands of companies with capacity supply of all hauliers and logistic service providers.

Different options in fulfilling the tasks of a coordinator can be a single business, one or more logistic service providers or a neutral instance without economic interest. The following figure shows advantages and disadvantages of the peculiarities.

	Single company	More than 1 company	Neutral instance	Single logistic service provider	More than 1 logistic service provider
+	+ basic coordination	+ cooperation demands for good holistic solution	+ neutrality + confidentiality	+ know-how + demanded cooperation	+ know-how + easy coordination and execution
-	- confidentiality - neutrality in planing and priotity - missing know-how	- coordination of planning and priority	- know-how - missing structures costs of additional partner	- coordination	- neutrality due to choice of haulier - gain of information
Risks	no holistic optimum own interests of company	responsibilities	distribution of risks	price cartell and little competition	monopol and freedom of price setting
Similar concepts	central logistic department of corporate group	logistic koint-venture of individual businesses		freight village	network of individual logistic service providers

Fig. 2: Peculiarities of coordination

The enquiry of suppliers and therefore potential partners identified neutrality and confidentiality as the key factors to a successful cooperation. Therefore a neutral coordination position fulfils the requirements best.

The general set-up for a high volume of shipments with different recipients causing a high effort in disposition with delivery restrictions requires a central disposition. This coordination with fix and variable costs caused by personal as well as software and hardware needs to be financed. Hence detailed contracts between the partners are necessary.

Since neutrality is one of the key issues only the planning but not the provision of logistic performance is requested. On the other hand the negotiation of prices and framework contracts should ideally be part of the duties of a coordinator. The usage of block trains increases the complexity of coordination as well as the level of contract and commitment for the suppliers. To get competitive rates block trains can usually only be operated over an extended period of time. Framework contracts with railway companies imply a weekly capacity for each company with certain up- and downturns. Therefore a yearlong contract is the minimum that can economically be settled by a coordinator. This is another reason why a coordination instance needs fixed financing contracts. In the legal sense limited liability company would be possible to provide the needed flexibility to support the formation of cooperation.

The following contract types can be contemplated from the coordinator point of view:

- Logistic demands and definition of minimum requirements for hauliers and sub-contractors
- Internal price calculation or cost-benefit distribution
- Liability and insurance
- Neutrality and concealment
- Exclusivity (all relevant shipments must be included)
- Definition of sanction e.g. penalty of non-fulfilment

Regarding the distribution of expenses and revenues these models can be implemented:

- Price recommendations in accordance to volume and distance
- Performance based price
- Billing based on pallets and flat rate for disposition
- Price composed of fix and variable component (percentage of sub-contractor cost directly billed and the rest according to shipment volume)

Furthermore logistic cooperation should not be reliant on a single partner to avoid complete failure of the cooperation in case one partner cancels. In the specific case of suppliers in Timisoara an efficient usage of the block train even without the main volumes of the biggest partner is essential for the cooperation. But the success of the concept of cross-company logistic models is supported by an institutionalized regional management that supports businesses in using the synergies of cooperation. Therefore the organizational model is the decisive factor to tap the full potentials of cross-company logistic models.

4 SUMMARY

Cross-company logistic models help companies, which individually do not have access to highly productive transport networks, to active cost cutting potential in logistics and reduce emissions. To build up successful cross-company logistic solutions and tap the full potentials organizational models

are needed. This paper showed different possibilities for the organisation of business cooperation in transport logistics. Due to the variety of parameters of cooperation and complexity in planning no general accepted model can be identified. Though in the framework of designing cooperation between suppliers for logistic transport a neutral coordinator seems to fulfil the surveyed suppliers' requirements best. Further research is needed to identify and specify detailed implementation forms for organizational models that fit the different needs of cooperation partners.

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