EMPTY TRAILERS AND EMPTY KILOMETERS

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This article is based on a master thesis conducted at DSV Road AB in Malmö, in cooperation with the Department of Industrial Management and Logistics at Lund University, during winter 2010/2011. The overall objectives of the study were to measure the number of trailers that are standing still (empty trailers) and the distance trailers are moved without goods (empty kilometers) in relation to the total number of trailers and kilometers and also suggest how to reduce those within DSV Road AB. During this study a number of factors that influence empty trailers and empty kilometers have been identified and some of them are new and not found in the literature. In this article these factors will be described and discussed and suggestions of how to reduce them will be presented.

INTRODUCTION

The transport market has long been characterized by low margins and fierce competition. The players in this market compete primarily through price and it is therefore important for them to constantly improve the organization and reduce costs. One of the great challenges for transportation companies is reducing costs without affecting customer service. Lean manufacturing is a common method, which means that the non-value adding activities are reduced or eliminated. Within the transportation industry, trailers standing still (empty trailers) or being moved without goods (empty kilometers) are examples of such non-value adding activities and they are also the focus of this study. Through studying the transport company DSV Road AB and their metrics, several factors that influence these non-value adding activities have been identified, as have different ways of reducing the related costs.

DSV Road AB is the Swedish part of the global company DSV which is responsible for road transportation to, from and within Sweden. DSV is a full-service logistics company and handles all aspects of logistics from forwarding, packing, sorting and labeling to warehouse management. DSV was founded in 1976 and has bought a number of transportation companies over the years. This means that DSV is based on operating procedures from many different companies. DSV Road AB has its head office in Malmö and handles approximately 1400 trailer movements each day. The planning of the transport operations is divided, due to geographical areas, into ten different business units and each one of them is responsible for planning transports between their specific area and Sweden.

METHODOLOGY

The thesis work started with a preparatory explorative and descriptive study in order to get an understanding, through interviews, observations and data collection, of the factors affecting empty trailers and empty kilometers. In order to create a simplified and manageable picture of the reality, models over how the identified factors influence empty trailers and empty kilometers was created. Combinations of different qualitative methods, such as interviews, and quantitative methods, such as measurements, were used in order to give credibility and validity to the results and to the analysis. For the data gathering, modeling and analyses a theoretical frame of reference was used that was based on previous research and models found in academic literature regarding freight transport in general and management of load units as pallets, containers and trailers in particular.

EMPTY TRAILERS

In this study, an empty trailer has been defined as a trailer without cost coverage for the rental charge, i.e. a trailer that is standing still and is not in use. In DSV Road AB's case, the cost of empty trailers account for 1/3 of the total trailer rental cost, which means that there is a great potential of reducing this cost. The factors influencing empty trailers have been identified as:

- *Different planning tools.* As mentioned earlier, DSV have bought a number of transportation companies over the years and thereby several planning tools have been introduced in the company. Some of them are not in use while some of them still are, and today multiple tools are used within the organization. When different tools are used in an organization, it is difficult to get a good overview of the trailers and their status, especially if there is no common system where all information is registered. In this situation it is hard to match the capacity with the demand, resulting in lack of capacity in some cases and excessive capacity in other.

- *Incorrect information in the system.* DSV has a common system, called CargoLink, where all information should be registered since it is the only system used by all users within DSV. However, due to incorrect registering or information not being registered at all, the information in the system is not always reliable. When the system contains incorrect information it is not possible to get an overview of all trailers and use them optimally.

- *Lack of control of the trailers.* One of the greatest influencing factors is the lack of control of the trailers. Due to different planning tools and incorrect information in the systems, there is no holistic perspective of all trailers and the trailers are therefore not located where they are needed. (Shen & Khoong, 1995) Moreover, there are fragmented tools to support decisions regarding planning and allocation of trailers for their future missions. This means for example that some of the empty trailers simply are "forgotten" and cannot be used since there is no knowledge of their existence.

- *Function-oriented organization.* In a function-oriented organization, every business unit tries to optimize its own result without considering the performance of the whole company. When it comes to empty trailers this results in them being used in a suboptimal way which in extension increases their number.

EMPTY KILOMETERS

Empty kilometers have, in this study, been defined as the distance a truck tractor pulls a trailer without goods. The distance referred to as empty kilometers is the distance from where the trailer unloaded goods to the next location where goods is picked up (Figure 1).
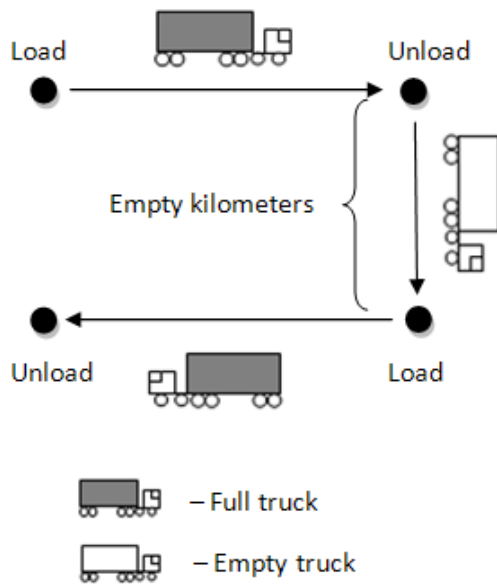

Figure 1 - Empty kilometers

Lumsden (1995) states that imbalance is the factor that has the greatest influence on empty kilometers. Imbalance means that there are more goods in one direction than the other in a transport relation. Imbalances can be divided into four different categories based on the underlying reasons for them:

- *Structural imbalances* which mean that the volume produced in a region differs from the volume consumed in the same region.
- *Design dependent imbalance* which is caused by the design of the load units. Some load units are designed to fit special types of goods and cannot carry other types.
- *Operational imbalances* which can be traced to how the equipages are handled and routed.

- *Commercial imbalances,* which are caused by the market. One example of this is when a load unit is positioned empty near a location where the transportation prices are higher, even though there are goods at other locations.

Lumsden (2006) states that in order to achieve balanced coordination, there are three criteria that should be fulfilled:

- Potential flows of goods must be visible
- Technical and administrative restrictions have to be taken into account
- Economic savings must be possible

Good coordination is made possible by a good overview of all load units, trucks and tractors within the organization, primarily within a geographic area, and helps to reduce the number of empty kilometers. (Tarkowski, Ihrestål, & Lumsden, 1995)

Imbalances are factors, already established in the literature, that influence empty kilometers. In this study the following additional factors have been identified:

- *Lack of communication* between the sales department and the transport planners. The sales department may know of potential customers that can reduce imbalances and lack of return transports while transport planners operate and implement the routing of the transports.
- *Inspection.* Every year, each trailer has to be inspected in the country where it is registered. Having to go to a particular destination, there may not always be goods for the trailer to transport both ways and therefore it sometimes has to travel empty. Inspection of trailers is a factor that all transportation

companies have to deal with. By developing an agreement so that inspection can be carried out in the country which is most appropriate, empty kilometers can be reduced. Such an agreement could mean that the cost of inspection increases, but as long as this cost is not higher than the cost of moving the trailer to the country where it is registered this is profitable. The benefit of such an agreement is cost savings, but also a time savings. If a trailer is inspected in a country closer to its current position, the trailer will be available earlier and more transports can be performed.

- *Different planning tools.* As the various business units use different tools for routing and planning, cooperation benefits are not visualized which contributes to unnecessary empty kilometers.
- *Incorrect information in the system.* As mentioned earlier, there might be incorrect information in the system which sometimes can prevent transport planners from using the trailer that is closest to the goods.

REDUCING EMPTY TRAILERS AND EMPTY KILOMETERS

In this study, three critical factors in order to reduce the number of empty trailers and empty kilometers in relation to the total number of trailers and kilometers have been identified:

- *Order and proper arrangement.* In many cases the lack of control is the reason for not using the load units optimally. In order to create orderliness and proper arrangements it is important to ensure that everyone in the planning process has the right information. This can be achieved through setting up clear rules

for how registrations should be done and through using the same system throughout the organization. By doing this, cooperation benefits can be visualized and the production can get a clearer picture of the location and status of the load units. These units can thereby be utilized in a more optimal way and both the empty trailers and empty kilometers metrics will be reduced. It is also possible to better assure the quality of the company's services by doing this.

- *Metrics and follow-up.* The lack of operational metrics makes it difficult for the production to know how they perform and where there are potential savings. Through working actively with the metrics and through thorough follow-ups, the process can be measured and problems can be found and solved. However, it is better to have a few good metrics that are used and followed up properly, than a lot of irrelevant metrics. (Gunasekaran, 2001)
- *Reduce all types of imbalances.* Imbalance due to low customer density is considered the most critical factor contributing to empty kilometers. By working actively on reducing all types of imbalances, the number of empty kilometers can be reduced drastically. Communicating information about imbalances and where the empty kilometers exist lets the sales department focus on finding customers in these directions. With improved communication, the possibility to achieve customer satisfaction and maintain the service level increase. Yield pricing and freight exchange among business units as well as competing forwarders are other means to reduce imbalances.
- *Rebalance amount of trailers leased on long versus short contracts*

Conclusions

This study has shown that there is great potential of reducing both empty trailers and empty kilometers without affecting the quality to the customer. Since these activities are seen as non-value adding, a reduction has only positive effects for both the customer and the company.

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