

Overcoming the obstacles of intermodal transport

– a shipper perspective on the effects of modal shift

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With the increased public focus on sustainability issues and climate change, “going green” has become a buzz word among firms in Sweden and abroad. Sustainability reports are released and environmental initiatives are proclaimed but in reality the general view is that most logistics greening measures will jeopardize a firm’s ability to deliver service according to contract. This is also the consensus on mode shift, the change a firm makes when shifting from all-road transport to intermodal road-rail transport, something which is suggested by policy makers and researchers as a possible mean to lower the CO₂ emissions caused by a firm’s logistics system. What this master thesis shows is that intermodal transport may be a relatively easy way for firms to decrease their CO₂ emissions – without jeopardizing their competitiveness.

Climate change and transportation

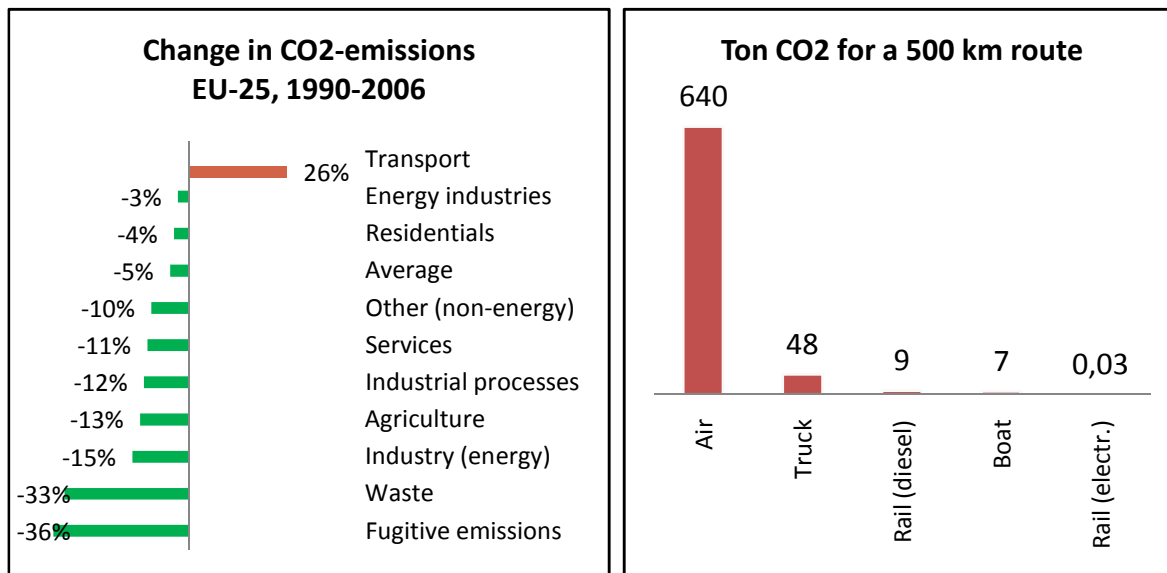
Climate change is essentially a social problem. Droughts, floodings, the melting of glaciers and the subsequent shortage of fresh water in regions such as India, China, or South America, are all examples of challenges the world population will be facing to a larger extent with the rise in surface temperature. The tricky part is that the problem is caused by individual firms. It is the production, transportation and eventually the consumption of goods that produce emissions. These emissions give rise to climate change with social costs in the form of famine or diseases, costs that do not have to be carried by the actual polluter.

In order to come to terms with this, many governments in Europe have now decided to take legislative action. On June 16, 2009, the Swedish government passed a bill stating the long term energy and climate policies of Sweden. The level of greenhouse gases is to be reduced by 40% by 2020 and by 2030 the Swedish vehicle fleet is to be fully independent on fossil fuels. A number of economic measures are suggested. The social costs will have to be internalized and to achieve this carbon taxes and emissions trading schemes will be utilized. (Regeringen, 2009)

This, of course, put a lot of pressure on the individual firms. Although greenhouse gas emissions in the EU have been reduced in most sectors over the last 15 years, one area has shown a 25% increase: transportation (Eurostat, 2006). One could argue that a tradeoff exists; that in order to lower total emissions, transport related emissions will have to increase. For example, by consolidating manufacturing units from across Europe into a single plant, energy-related emissions can be lowered but only at the expense of increased transportation. And with increased globalization, transport work will increase along with GDP and the overall economic welfare. However, the problem is that transport emissions have by far outgrown GDP over the last couple of years.

Incentives for greening the logistics system

It is evident that to avoid the forthcoming tax pressure, action will need to be taken by the individual firms to reduce greenhouse gas emissions. But avoiding costs is not the only incentive. Research has also shown that consumers prefer, and under certain circumstances are willing to pay more for, products that has caused less CO₂ emission over their total life



Figur 1. CO2-emissions from transportation (Eurostat, 2006)

cycle. It is also shown that the consumers believe the carbon reduction to be the responsibility of the manufacturing or producing firm, not the consumer's (LEK Consulting, 2007). Conclusively, there are both cost-related and revenue-related incentives for a firm to reduce its CO₂ emission.

In order to achieve a reduction, a firm may choose between a number of measures. One measure commonly suggested is a shift in transport mode, from faster, more polluting, modes such as road and air transport to slower and less polluting modes such as rail or sea-bound transport. A particularly interesting solution is an intermodal road-rail solution, where a combination of road and rail transport is utilized. In this way, the flexibility and availability of truck transport is combined with the low cost, CO₂ efficient, rail transport for the longer leg of the journey. Research has shown that, with this type of mode shift, CO₂ emissions can be reduced by 20-50% or more depending on how the electricity for the train part is produced (IFEU and SGKV, 2009).

By many firms, switching to a rail-bound solution is said to be interesting but impossible to implement. The general perception is that it would jeopardize the ability to deliver cost efficient customer service (Ludvigsen, 1999). Especially, the longer transit time, the lower precision in delivery time, and the larger risk of goods damage is put forward as major obstacles. Only bulk items such as iron ore or pulp are considered suitable while, according

to both previous studies and established theories, consumer products are not (Coyle et al., 1996; Lumsden, 2006).

Questioning the general consensus

What can be seen, though, is that this is not always the case. In our study of five Swedish firms selling non-bulk, fast moving goods, the views on the quality of intermodal road-rail solutions differ greatly from the general consensus. All of the companies had recently gone through, or were in the process of, a modal shift from road to road-rail transport in five different businesses: baby food distribution, tile retail, water pump manufacturing, fashion retail, and automotive manufacturing. Although transport quality with regards to transit time and delivery precision was somewhat lower in general, it was evident from the study that the perceived quality of the intermodal solution was not as low as suggested by previous findings. In fact, many of the firms claimed the intermodal solution to be better. This contradicts previous research but could be interpreted in more than one way:

- The initial truck solution was underperforming.
- The case companies are rare exceptions with unique circumstances with regards to, for example, geography and consolidation opportunities.
- The findings are in line with theories suggesting that those shippers that use intermodal transport are more positive

to this type of solution than those that do not.

- Theory is outdated and transport quality has significantly improved since the previous studies were conducted.

As in most cases, the truth is likely to be a mixture of the points above. It is likely however, that things have actually changed over time and that theory should be updated. This could be supported by the fact that intermodal transport has seen a lot of research over the last few years and supply and demand has increased simultaneously. From the studied cases, a number of conclusions can be drawn:

Intermodal transportation works well independently of the overarching logistics strategy of the shipper

Many of the firms in the study use the intermodal solution in settings where one would not expect to find them. Products which are suggested to be inappropriate for any type of rail-bound transport; perishable items (glass jars), goods with news value (fashion), and spare parts (water pumps) can indeed be successfully used in a road-rail solution. The solution may even work for a time controlled logistics system, which was the case for the automotive manufacturer. In this case, however, a back-up solution may have to be utilized as to not jeopardize the ability to deliver customer service.

The relative quality is more of a carrier selection issue than a mode choice issue

The relationship to the logistics service provider is stressed by most firms as an important success factor. It is clear that quality may vary just as much in between two truck carriers as between a truck carrier and an intermodal carrier. For example, the tile retailer experienced an increase in almost all transport quality measures, something which could in most cases be attributed to the carrier and not the chosen mode of transport. It is the carrier who is ultimately responsible for the quality and the solving of situations when this fails. This will be the case independently of the transport mode.

Transit time and precision must not decrease with the implementation of an intermodal solution

As described above, the common perception among shippers is that transport quality, as measured in transit time or precision, will decrease if the firm shifts to an intermodal solution. It was seen among many of the firms that this is not necessarily the case. The reason for this varies, and to some extent depends on the initial solution, but the point is that one will have to make a thorough assessment before making any assertions. An intermodal solution may, contrary to popular belief, improve system performance.

Tradeoffs tend to be more about purchasing convenience vs. price than transport quality vs. price or customer service vs. cost.

In traditional logistics management, the major tradeoff a firm has to consider when making decisions is that of customer service vs. cost. That is, offering a higher level of customer service increases logistics costs. For a transportation decision this would be translated to a tradeoff between transport quality vs. transport price. In the studied companies, this was never the major tradeoff. Instead, the major tradeoff was that of purchasing convenience vs. transport price, that is, it was not the performance of the solution that was lacking, but the ease of purchasing and switching.

Process and planning changes may be needed at both consignor and consignee, but their relation to total costs is ambiguous

In many of the cases minor changes had to be made at the consignor and/or consignee side of the solution. For example, in the fashion retail case, the delivery windows had to be expanded, and consignor administration increased. In the baby food distributor case somewhat larger inventories were needed at the consignee side in order to cover for the slightly longer and less reliable transit time. We were not able to judge whether or not these changes affected total costs negatively. In the fashion retail case the small delivery windows turned out to be a service which was not demanded and the expansion was thus not seen as problematic.

Total CO₂ emissions are likely to decrease with an intermodal solution

The five cases reassure the underlying assumption that a shift from all-road to intermodal

transport will decrease the amount of CO₂ emissions from the logistics system. The scale of the decrease varies among the companies, from 6-40%, but a decrease is nevertheless shown. The actual amount of the decrease depends on many aspects, with the amount of back-up transport being a major variable.

What does it all mean?

The study shows that intermodal and less polluting transportation does not have to jeopardize a firm's competitiveness. Rather, the competitiveness may be strengthened both through direct and future cost savings and through goodwill or other commercial aspects. Although transport quality may be somewhat worse, this could easily be countered through planning efforts and a less convenient approach to transport purchasing.

The study also shows that the major barriers are not performance-related. Attitudes outside and within the firm and poor customer orientation from the transport providers are far more inhibiting. Therefore, any change that sets aside resources at the shipper will simplify the mode shift, since comfort becomes less of any issue if a person or team is dedicated to the task. As barriers exist, internally as well as externally, the findings from cases suggest that these can be overcome by:

- *Dedication* – resources must be dedicated to drive the implementation project
- *Communication* – clear communication and information exchange with employees, customers, and suppliers about the results and quality of the solution in order to avoid negative attitudes
- *Cooperation* – to reach the right levels of consolidation, cooperation with suppliers, customers, transport providers, and competitors will be important

Intermodal transport may not alone be a measure to reach the targets set by the policy-makers. It could, however, relatively easily be utilized for large goods volumes transported over long distances within Europe – without jeopardizing the ability to deliver cost efficient customer service.

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