

Summary:

Changing logistics in Norway

TØI Report 1193/2012

Authors: Olav Eidhammer, Inger Beate Hovi and Thorkel Askildsen

Oslo 2012, 125 pages Norwegian language

In a survey of goods-supplying enterprises in Norway in 2010, the three main components of logistics costs were found to be transport, warehousing and inventory capital costs. This report shows that these are also the areas with the greatest potential for efficiency improvements in logistics and thereby corporate focus areas of logistics organisation. A fourth area of focus is packaging conducive to improved transport capacity utilisation.

Purpose

The aim of this report is to increase our knowledge of development in the organisation of value chains, in localisation of production and warehousing, and in transportation. A key point is to shed light on how increased internationalisation affects logistics solutions in Norway.

Important objectives analysed are:

- How Norwegian goods-supplying enterprises adapt and thus contribute to more efficient and environmentally friendly transport solutions
- How current solutions are organised and which are implemented
- Structure in trade flows and corporate logistics
- Development and use of Key Performance Indicators (KPIs) related to logistics efficiency in companies

Method

The study is limited to goods-supplying enterprises in Norway and was conducted in the form of case studies in which key elements were the organisation of logistics and transport between different activities in value chains, and the development and experiences of companies in this regard. Our results are supplemented by public statistics thus giving a macro-oriented perspective.

Logistics trends

Some of the more important underlying logistics trends that we found among our case companies can be summarised in the following main points:

- Increased specialisation
- Centralised warehousing and distribution points
- A more challenging market with a rapidly increasing range of products and customers increasingly demanding and expecting to receive customised products – so-called tailoring

- Smaller, but more frequent, shipments
- High reliability of lead times
- Extensive use of 3 PL service providers and stevedore services
- Increased vertical integration to achieve greater control of the supply chain
- Increased economic activity and trade with low-cost countries in Asia and Eastern Europe
- Cross-docking early in the supply chain and direct delivery to central warehouses or shops in Norway
- Automated warehouses
- An increased focus on the environment
- Increased utilisation of ICT-based tools and of cargo carriers, and use of new technology for more environmentally friendly transport
- Increased use of KPIs for benchmarking logistics activities

An extra package in a shipment is low cost, while an additional shipment is high cost.

Reduced numbers of production sites and warehouses

Over the past 10-20 years there has been a centralisation of production sites and warehouses to take advantage of economies of scale. Examples are of companies increasing the level of service to customers through reducing the number of warehouses they have – this due to saved operation time and an increased range of products in stock. A centralised versus a regionalised structure leads to reduced numbers of re-loadings and storage time and thus reduced lead times from manufacturer to retailer. Representatives of companies in our study say that centralisation reduces logistics and production costs, but increases transportation, especially in distribution. Some companies emphasise that it is essential the total footprint of operations and transportation is not aggravated by strategic choices. For example, environmental disadvantages in relation to increased transport have to be compensated through reduced energy use from more efficient production or fewer and more energy-efficient storage devices.

Criteria for choice of location

Production

Cost in relation to transport of intermediate goods is an important consideration manufacturing firms have to take when deciding where to locate, i.e. whether close to raw material availability or to ports through use of intermediate goods from more distant production sites. Other considerations in the choice of location are durability of the product and size of the shipment transported to the customer. Production of perishables and bulk products is located in the vicinity of customers so that lead time is short and sales time longer in the stores. More durable products are located in the vicinity of the source of the raw material in order to minimise internal transport. Location does not necessarily facilitate efficient distribution in the case of many manufacturing companies established long ago. This is so, for example, in the case of dairies and production established by a local entrepreneur of a product that has to reach a national or international market.

Wholesale

Location options for wholesale trading companies are based on two factors in particular: one the proximity to main customers, the other easy access to the highway network. Other factors are distance to the chain's main warehouse, distance to different terminals and a municipality's interest in the establishment of new commercial buildings.

For wholesalers, too, locating in proximity to other companies is advantageous – helping to increase consolidation and allowing better utilisation of transport capacity.

Direct distribution of imports

China is that of Norway's trading countries with the largest increase in nominal value of imports and exports in the period 2001 to 2010 –and it is in particular consumer goods that are imported from China and raw materials that are exported to China.

The value chain of imports of consumer goods in containers from Asia is usually organised based on commodities from just a few suppliers, sales periods of 6-10 weeks, and where the container is first sent to the supplier's European warehouse. Organisation based on many suppliers with sales periods of 2-4 weeks per container already in China, allows for the container to be sent directly to the warehouse in Norway and will reduce the lead time for delivery to the shop. This type of organisation will also increase the possibility of the container being transported close to the Norwegian warehouse by ship, while deliveries from European warehouses usually arrive by truck.

A further possibility is consolidation of the container as early as possible in the supply chain, e.g. in China, for direct delivery to retailers at a port close to the destination in Norway. This requires large volumes to the shop, several stores in the same region or consolidation of loads for multiple customers from the same area of China. To achieve this, it is advantageous to have supplier clusters at the delivery site and retail clusters on the customer side of the trade chain. This also

means that orders from different manufacturing companies are located in one area at one shipping company. The freight forwarder ensures delivery to a distribution terminal near the destination port, where the container is split before distribution to customers. To save transportation costs, 40-foot containers are used (rather than 20-foot containers) or "High Cubes", i.e. 20 and 40-foot containers with added height giving cheap additional capacity.

The public port statistics show an increase in imports of containers to ports in Norway other than Oslo, which is still the main port of imports, but is an indication of changes in the national transport pattern and of more imports in containers arriving at a port near the landing place.

More automated warehouses

To increase the efficiency of warehouses it has become common to invest in automated warehouse systems. Automated systems in combination with tall warehouses are area-efficient; they facilitate increased picking efficiency and reduce picking errors. Examples of automatic systems are freight elevators, automatic order picking, trolleys and support for the pickers (pick by light and pick by voice). Automated freight elevators in combination allow for more area-efficient warehouses, but the trend is toward the construction of larger warehouses. This can be explained by centralisation and the new bearings usually covering a larger market than before.

Increased focus on environment

The Accounting Act sets requirements for environmental reporting, will all accountable companies having to disclose any negative impacts on the environment. Environmental reporting has several purposes, but most importantly it has to show that an organisation is working systematically to improve the working environment and produce a cleaner environment. Environmental reporting also supports the principle of continuous improvement, i.e. the company must demonstrate it is working on measures that improve the environmental impact of the business.

Companies are increasingly focused on the environment. Social and environmental focus is on production, but also on environmentally friendly transport and logistics solutions. In our review, it seems that requirements for environmentally friendly transport solutions are motivated primarily by efficiency considerations. Examples of cost-effective logistics providing more environmentally friendly transportation are:

- Reduction of wastage in production, e.g. through better forecasting and reduced volumes of shipments both inbound and outbound.
- Development and use of more appropriate packaging utilising transport capacity in a more efficient manner.
- Active use of fleet management and route optimisation tools, contributing to increased vehicle utilisation and reduced exhaust emission kilometres.
- Reverse the directional imbalance in transport capacity through collaboration with other suppliers.

- Integrated systems for return logistics.
- Cross-dock containers for storage or shops as early as possible in the supply chain, thus allowing for rail or sea transport direct to the customer rather than through central warehouses in the Norwegian capital area, in another Nordic country or the Continent.
- Use of track and trace in the supply chain.
- Use of rail transport when possible.

In addition to these measures, there are also technological solutions that contribute to a more environmentally friendly transit of goods. Examples are:

- Minimum requirements for technical motor class, for example Euro V.
- Utilising food waste from own production in energy production.
- Use of alternative fuels (biodiesel, biogas, bioethanol).
- Use of alternative engine technology (electric vans and trucks with dual-fuel or hybrid).

When it comes to the use of alternative fuels and engine technology, the foremost barrier is high costs – both investment and operating costs and, as far as we know, alternative engine technologies have been used in some demonstration projects.

Logistics performance indicators

Logistics performance indicators are used to measure the level and development of quality, performance and efficiency in transport and logistics activities, but also in production. Performance indicators:

- give an indication of where resources can be used to get a more efficient supply chain
- improve management of effective production hours
- reduce internal transport between the various production phases
- reduce time spent restructuring production lines
- reduce costs of poor product quality
- improve financial performance

The choice of indicators is controlled in part by how easy it is to obtain data for measurement and at the same time about the development of manufacturing, logistics efficiency and service quality. Usually, goals, levels and trends are confidential. Examples of performance indicators used by the case companies in our study are:

- Service level measured by the number of lines provided as a percentage of the number of lines ordered.
- Delivery precision measured as the number of delivered lines of departure window as a percentage of the number of delivered lines.
- Supply as measured by the number of delivered lines without picking errors (complaint) as a percentage of the number of delivered lines.
- Compliance with the timetable as measured by the number of delivered lines within the timetable as a percentage of the number of delivered lines.
- Costs related to poor quality of the product as a percentage of holdings.
- Number of scrapped product units per million products delivered.

- Material efficiency measured as hours of operation as a percentage of operating hours.
- Number of staff accidents per year.
- Unit cost of production and transport (NOK/tonne)
- Transport distance (km, nautical mile) per product per time unit (week, month, quarter, year).
- Turnover and volume per unit of production (million tonnes) per unit of time (month, quarter, year).
- Environmental accounts for the production and transport, as given by CO₂ emissions (kg/tonne produced or transported), sulphur dioxide (SO₂) and nitrogen oxides (NO₂) in tonnes.

Logistic challenges

Major challenges associated with implementing efficient logistics in Norway are geography and settlement patterns. Norway is a long stretch of land with scattered settlements, making it difficult to maintain high utilisation of transport mode. Distortions in the direction of balance tend to reinforce these challenges. Long transport distances and sparse settlements also help to explain why delivery rate is lower and delivery times longer for northern than for southern Norway. Many companies have historically given location, citing for example access to cheap energy, labour and proximity to a consolidation terminal or port, or proximity to the founder's residence.

Industry-oriented business experiences increasing pressure in relation to alternative use of land, especially in close proximity to major cities, and particularly in areas that can substitute for domestic purposes. To reduce distribution transport, wholesalers are located close to population centres, but for most larger cities economic activity has moved out of cities due to a lack of areas for housing.

Firms with a highly centralised structure, i.e. with only one plant or warehouse, are vulnerable to unforeseen events such as fire, flooding, lightning, landslides and power outages.