Logistic Network Analysis Zeeland

An analysis and integrated visualisation of the multimodal network

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This report, commissioned by Goudappel, a leading transport and logistics consultancy, analyses the logistics network of Zeeland, a region strategically located between Rotterdam and Antwerp. The aim is to strengthen the resilience of Zeeland's logistics network, enhance its position as a logistics hub and provide a framework for sustainable development in anticipation of expected economic growth. Through the use of data and trends, the report supports informed decision-making for businesses and government agencies. The results of the analysis are visualised through a user-friendly tool that integrates qualitative and quantitative data, enabling stakeholders to identify critical nodes, assess intermodal connectivity, and pinpoint potential bottlenecks. This tool facilitates informed decision-making in order to optimise logistics operations, contributing to the sustainable economic development of Zeeland

Quantitative and qualitative data were compiled from various sources. The BasGoed model from Rijkswaterstaat provided the most valuable data on cargo flows, while many other sources contributed to a better understanding of infrastructure capacities and flow through the network.

From the collected data, the analysis of the current state of the logistics network in Zeeland revealed several insights. Firstly, the transshipment nodes were identified within the province of Zeeland. The most important nodes to be identified were the ports that are part of the North Sea Port, Vlissingen Oost, Vlissingen Buitenhaven, and the port area of Terneuzen. These ports handle a variety of cargo types, including including liquid bulk (petroleum, chemicals, fruit juices), dry bulk (coal, ores), breakbulk products (cars, wind turbine components, and food products), as well as containerised products.

The capacity of the inland waterways is highly dependent on the characteristics of locks which determine the maximum capacity of cargo passing through. These capacities were determined using the Kooman method as described by Rijkswaterstaat. Three main routes through Zeeland were identified, through the Kanaal van Walcheren, the Kanaal door Zuid-Beveland, and the Scheldt-Rhine canal. Of these routes, the latter two are used most intensively while the route through the Kanaal van Walcheren is barely used by any through traffic. Furthermore, there is the Ghent-Terneuzen canal, linking the Westerschelde to the port of Ghent in Belgium (also part of North Sea Port). The throughput at the critical locks along these routes was determined.

Zeeland has a relatively modest railway network compared to other regions in the Netherlands. It consists of one main double-track line connecting cities such as Vlissingen, Middelburg, and Goes with Brabant and the rest of the Netherlands. In addition to this main, there is the southern line from Terneuzen to Ghent which is currently solely used for freight transport. The main nodes for freight transport are Vlissingen Oost (Sloehaven) and Terneuzen). At Sloehaven there are no terminals available for the intermodal transport of containers, so this node mainly handles dry and wet bulk, as well as cars. The southern line from Terneuzen also mainly handles dry and wet bulk but has some possibilities for loading containers on trains. The current usage of the rail network does not face significant capacity issues as analysis shows that the lines within Zeeland are used at less than 50 percent of their capacity.

The road network in Zeeland is an important part of the logistics network, connecting key industrial areas and ports to major European routes like the E17 and E40. Important roads include the A58, the only highway in the region linking Vlissingen, Middelburg and Goes with Brabant and the A4, providing access to Antwerp and Rotterdam. Other significant routes comprise several regional N-roads (provincial roads), facilitating north-south and east-west traffic. Capacity analysis estimated a maximum of 160 trucks per hour per lane on single- and double-lane roads. Despite adequate capacity, infrastructure like the Zeelandbrug faces strain from heavy traffic, highlighting the need for targeted improvement to ensure the robustness of the network.

Analysing the findings from the current state analysis using the visualisations that were implemented in the designed tool, along with projections for future growth, bottleneck and inefficiencies in the logistics network of Zeeland were highlighted, as well as interdependencies among the networks and the potential areas where modal shift might occur.

In summary, the multimodal logistics network in Zeeland faces several existing and potential bottlenecks and inefficiencies. Key among these are the constraints imposed by the capacity of locks on the waterways, particularly at Kreekrak and Volkerak, already operating at full and over capacity, inducing significant waiting times. The locks at Hansweert and Krammer are also approaching capacity, with projections indicating they will reach their limits by 2040. The railway network, while currently underutilized, faces challenges due to the lack of essential detection systems and limited infrastructure, particularly at transshipment nodes. The road network's critical dependency on the A58 highway presents a significant vulnerability for freight traffic due to the lack of alternative routes. Additionally, the overall efficiency and resilience of the network are compromised by these bottlenecks, necessitating strategic investments and infrastructure upgrades to mitigate these vulnerabilities and improve the flow of goods throughout the region. However, significant opportunities lie in shifting goods to other modalities. Minimising the use of road transport in favor of rail or barge transport for cargo types for which road represents an inefficient and unsustainable solution can optimize logistics operations. Utilising the available capacity on the rail network can relieve pressure from the waterways, thereby contributing to the prevention of an inverse modal shift, which is undesirable due to decreased efficiency and concerning environmental impacts. By strategically leveraging the rail network's unused capacity, Zeeland can enhance its multimodal logistics efficiency, reduce congestion, and promote sustainable transport practices.