The Future Development of Transportation Costs  
- A Study for Volvo Logistics

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This study was conducted at Volvo Logistics Corporation (VLC), a logistic provider that mainly delivers transport services to companies within the Volvo Group. The overall purpose of this study was to define the most significant factors that will affect transportation costs in the future.

Introduction
In the last couple of years the transport industry has experienced rapid changes and the competition between companies are stronger, making drive for improvement and cost savings an important part of the every day work. The business environment is becoming more and more complex and many of the factors that affect transportation costs are factors that the company cannot affect. Globalisation has given transport companies new challenges as new markets and regions are being developed. The global perspective is first stated in conclusions and then followed by a regional perspective.

Focus
The focus in this study is on the target regions Europe, the US, India, China and Russia and the modes of rail, road and sea transports, since these are the main regions and modes utilized by VLC. As it seems today the most essential changes in the transport sector is going to happen in road transportation, therefore a focus is going to be put on road transport.

Problem Description
The discussion above eventually led to a problem description with the following areas of investigation for the study:

- Which are the most important factors that will affect the transportation costs for VLC in the short and long term?
- Will these factors change in the different regions?
- How will the factors affect each other and to which extent are they linked?
- Which are the major uncertainties in the factors above?

Method
The working procedure for this study was initially to study the different target regions and transport modes utilized in these regions to get a better understanding of the conditions today. The next step was to conduct interviews with different people at VLC to investigate their opinion on what factors they thought would be the most important affecting the transport industry in the future. The third step was to investigate these factors further and gather information about them. After that an analysis were done in order to answer the research questions.

Conclusions
The most important factors that will affect the transportation costs were found to be: fuel prices, taxation, lack of educated personnel and infrastructure issues.

The transport industry is today very dependent on fossil fuels. An increased use of these types of products in especially the developing countries is one of the driving forces behind the increased fuel price, which gets not only regional effects but also effects globally. The price on crude
Oil, that is a large part of the price on gasoline and diesel, has increased drastically in the last couple of years due to increased demand. Price on crude oil is also affected by the political situation in the world and conflicts; especially in the oil producing countries.

Taxation and different charges for using infrastructure will probably be more commonly used in the future. The taxes studied in this project is foremost; road taxation, fuel taxation, kilometre taxation and carbon dioxide taxation. Road taxation is charges when using specific infrastructure like roads, bridges and tunnels. It is an excellent way to finance building and maintenance of the infrastructure. As road taxation will be more commonly used they will have an impact on transportation costs. Fuel taxation is a powerful way to make users of fossil fuels pay for the external costs i.e., the costs the emission cause the society. High taxes on fuel can drive truck companies to develop more fuel efficient engines, as a reduction in fuel consumption leads to lower fuel costs. Fuel taxation will in the future have a continuing effect on transportation costs via the fuel price. Kilometre taxation is a relatively new taxation that has been introduced in a couple of European countries, for example Austria, Switzerland and Germany and it is expected that additional countries will follow in a soon future. The level of kilometre taxation can be differentiated based on the number of axles, and environmental classification, as well as weight. As more countries are expected to start to apply kilometre taxation in a soon future this tax can have a large impact on transportation in the future. Carbon dioxide taxation is becoming more and more discussed and as the average temperature is rising limits for how much the transport industry is allowed emit is needed. One way to address this issue is to introduce carbon dioxide taxation. However, this can be very difficult to do on an international level. Another approach is to set limits in how much every country and industry is allowed to emit, so called emission rights, and emission trading systems that makes the market reduce emissions where it is most cost effective.

The lack of educated personnel is starting to affect the transport industry. The lack of drivers is starting to be a restraining factor in especially the US and is expected to spread. The trucker profession needs to be more appealing, especially to young people. There are a few ways to do that, for example, higher wages which will directly make transportation costs higher. Another way may be to make the working times more attractive. However, as a trucker, your job is basically to be away from home and to many that is not an attractive option.

A good infrastructure is essential to keep the economy growing, providing services and products to customers. However, the increasing need for transport has made the infrastructure insufficient in many areas and the problems are expected to get worse in the future. Especially the railway network is limited since the number of tracks that can be used is a restraining factor. The nature of railway as sensitive to disruptions also affects the competition between the modes, in favour for road transport. Another factor that affects transportation time and indirectly the costs are the infrastructure at ports and in terminals. An effective way to handle gods makes turnaround time shorter, reducing the total costs.

**EU**

The price on fuel has not increased in the same extent as in the US. The weak dollar compared to the Euro has prevented fuel prices from soaring and since the tax part of the fuel price is larger in the EU, taxes has been lowered in order to keep prices down.

When it comes to environmental taxation the EU is far ahead the rest of the world.
There are many factors that probably will affect transportation costs in the EU before the rest of the target areas. The railway is hopefully going to compete better with especially road transports in the future. Policies coming from the EU are stating directives to develop the railway sector. Taxations and fees for road transports will probably be more common in the future. Transport fees today affect transport through the large transit countries like, Germany, Austria and Switzerland but are expected to spread quite rapidly.

The US
The fuel price development in the US has been radical. Prices on gasoline and diesel have risen drastically. One of the reason are the increasing price of crude oil that affects the price of fossil fuels in a more direct way compared to Europe. Almost 70% of the gasoline price at the pump is based on the price on crude oil. Transportation costs in the past have been at a very low level and are now rising. The US is the only country in the developed world that has not ratified the Kyoto Protocol and environmental regulations have not been implemented in the same extent as in the EU. However, the US will sooner or later follow and implement different kinds of taxation to address the external costs. Intermodal solutions need to be developed in the US and combinations of road transports and rail or sea transport have potential to reduce transportation time and costs. Today the different modes see each other as competitors.

India
The fuel price in India is very low and the government is trying to keep prices down in order to make vehicles affordable to everyone. The question is how long the government can finance these subsidies? Different taxes have a small impact on the transport industry in India. But as environmental awareness is increasing, truck transports will probably meet new legislation first. Today there are capacity restraints on the railway network in India and since the government subsidise passenger transports, this will hold back the development of goods transports on railway. The road transport sector in India is growing rapidly and today it is the primary transport mode used in India. Passing boarders between different states is an issue that needs to be addressed in the future in order to reduce passing through time. Another main issue is the severely underdeveloped road network that needs improvement. The shipping industry in India needs to be developed and the potential of sea transport is high as India possesses a very long coastline.

China
The price of fuel is on a low level today and there is no fuel taxation today. China is one of the countries that stand for the increasing global demand leading to higher price of crude oil. Road taxation is used in China to a large extent to finance construction of new infrastructure and as more tolls are being set up, transportation costs increase. Road transports are the mode that has increased the most in the last couple of years. The large distances in the country makes railway transport a more favourable transport mode but the existing railway network needs to be extended to meet the increasing demand. In China the lack of educated personnel in the logistic sector increases the handling time in ports and terminals and an improvement in goods handling and inventory control would reduce time and costs.

Russia
Since Russia is one of the largest oil producers in the world the price of fuel is low. This can be a large advantage in the future. There are today no fuel taxation, instead the government subsidise fuel prices. Taxation is not commonly used in Russia as a way to put external costs on transportation. However, it is expected that it will be used in a larger extent to finance new infrastructure. Railway transport has a
large potential in Russia due to the long distances in the country. There are plans to connect China and the EU via railway through Russia. Congestion is common in Russia and appears not only during peak hour. Since Russia is a large importer of goods it is essential to get the products to customers. The importance of sea transport in Russia is already evident. Large flows of goods come to the country through the Baltic Sea and efficiency in the ports needs to be improved.

How do the factors affect each other and transportation costs? The factors listed above, both regional and global, are affecting each other and their interactions will lead to further extended costs. An illustration is shown below;

After looking at how the factors affect each other a ranking was done and as the factors are so closely linked the ranking is combined;

The most important combined factor will be the price on fuel and environmental taxation, like fuel taxation, kilometre taxation and CO₂-taxation. As they are closely linked they will together make a “single” most important factor. Fossil fuels are affecting the climate and forcing a need for environmental taxations. If there were an unlimited amount of crude oil the world would still need to address the climate changes. The other way around, the limited amount of crude oil would result in the need to take action to keep the consumption down, leading to taxation and other charges.

The second most important combined factor will be issues regarding the infrastructure and taxation that affect the infrastructure, road taxation and kilometre taxation. The external costs caused by the transport industry will in a near future be put more and more on the vehicles.

Lack of educated personnel will be a larger problem starting in the US but soon spreading to the rest of the target areas, first to the EU. It will be a necessity for the transport companies to secure their drivers and educate new ones. The driving profession will need to be more appealing to young people and change in wages and driving times; in order to attract more people to the industry, transport costs may increase.

Uncertainties in the analysis above:
The main uncertainties in the analysis above is mainly how large the impact of the factors mentioned above will be and how soon they will start to affect the transport industry. The EU is far ahead of the rest of the world when it comes to environmental policies. New legislations and taxation that are starting to affect Europe today, will probably take place in the US in a few years and in the developing countries after that. The environmental “thinking” is starting to affect the US but it will probably be years before they reach the European level. When the importance of the environment reaches the developing countries is very uncertain. It is very difficult to predict.