

Summary:

The regional catchment area of Alnabru freight terminal in Oslo – a mapping of shipment data

Transport analyses based on synthetic data and a stylised transport network may be too general to be applied to a detailed geographical level. For this reason, we have in this project assigned specifically collected, empirical shipment data to a detailed, digitalised road network. The argument for sustaining the development of Norway's largest freight cluster and one of Europe's largest road/rail terminals well within Oslo's city limits is to a considerable extent based on the perceived importance of proximity between shipper and carrier. The maps in this report visualise the spatial configuration of the freight cluster.

Background and research question

In line with a more general aim of enhancing our knowledge of the freight flows in the Oslo region, the Institute of Transport Economics has been assigned the task of mapping the regional influence area of Alnabru freight terminal.

The Alnabru terminal area hosts four of the major actors in the Norwegian freight market and is a dominant node in the Norwegian freight system. Due to the large turnover of intermodal units on the railroad's share of the terminal area, Alnabru freight terminal is also one of Europe's largest road/rail terminals.

In addition to its central role in the national transport system, Alnabru freight terminal also serves an important function in the regional freight system, here understood as transports of small shipments between the terminal as a consolidation and stripping point and customers in Oslo and Akershus counties.

Mapping the spatial configuration of transporter/customer-relations in connection with Alnabru is important for two reasons:

1. It generates new knowledge on freight flows on a detailed spatial level
2. It indicates whether the terminal's location in relation to its customers is favourable in the sense that it does not generate excessive freight traffic

The project is designed according to the following research question:

How can ArcGIS be utilised to analyse and visualise Alnabru freight terminal's regional influence area?

Consequently, the aim of the project has been to construct maps that show the regional catchment area of the transport companies at Alnabru. We argue that such a visualisation of the regional freight activity is a useful product in itself, in addition to the versatile analyses that may be performed on the basis of the data material collected. The impact on different road links can be shown, and it can be analysed how alternative terminal locations affect freight traffic.

Method and tasks

Two distinct data sources have been used in this project:

A spatial allocation of transport orders

Map production has been performed in ArcGIS. The four transport companies at Alnabru freight terminal submitted data covering all regional shipments for two "representative" weeks in 2007.

This resulted in the following amount of data:

Table 1: Collected data from four transport companies

(Received data)	Collected		Distributed	
Transporter 1-4	Shipments	Weight, kg	Shipments	Weight, kg
Total	247 164	20 586 008	113 273	31 168 503
Georeferenced to address	166 510	17 498 004	88 212	23 998 811
Georeferenced to postal code	20 776	2 101 883	19 958	6 283 154
Not georeferenced	59 878	986 121	5 103	886 538

The most time-consuming task of the project was, as expected, to "clean up" the shipment data so that they could be georeferenced.

Inbound shipments are georeferenced to 86 different postal codes and 1 840 addresses in the two counties, while outbound shipments are georeferenced to 445 different postal codes and 8 797 addresses.

Our aim was to assign freight volumes to areas, not to the road network. For these calculations, we have utilised a kernel function in ArcGIS which distributes the aggregate freight volumes assigned to points on the map (addresses) within a defined area evenly over this area. Hence, the maps express "goods volume per square meter" which is formally incorrect, but nevertheless gives a good visualisation of the transport activities.

Freight flow data from the Base Matrices allocated to the road network

As an addition to the survey data containing information on local transports over two weeks, we have also estimated the *total* annual road freight volume to and from the Alnabru terminal. For this task we have relied on the freight volumes from the Base Matrices. The Logistics Model that is commonly utilised to allocate these freight volumes to the network is rather stylised when focusing on the local level, so we have visualised the freight flows in the more detailed road network of Elveg.

Conclusions

The maps do not show any peculiar results on the county level. Rather, they confirm a freight flow pattern previously presumed: The most "dense" freight volume areas are along the major roads from Alnabru towards the city center, with industrial estates and shopping malls as "satellites" surrounding this axis. It appears to be a good resemblance between the inbound and outbound patterns, although the densities for outbound freight volumes are higher. On a more detailed spatial scale, as for individual city zones, we believe the maps reveal new knowledge about the distribution of freight volume densities.

When utilising ArcGIS to allocate the freight flows of the Base Matrices to the Elveg road network, we are able to visualise the freight flows in a more detailed and spatially correct way than by using the more stylised network of our logistics model and the data programme Cube. However, the synthetic character of the Base Matrices and its rather coarse zoning system (compared to the actual transport activities), probably do not warrant a concise representation of freight volumes in local route choices.