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Summary:

Industry structure and and freight transport development

Introduction

Developments in Norwegian manufacturing industry are characterised of centralisation and globalisation. Traditional manufacturing industry is moving from inland production to production in low cost countries in Eastern Europe and Southeast Asia. Domestic service industries are increasing, while production and trade are getting more globalised. New technology as IKT and increased priority on intermodal transports are also factors affecting size and composition of transport demand.

The average growth in the service industries have exceed the growth in the manufacturing industry, leading to an expected development from trucks to vans and delivery trucks with lower capacity utilisation, and thereby an increase in traffic work exceeding transport work. On the other hand increase in average transport distance and improved IKT leads to increased use of more heavy vehicles with a higher utilisation and thereby a bigger increase in transport than traffic works.

Driving forces in the freight marked

Relationship between industry developments and transport work

There is a close relationship between industrial development and development in transport performances. Closest relationship is found between development in manufacturing industries and transport work by vehicles with payload over 3,5 tons. Regressions based on regional national accounts in Norway and Lorry surveys shows that each per cent increase in gross production in these industries have leaded to a 0,95 per cent increase in transport work done by these vehicles. Developments in service industries are primary correlated with transport work done by freight vehicles with a payload under 3,5 tons. Each per cent increase in gross production in service industries lead to a significant increase in transport work done by cars with a pay load under 3,5 tons with 0,45 per cent. For primary industries no significant relationship between industry development and use of freight vehicles is found.

Increased import and export

Norway is a small country with an open economy. Growth in external trade is an important driving force for economic development. The Norwegian economy is based on extensive external trade, and import and export constitute 28 and 41 per cent of GDP. In volume import has increased more than export that again has increased more than GDP from 1990 to 2003.

Norwegian production is characterised by low value products. Rich availability to cheap electricity has leaded to production of power intensive products. Elimination of tolls, barriers, EU, EEC and opening of earlier closed economies (in China and eastern Europe) have leaded to equalization of energy prices and availability to cheap labour forces. The real cost of transportation have decreased in the same period. These are all factors leading to concentration of production in specialised enterprises.

Developments in production processes

The last decades there has been a change in production process from series based production to demand based production. Production series have been smaller, inventories and delivery sizes are decreasing. Thereby there have been increased request for short delivery times and Just in Time deliveries have been more the rule than the exception. Narrow time delivery windows have in short time lead to lower utilisation of vehicles. Availability to improved IT tools has leaded to better vehicle utilisation in the long run.

Centralization of inventories and production

Caused by decreased real transport costs both on national and international level, scale advantages are checked out in both production and inventories. These developments lead to increased transport distance and distribution areas. It is also a trend to distribution of commodities on Nordic or European level and

terminals and groceries are covering an area across country boarders.

Decoupling the growth of GDP and transport work

The close relationship between development in transport work and GDP is not only national, but a global trend.

In the EC's White Paper "Time to decide" a desired goal is to decouple of the national growth in transport work from the growth in GDP. This is proposed carried out through implementation of marginal cost pricing.

A statement from the EU Commission about carrying out the Lisboan strategy with respect to break the trend between transport work and GDP, were carried out February 2004. Calculations are indicating that Norway seems to have turned this trend from 1999 to 2002.

Developments in road transport marked

Vehicle stock

Developments in the freight vehicle stock in Norway are against increased level of small and big vehicles, while the stock of freight vehicles with a payload between 3 and 10 tons are decreasing. Holding vehicles with a payload up to 1 ton outside (these are mostly used for passenger transport), the stock of freight vehicles in Norway are reduced by 5 per cent from 1993 to 2003.

Technological and organizational developments

Last decades there have been main developments in electronic equipments used as tools for more efficient transports. The most important alterations are the mobile phone, route optimization and fleet steering tools. The quality of electronic maps is now considerable for making basis of electronic route optimisation. Mobile phones and Personal Digital Adapters make it possible to reallocate in route vehicles to incoming transport tasks. As a result vehicle utilisation has now increased.

Developments in different transport indicators

There have been an average increase in freight volume on 2,6 per cent, transported by trucks with 3,5 tons payload and over, from 1993 to 2003. More than half of the increase is related to the construction and building industry. Transport work had an average increase of 6,1 per cent during the same period. This increase is result of increased freight volume, but also caused by an increase in average transport distance, that are doubled for road transport from 1985 to 2003. The most important segment for growth in transport work is consolidated goods. Among the specified commodities, transport of food and perishable goods (including fish transports) is the most important parts of the increased transport work in addition to petroleum products (fuel and heating oil).

Traffic work has increased from 1993 to 1997, but was reduced from 1997 to 2002, but increased from 2002 to 2003 by 10 per cent. The decrease in traffic work is mainly caused by decreased empty transport.

There has been an increase in average vehicle size and payload contemporary to increased capacity utilisation: All transport indicators related to freight vehicles with a maximum payload over 17,5 tons have increased from 1993 to 2003. Biggest increase is found for transport work, that have been more than six doubled in the period, while transport work for vehicles with payload between 3,5 and 17,5 tons are reduced with 25 per cent. There has been an increase in average capacity utilisation with 14 per cent from 1993 to 2003. The transports are in consequence got more efficient and the need for vehicles and drivers to do the same amount of transport work is reduced. Consequently transport costs per tonne km are reduced. There are expected a continued increase in capacity utilisation, but since transport cost savings decrease by increasing utilisation, it is expected a reduction in transport costs savings.

Intermodal transport

From the National Transport Plan in Norway 2006 – 2015 there are a superior measure to arrange for more freight on sea and rail. To promote this measure it is proposed consolidation of freight flows to junctions and corridors.

Developments in transport indicators

Freight flows by rail decreased from 1985 to a minimum in 1995, increased from 1995 until 2001, and then decreased again from 2001 to 2003. The last years there have been a development in the rail industry against increased specialising where combined transport are the main product in addition to semi trailers and whole train solutions for the industry. Coastal transport were reduced from 1985 to 1995, but have increased since 1995 at a higher average rate than road transport.

Road transport had the biggest increase in transport work in the period from 1985 to 1995; succeed of seaborne transport, while rail transport has only smaller differences in the period. From 1995 to 2000 the growth in transport work was higher for seaborne than road transport. This has however been a period

without statistics covering geographic distribution for seaborne transport and thereby any available indicators about developments in average transport distance. Therefore this development in transport works for seaborne transport is quite uncertain.

From 1985 to 2003 there has been an increase in transport distance of nearby 50 per cent for all modes in average. Until 1997 average distance increased mostly for rail followed by road and seaborne transport. Road transport has had a monotonous increase in the period and is doubled from 1985 to 2003. The increase in average distance for both rail and road transport have been a result of freight switched from rail to road (a consequence of more specialised rail transports).

Coastal transport

Seaborne transport is the main mode in external trade. Inland transports between Western and Northern parts of Norway are the only areas were seaborne transport have a significant share for other products than bulk. The coastal fleet in Norway is quite old and consists of ships being 29 years in average. Towboats, bulk- and tank ships are oldest with an average from 33 to 35 years, while boats related to the petroleum extraction industry are youngest with an average of 20 years. Low profitability in the sea transport marked has resulted in an investment refusal in the industry.

Barriers against today's seaborne transport is related to high transport time, low frequencies and reliability, more reloading and higher transport costs than by trucks.

Rail transport

The railways in Norway were opened for competition in freight transport the 15. March 2003. There are now four private rail agencies in addition to CargoNet: GreenCargo, MTAS (Malmtrafikk AS), Tågåkeriet i Bergslagen AB (TÅGAB) og Ofotenbanen AS.

CargoNet have ended their traditional rail load product and strengthen focus on a Scandinavian network for combined transports with good connections to Europe.

Methodological developments of traffic work

The national freight model in Norway (NEMO) consists of a network model computing transport work for each mode, based on freight flow matrices for freight flows between municipalities in Norway and abroad. For many purposes it is more reasonable to get information about traffic work or number of vehicles passing sections in the network.

Therefore a part of this project has been to develop a methodological tool for computing number of vehicles in NEMO. The model is implemented in STAN who laid restrictions on parameters to be used:

1. Number of loaded vehicles can be computed on basis of mode specific freight flows, by use of conversion factors for average load per tour.
2. There have to be used only one common load factor per mode, but the factor can vary with commodity and mode.
3. The model tool does not consider transport routing problems, but distribute freight on direct relations (from/to).

Number of empty vehicles can then be computed on the basis of mode specific freight flows in the opposite directions and a probability of getting no return loads. Average payloads and probabilities for getting no return loads are computed on basis of data from the Lorry Surveys from statistics Norway.

Transport forecasts based on marginal cost pricing and technological expectations

By use of the transport model system NEMO/PINGO, were PINGO is the demand and forecast model specified as an SCGE model, we have calculated expected effects of 1) implementation of Marginal Cost Pricing (MCP) in transport and 2) technological developments.

In the MCP scenario (without technological improvements) transport costs are increasing relatively to the basis scenario (do nothing), because today's fees is not covering the external marginal costs related to the transport activities. The cost increase is highest for modes paying less of the MCP today. This will first of all apply the rail industry, which is paying lowest fee today related to the marginal costs, while seaborne transport is the mode with the lowest cost increase related to this transport policy.

Number of tonne km is higher in the scenarios with technological improvements but without MCP. This is because improved technology makes transport cheaper compared to other products and services. MCP gives increased seaborne transport, where transport distance is higher than similar land based transports. With technological improvements road transport have bigger reduction in external costs compared to the other modes and thereby the switching to seaborne transport

is not just as comprehensive as with unchanged technology.

Initial MCP result in reduced growth for road transport compared to the basic situation, but in the technology scenario, transport works is increasing in the last scenario years. The scenarios with unchanged technology lead to decreased road transport in the first years, but increased road transport in the late years. The increase in road transport is a result of differentiated fees between urban and rural areas and thereby road transport is motivated to take a longer way to drop the road links with a higher fee. Higher total amount of transport work is caused by increased seaborne transport that gives longer transport routes.

For rail transport the result of both MCP and technological improvements is decreased transport work. This is because both alternatives lead to increased transport costs relative to other modes.

Seaborne transport is the winning mode in the MCP scenario. This is caused by the low amount of external costs related to the fees paid already. The effect of MCP is less in the technology scenario since improved technologies are expected to be most efficient for trucks.

External costs related to transport are lower in the MCP pricing scenario compared to the basis scenario, but the effect of improved technology exceeds the effect of MCP. Therefore the external costs are decidedly lowest in the combined MCP and improved technology scenario.

When transport fees are reflecting external costs connected to the transport, there would be a self-reinforcing effect, where it would be an incentive for the producers of modes to make fuel-efficient engines that reduce external costs and thereby the fees.

Conclusions

The following five transport indicators measure developments in the transport marked:

1. Freight flows (gives a basic foundation of the transport needs)
2. Transport distance
3. Number of tours
4. Traffic work
5. Transport work

In the period from 1993 to 2003 there has been a continuous increase in freight flows on road, contemporary to an increase in transport distance. Consequently there have been a continuous and strong increase in transport work of 6,1 per cent per year for road transport on an average from 1993 to 2003.

Freight transport on road has been more efficient. From 1997 to 2002 traffic work have been reduced for trucks with payloads over 3,5 tons, because of reduced empty driving, increased vehicle sizes and capacity utilization. The two last factors is in favour of reduced needs for number of trucks and drivers, who leads to lower transport costs per tonne km, that is motive power for more road transport, because the balance between number of inventories and production places and thereby extension of centralisation are affected by the level of transport cost.

An introduction of MCP in freight transport marked would lead to a general cost increase, because none of the modes initially pay a fee covering external costs related to transport work. The result is changing transport shares and increased seaborne transport and thereby an increase in total tonne km. A differentiated implementation where the fees are higher in urban than rural areas, gives a motivation for trucking transport to take a longer way round to drop road links with higher fee.

The result from the PINGO model is dependent of “top-down” or “bottom-up” applications of the model, i.e. what variables are set as endogenous or exogenous in the calculations. Therefore further work has to be done with Pingo about improved assumptions for quantifying social welfare effects from exchanging transport fees.