

## Tangible and intangible factors for supply chain co-transportation practices

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### Abstract

*In the last years, companies have concentrated on optimizing their production processes and cut their costs down significantly, while neglecting the costs for transportation. Today, when the trend for companies is to move their production to countries in the Middle East and Asia, to attain lower production costs, one can find that the cost for transportation will increase due to the long distances. Therefore, it is very important to try to minimize and optimize these costs as soon as possible to achieve competitive advantages.*

*This paper aims to outline all these factors and explain their importance for companies that are willing to joint a collaborative transportation network. From experience, companies that are thinking to start collaborative transportation practices must check not only the tangible factors but also the intangible ones, as these are factors-related to the relationship and degree of collaboration to be kept with the different partners.*

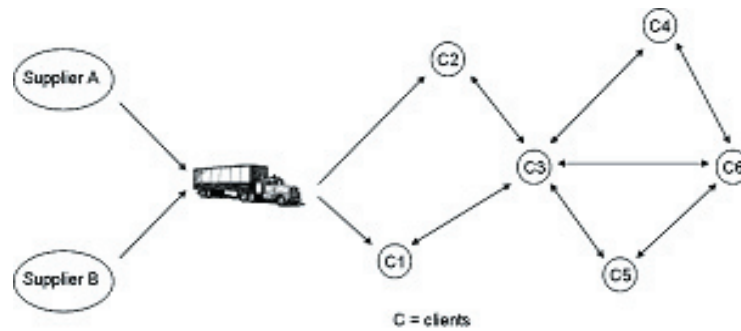
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### 1. Introducción

All these reasons (the new rule of competition, globalization of industry, downward pressure on price, customers taking control and new technology) and not at least transportation costs has lead managers to seek for cheaper and more efficient ways of transporting goods. One way of solving this is to increase the co-operation with other companies in the supply chain (Christopher, 2005).

Co-distribution in its most simple form is when there are two suppliers and one client, and the suppliers share the transportation from the factories to the client.

But this example does not suite all companies, they have all different customers at different locations, and their factories are situated at different locations. The supply chain from the suppliers to the customers is getting more complex, with different rout alternatives and costs as a result. Figure 1 show possible routs and scenarios for a supply chain with two suppliers and five clients. The figure also shows that there will be a lot of different scenarios that must be considered, for example could supplier A send products to client 2 and client 6, while supplier B send products to client 1, 3 and 6.



**Figure 1.** A Supply Chain for two suppliers and six clients.

Then, before to joint a collaborative distribution network an organization must carefully check the benefits it would reach by joining. There are many factors that will affect the decision of joining a collaborative distribution network or not. These have been split up into intangible (such as company image and level of service) and tangible factors (such as weight and volume). The election of these factors came from both the experience of the authors of dealing with co-transportation issues and from the academic literature found at this respect. Then, the authors followed a constructivist methodology (Coughlan and Coughlan, 2002) based on the following activities: recompilation and analysis of scientific knowledge, acquisition of main postulates and construction of initial framework taking into account practical experience gained from previous collaborative projects.

## 2. Tangible and intangible factors

Then, according to the research carried out by the authors, the most important tangible factors are the following:

- Volume. There are two limiting factors when loading a vehicle with goods, volume and weight. In most cases is the volume the limiting factor when trying to fill a truck (Hageback and Segerstedt, 2003). This means that even though there is a limit how much weight you can load on a truck, most often will it be full before reaching that limit. The companies must consider how the products will be placed on the truck so that the utilization actually becomes better than before.
- Weight. The weight of the products must also be one part of the decision. The most basic aspect is if the vehicles that are supposed to do the delivery are able to carry the weight of all the different products, since it is not possible to load the vehicles with an unlimited amount of goods.
- Shape. The two factors above, volume and weight, are closely connected to the shape of the packages. There must be an efficient and easy way of placing the products in the vehicles. The easiest possibility is if all packages had the shape of boxes, then there would not be any question how to stack them.
- Fragility. Fragile products should not be transported with products that are insensitive to rough handling, when loading and unloading it should be simple for the people doing that, so that they do not have to think about what is fragile or not.
- Route. A close analyze must also be done regarding the transportation routs, and the amount of goods that will be transported. Even though the distance becomes longer the alternative

of co-distribution can be more profitable due to the economics of scale (Groothedde, et al, 2005). Different customers have different demands about their deliveries; the time is one of these factors. Many companies have got a time windows when they allow deliveries, and therefore is it very important that these times are kept. The route that the truck will drive must be planned regarding opening hours, delivery windows, road regulations (e.g. max weight on the roads) and also the distance.

- Ability to stack. Different products have different possibilities to be stacked. A close analyze should be done, with the help of the listing of products, to determine which products that are able to load efficient together so that the filling ratio becomes as good as possible.
- Regulations. Some products can not be transported with others due to special regulations and laws. Products concerned by this are often food, due to hygiene reasons, explosive goods and in other way dangerous material.

On the other hand, the most important intangible factors are the following:

- Who should transport? There are two alternatives for companies how to transport their products. Do it themselves or let someone else do it. Both alternatives have its advantages and disadvantages. The basic of economy is if there is someone that can do something better than you, then let him do it. Then you could concentrate on what is your specialty. This means that many companies today are letting other companies, which are experts, handle their shipments.
- Information sharing. Another factor that is important to consider is how much information the company is willing to share with others. Since there will be more than one company planning the transportations when co-distribution, some kind of exchange of information about quantities, shipping dates and so on must be shared. This is, for many companies, classified information and therefore not suitable to share with others. This decision is very delicate for the management, to compare the possibility to decrease the transportation cost relative revealing information about the company.
- Level of service. According to Christopher M. (2005), the role of customer service is to provide “*time and place utility*” in the transfer of goods and services between buyer and seller. This means that there is no value in the product or service until it is in the hand of the customer or consumer. There are many aspects that one have to take into account, did we send the right material, and the right quantity to the customer. And furthermore, was it delivered in time, undamaged. All this make the process of measuring the service level very hard.
- Re-liability of co-operators. The reliability of the data about how much goods that should be sent must also be looked upon. As discussed under the paragraph strategic position, a change of the predicted transportation could mean increased costs than calculated. An increase of transported goods could mean that new material must be bought, and a decrease of transported goods could lead to that people have to be dismissed. Another reliability factor is if the co-operators will have their goods ready on time for the transports. Today when all companies are trying to cut costs, are the importance of that the goods are getting delivered on the right time increasing.
- Personnel. As mentioned, the supply chain could become rather complicated when the amount of suppliers and customers increases, and therefore will there be a need for recourses,

i.e. personal and information system, to cope with this new activity in the company. This given that the transportation is made by the company it self.

- Strategic position. Another important issue to consider, is how the deployment of-distribution would affect the company's strategic position within the market, that is which customers that the company are aiming at, if the company is differentiating its products or not, and so on. One method of examining these factors is to study the company's value chain, which could help understand how value is created or lost within the company.

### 3. Assessment of factors

Once the main tangible and intangible factors to take into account for carrying out co-transportation practices have been presented, it is time to assess them against some criterion. In this point, it is important to think of the fact that enterprises thinking to develop collaborative transportation practices, should check not only on the tangible factors but also on the intangible ones, as these are factors-related to the relationship and degree of collaboration to be kept with the different partners (Cohen and Roussel, 2004).

For some enterprises the tangible factors will be more important than the intangible ones and vice versa depending on mainly the main issues:

- The business and markets where the enterprise operates.
- The main aim pursued when starting co-transportation practices.
- The internal and external capacities of the enterprise.

In general, an enterprise should think carefully of the above issues when balancing what factors are most important when undertaken co-transportation practices. Then, an enterprise could apply different methods for assessing and deciding between the set of tangible and intangible factors. Different criteria will come up and the enterprise should, somehow, prioritise them according to the issues above stated (and/others). The multi-criteria decision aid methods in general, and the hierarchical techniques in particular, could be a good approach for solving the problem as these are multi-criteria evaluation techniques. Above all, the analytical hierarchical process (AHP) (Saaty, 1980) is perhaps the hierarchical technique most applied within the industrial ambit. The AHP carries out pairwise comparisons between the different variables (the tangible and intangible factors in our case), where the decision maker has to give the relative importance to the criteria.

Though there are more techniques and methods for weighting the relative importance of variables respect to others the AHP offers a rather simple and good approach. However, this method and all those gathered within the hierarchical techniques shared a common drawback: They are subjective in nature and therefore the achieved results should be carefully taken. This is due to the fact that comparisons between criteria are based on judgments made by enterprise experts rather than on objective data.

Anyway, decisions about what of the tangible or intangible factors are the key ones for an enterprise regarding co-transportation practices can only be carried out by insiders of the enterprise. External aid can only come in the form of guidelines and guidance on the different common factors accumulated from experience and from academic works (such for instance the present piece of work) and on the different methods that could be applied to all the different

factors for weighting them and then be able to establishing what the more important factors are.

#### **4. Conclusions**

This paper has presented has presented, based on experience and academic works, the main tangible and intangible factors that an enterprise could take into account when carrying out co-transportation practices. Thus, factors like volume, weight, shape, route, information sharing or level of service have been highlighted as of great importance to enterprises. Additionally, some tips regarding what sort of method could an enterprise use for assessing these factors according to its particular characteristics have been provided, resulting on a work that aims to be helpful to enterprises.

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