

**~MANUAL~**

# **OPTIMIZED LOCATIONS OF LOGISTICS CENTERS**

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Baltic Loop, WP 3

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## 1. Introduction

This manual serves as a summary of the importance of freight centers location. One of the Baltic Loop project's goal was to find out how it is possible to streamline transportation flows with technical and non-technical solutions. This manual has compiled results throughout the project and has been aimed at condensing them into a light and easy understandable package. The manual's gaze is in the future, but manual briefly go through the past and the present. The countries in the project area are at various stages of development in relation to logistics centers and terminals. This is due to the existing road and transport network and geographic location. This manual considers consciously about (future) logistics centers. There will certainly always be small freight terminals, but large logistics hubs are planned now where centralization can become more efficient and can bind together different functions. Even on the northern transportation corridor, the location of various functions and nodes are significant. Can different modes of transport be combined at the nodes?

Logistical hubs play a key role in designing new structures for a wider logistical network. Environmental perspectives are also playing a growing role, with different logistical solutions seeking efficiency. Sustainability measures should also be seen as part of the logistics company's measure. As a rule, energy-efficient solutions (material handling and logistical solutions) are cost-effective. The accessibility of the key market or other logistical hubs are constituted as the essential decision-making criterion.

The development of transportation corridors is one aspect in which logistics centers play a key role. The development of transportation corridors aims for new flows of goods and new business opportunities in region of Baltic Loop project. That's when logistics centers act as a value-added producer and as one customer value enhancer for the transportation corridor. Local trade and industry are a factors to be involved in locating a logistics center. Positioning to customer supply chains in this case is a key perspective when developing logistics center service models and sizing physical facilities. Demand factors affect location decisions along with supply chain.

## 2. What is a logistic center?

The logistics center is moderately new as a concept and phenomenon. Logistics centers have a variety of options, operating models, and solutions. A logistics center is a broad and multi-labeled concept that means different things to different users. The logistics center may use more forms of transport (rail, road, sea, and air transport) and may serve as a link between long-distance truck transport and local collection and distribution transport. (Logistiikkakeskuksen kehittäjän käsikirja, 2012, Lahtinen & Pulli, page 16-17.)

The geography of logistic center
Significant <b>market</b> area
Significant zone of <b>supply</b>
Location of logistical <b>nodes</b>

A logistics center is an area that includes functions for the transportation, storage, and distribution of products. As a rule, it is therefore the area in which the companies that maintain and conduct such activities are located. These key hallmarks are:

- 1) area comprised by transport companies, logistics service providers and logistic-intensive commercial and productive enterprises
- 2) connection to at least two different modes of transport — intermodal transport
- 3) a function managed by the developer of the local logistics center area, which maintains joint activity between companies to achieve synergies

The logistics center also often provides value-added services in addition to transportation and storage functions, such as the re-packaging of goods, pricing, merchandising, and illegal for sale. The logistics center can form a collaborative network of great regional importance. For example, business and educational institutions can be underpinned. The aim is to strengthen the cooperation and marketing of the various actors in the region. It allows to increase and gain new investments. (Logistiikkakeskuksen kehittäjän käsikirja, 2012, Lahtinen & Pulli, page 16-17.)

Logistics centers, in professional and in spoken language, and in research literature, involve several sub-and near-term concepts such as distribution center, central warehouse, freight center or “freight village”, logistics village or logistics park, hinterland port and terminal. Nodes where storage plays a large role are often referred to as central warehouses. If the purpose is not to store the goods, but to combine loads, it may in turn be a flow-through terminal (cross-docking). The logistics park, on the other hand, usually places more distribution centers. (Logistiikkakeskuksen kehittäjän käsikirja, 2012, Lahtinen & Pulli, page 21-23.)

Terminal refers to a point where two modes of transport combine. It does not just mean combining different forms of transportation, such as intermodal transport, but it can also be a truck terminal, where distribution transportation combines with truck transportation or otherwise. The key point in terminal is that goods entering the terminal have a follow-up address clear. (Logistiikkakeskuksen kehittäjän käsikirja, 2012, Lahtinen & Pulli, page 21-23.)

The development of a logistics center is essential to the development of a logistics area. Logistics centers can therefore be defined based on two different approaches: part of transportation infrastructure and business enablers. On this basis, it is understandable that logistics centers are viewed from both public and corporate perspectives. (Logistiikkakeskuksen kehittäjän käsikirja, 2012, Lahtinen & Pulli, page 21-23.)

### 3. Meaning of location

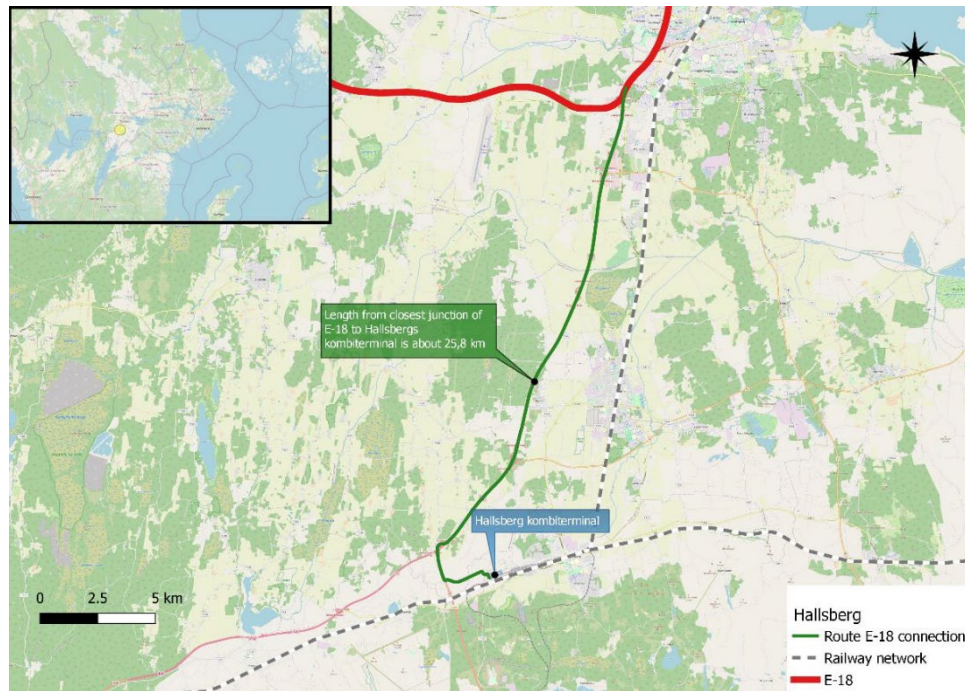
Terminal processing has many meanings. In transport and logistics, a terminal refers to the place where passengers or transportable products are assembled before being transferred to a means of transport. In this context, a terminal or terminal area refers to the places where the collection ends and the transfer begins. When the transfer is terminated the distribution begins. In other words, goods already have delivery addresses clear. A key task in cargo terminals is to connect the flow of goods and transport units.

The following factors influence location decisions of terminals and logistics centers:

- Relative location to customers
- Relative location to suppliers and sourced materials
- Regional land and property costs
- Accessibility based on transport infrastructure with different modes of transport
- Exchange rates
- Culture and social attitudes towards activities of people in nearby areas
- Regulations and decision-making by authorities on the use of areas
- Organization, industry and principle of operation of the company

It is typical of Swedish and Scandinavian trade and industrial distribution chains and channels, that a domestic / Scandinavian distribution center is located at multi/intermodal logistics zones besides the east-west cargo corridors in Southern and Central Sweden. In addition to coastal logistics zones at major port cities (Trelleborg, Malmö, Helsingborg, Gothenburg, Stockholm, Nynäshamn), there are inter/multimodal hinterland logistics zones and centers e.g., close to metropolitan areas of Jönköping, Örebro (Hallsberg intermodal terminal, picture 1.) and Karlstad.





Picture 1. Location of Hallsberg intermodal terminal in central Sweden, county of Örebro. (Patrick Yliluoto.)

It is typical of Finnish trade and industrial distribution chains and channels, that a nationwide distribution center is located at the working area of Helsinki — either closer to or further away from the urban center. Import and export transport through these distribution centers, terminal deliveries carried by truck transport to regional terminals in the distribution chain, direct deliveries driven directly from the distribution center to large final customers and return logistics for customers and regional terminals.

The optimal location to customers depends significantly on the product categories of goods passing through the terminal or logistics center and the industry of customers. For example, several public sector government buildings and agencies, large educational institutions, department stores, shopping centers, restaurants, and specialty shops small in area are often located in city centers. Where most of the goods passing through the terminal are associated with the above industries, a reasonable distance of transport from the terminal to the urban center is an important criterion. On the other hand, customers of industrial and hypermarket type shops and shopping centers are mainly located further away from urban centers, for example in Turku urban area E18, just off or outside Helsinki

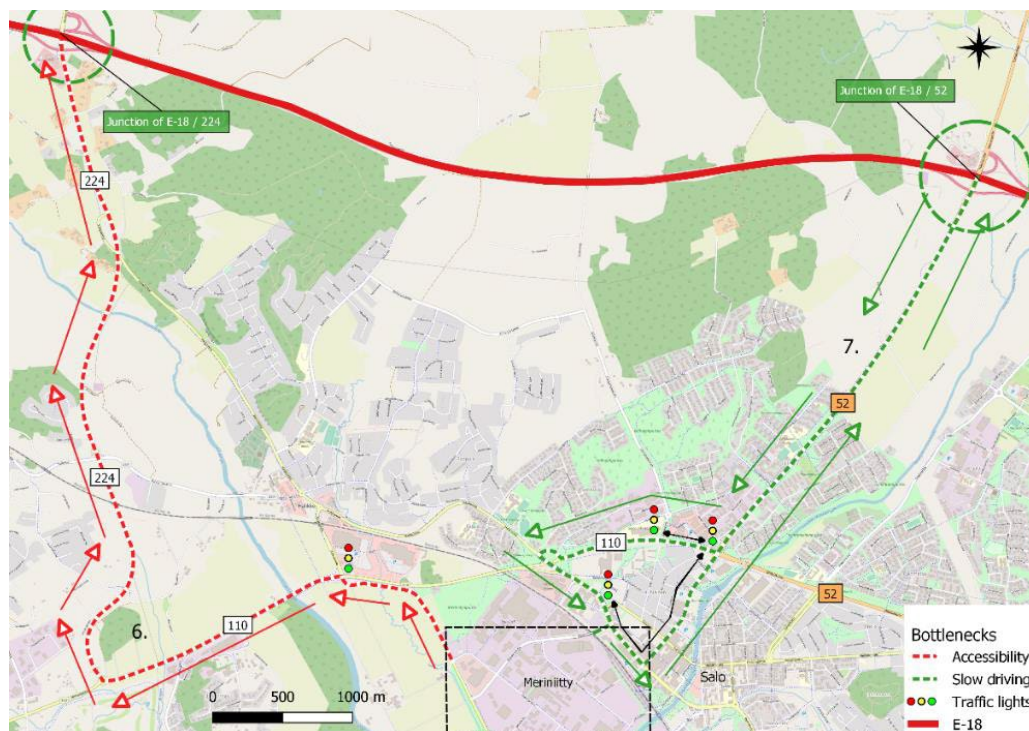
Ringway III, in the Helsinki urban area. Heavy forestry metals and chemical industry customers on the Finnish section of the E18 road are significantly less than in the interior of southern Finland and central Finland.

Regional land and real estate costs, as well as accessibility based on traffic infra with different modes of transport, have led to a significant trend in the location decisions of Finnish terminals and logistics centers: In addition to the fact that the new centers of operators are larger than the old ones, they are also consistently located further away from urban centers than the old terminals already driven down. In the 1960s to 1990s, for example, Turku urban area tended to build terminals for trade, industry, and transport shops near the port, in Pansio and Rieskalähteentie about 3-5 km from the city center.

In the early 2020s, the new logistics focus of Turku urban area is ascending about 10 km from the city center on the E18 bypass road, to the Avanti -Tuulissuo area of the municipality of Lieto. In the Helsinki urban area, in the 1960s to 1980s logistics centers were built, for example, within Metsälä inside Ringway I, about 6 km from the city center, in Kilo in Espoo, about 12 km from the center of Helsinki, and already after the World War II. In 1940s and 1950s in Sörnäinen's corner near Sompasaari port on the eastern edge of central urban area. In the 1990s to 2000s, an unprecedented high concentration of logistics and business in Finland was built to the north of Ring III on both sides of Tuusula road around Helsinki-Vantaa international airport (picture x). Starting in the 2010s (picture x), several operators in the grocery and utilization trade and transport operators Schenker Cargo have taken a bigger leap outside Ring III further from the heart of Helsinki: for example, Schenker Nurmijärvi Ilvesvuori (30 km from Helsinki on the E12 road. in Tampere direction), Tokmanni Mäntsälä (60 km from Helsinki to Lahti, E-75 road), Lidl Järvenpää (40 km from Helsinki, E-75 road) and Inex Sipoo Talma, responsible for logistics for the S-Group (30 km from Helsinki, E-75 road). Why are terminals and logistics centers then moving and, in part, already moving further away from urban centers? Finland's largest urban areas (Helsinki, Tampere, Turku, Oulu) are constantly growing, and terminals built between the 1960s and 1990s began to remain within the urban structure, surrounded by residential and workplace areas. Growth in urban areas and traffic volumes increased traffic congestion on the lanes



leading to the old terminals, negatively impacting travel times for heavy vehicles using the terminals (e.g., Meriniitty Salo, picture 2.) and their predictability rates.

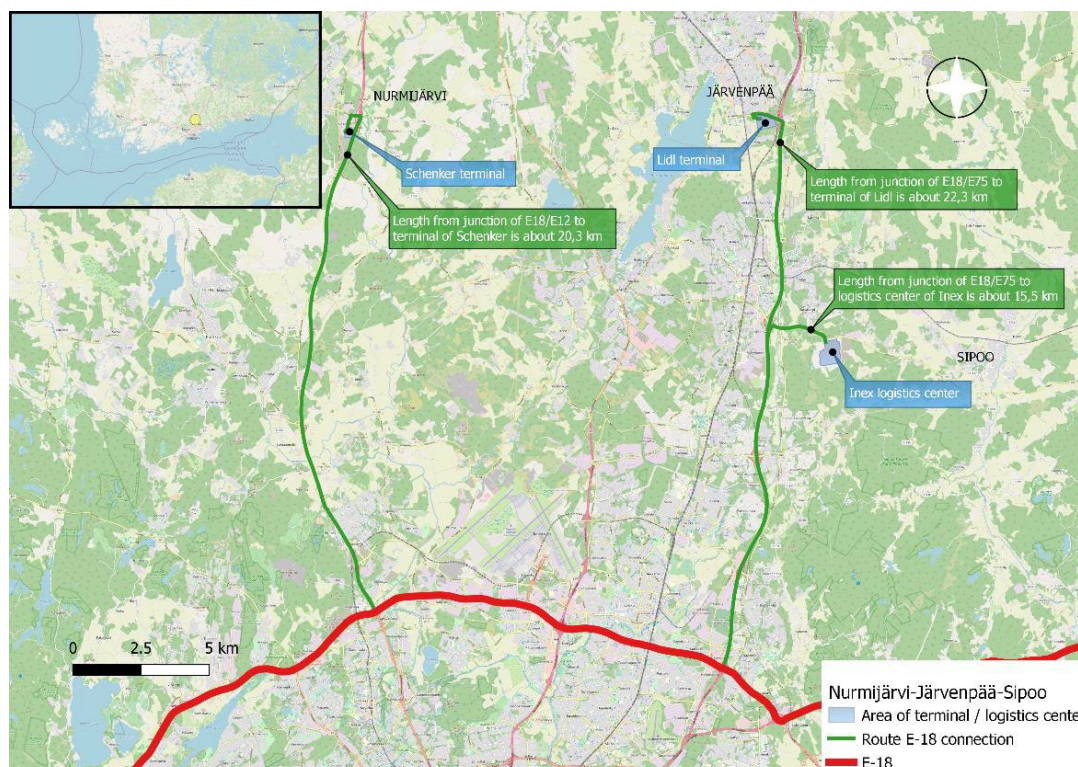


Picture 2. Location of Meriniitty industrial and logistics area, Salo, with poor accessibility to E18 route.  
(Patrick Yliluoto.)





Picture 3. Logistics zone besides E18 Helsinki ringway Ring III (Patrick Yliluoto).



Picture 4. Locations of new terminals further beyond metropolitan area of Helsinki (Patrick Yliluoto.)

In accordance with the positioning trends mentioned above, the challenge of distribution and last-mile transport between regional distribution centers beyond metropolitan areas and final customers within the metropolitan area, has started to be solved by new innovations in City Logistics. For example, in Turku and Helsinki, there has been launched, in the end of 2010's and beginning of 2020's, small new city terminals in city centers as well as new small and carbon-neutral transportation carrier vehicles to operate with the last-mile delivery. The City Logistics itself has been investigated in Finnish "6aika, New solutions of City Logistics" - project by Turku University of Applied Sciences and several public project partners in 2019-20.

Within the Baltic Loop project, the traffic connections between regional distribution centers and city terminals have been under research. It's common within the largest metropolitan areas of the research regions, that the existing traffic infrastructure and management within approaching and exiting the city centers is far from fluent to heavy cargo vehicles. Also loading, unloading, parking, and waiting areas to cargo transport are commonly insufficient close to the city terminals and major final customers in city centers.

To improve the traffic connections and management between regional distribution centers, city terminals and major final customers in city centers, the following recommendations have been concluded: Cargo transport vehicles should be allowed to use more bus and taxi lanes and other street or junction sections that are not allowed to private passenger cars. New benefits to cargo transport vehicles within traffic regulations and management are expected to be made – e.g., intelligent traffic signals and priority crossing of junctions and roundabouts. More short-term loading, unloading and waiting areas should be opened besides the streets and city terminals – despite it would lead to decreasing number of passenger car parking places.



Reducing transportation bottlenecks throughout the Baltic Loop research regions as well as between distribution centers and cities is enabled in multiple ways by digitalization and intelligent transport management. Maps, navigators and route optimization software are continuously developing. It's important, that dynamic information about traffic situation, travel time and alternative routes is available to transportation operators. It must be taken into account, that heavy cargo vehicles might have several route infrastructures and regulation-based restrictions (e.g. weight and dimension limitations), and there is strong variety within route optimization and navigation applications, how to manage those restrictions.

Dynamic information about existing and waiting vehicles in the loading and unloading areas as well as any disorder or exception in traffic flow should be disseminated to on-board-units and mobile devices in cargo vehicles by suitable open data platform.

Currently, there are various intelligent traffic signals on E18 route Finland and Sweden as well as main streets and ringways of metropolitan areas. Typical intelligent traffic signals are e.g. variable speed limits, lane and alignment information (picture x), expected travel time information between major junctions and dynamic notifications about accidents, construction zones, road and weather conditions and various exceptional traffic conditions. Number and contents of intelligent traffic information is still increasing in the Baltic Loop research region.



Picture 5. Intelligent traffic signals on E18 Finland segment Lohjanharju - Muurla. (Fintraffic 2021.)

## 5. Future trends in freight transportation

How do future and megatrends affect the development and changes in the field of logistics? The role of logistics and logistics centers has become more pronounced over the past few years. This has been influenced at by the explosive growth of global trade and by the change in activity and production thinking. Political perspectives no longer have that much impact on who is traded with or where the products are made. In parallel with this, and due to the companies, there has been significant focus on core competencies. The increase in the share of resources from outside the company, which reflect in the elongation and fragmentation of supply chains. (Etelä-Suomen Kuljetuskäytävä, Nurmi, Ahvenainen and Hietanen, page 26-27.)

Megatrends are global, commonly known strong developments whose course is difficult to quickly change. For industries, businesses and individuals, the megatrend is by nature an inexorable force for change. A given factor of change that has major impacts on the national and international economic and social system and on the functioning of enterprises. Megatrends and change factors describe political, economic, social, technological, and ecological changes occurring in the operating environment of businesses and organizations. (Etelä-Suomen Kuljetuskäytävä, Nurmi, Ahvenainen and Hietanen, page 26-27.)

<b>FUTURE CHANGES IN THE LOGISTICS OPERATING ENVIRONMENT</b>	
1. Transportation logistics is turning into a high-tech business (ICT, mobile platform)	
2. Development of intelligent transport systems	
3. Logistics services evolve towards mass adjusting and door-to-door service	
4. Control of material flows and increased intermodality in transport reduces storage and increases terminal activity	
5. In the future, competence and logistical systems will increase their importance	
6. Logistics services market and outsourcing will grow	
7. Procurement and purchase of the online store will grow	
8. The management of transport chains is moving to multi-operator and interconnecting networks	
9. Green logistics bring the organization a competitive advantage	
10. Dependence on road transport increases congestion, noise, air pollution and safety risks	

Table 2. In the expert survey (Southern Finland Transport Corridor 2030), the objective was to map out the logistics sector of the future and its prospects for change in Southern Finland.

The trend has been reflected in our domestic market, where retail companies have sought increased activity through centralization and a few major centers have emerged in the sector, which collectively handle all of Finland's logistics. The main motive behind centralization and reorientation of operations has been to make business more efficient and, by extension, to improve the profitability of the entire operation. (Etelä-Suomen Kuljetuskäytävä, Nurmi, Ahvenainen and Hietanen, page 27-28.)

The shadow side of all this has been the increase in transport travel and costs, and the greater reliance on the logistical system. Delivery times for products, ensuring availability and addressing the challenges of the market, rise to a key role in the present day. To ensure the functioning of both the export and import industries, and our entire internal market, our national logistics system must be able to meet the demands of the era. This needs comprehensive expertise in logistics and related operational logistics centers. (Etelä-Suomen Kuljetuskäytävä, Nurmi, Ahvenainen and Hietanen, page 27-28.)



Technical Research Centre of Finland (VTT), Megatrends:

Climate of the future — clean energy

Resource adequacy — resource splash ensures success

Good life — quality of life and well-being

Total security — certainty in a changing world

Industrial renewal — opportunities through innovation

Important development trends for logistics include cybersecurity in supply chains, circular economy, and sharing economy. Digitalization makes all these potentials global. Characteristic of all three trends is the change in people's consumerism and social behavior.

## Sources of references:

1. Etelä-Suomen kuljetuskäytävä 2030,  
ELLO-Tulevaisuusprosessin loppuraportti  
Copyright © 2012 Nurmi, Ahvenainen, Hietanen & Tulevaisuuden tutkimuskeskus & Turun  
yliopisto  
ISBN 978-952-249-137-4  
ISSN 1797-1322
2. Logistiikkakeskuksen kehittäjän käsikirja,  
Etelä-Suomen logistiikkakeskusjärjestelmän kehittäminen  
-hanke 2009–2012  
Teknologiakeskus TechVilla Oy / LIMOWA Logistiikkakeskusklusteri  
Heikki Lahtinen ja Juuso Pulli  
ISBN 978-952-93-1164-4 (nid.)  
ISBN 978-952-93-1165-1 (PDF)
3. Technical Research Centre of Finland (VTT) <https://www.vttresearch.com/fi/uutiset-ja-tarinat/mista-loytyvat-tulevaisuuden-kasvualueet-suomelle-vtn-majakat-nayttavat-monta>