The Gorizia Railway Terminal as a Strategic Hub: A Study of Logistics Dynamics in Friuli-Venezia Giulia

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Abstract. The initiative stems from a desire to assess the feasibility of reviving logistics activities in the area of Gorizia, which is considered a key asset for the development of the region and the local community. The Gorizia Railway terminal could, in fact, play a crucial role in supporting supply chains and integrating different modes of transport, helping to reduce logistics costs and environmental impact. The project outcomes fall into two distinct categories. The first stage involved obtaining as detailed an overview as possible of the current situation. The project aims to provide a detailed analysis of freight transport flows, focusing on the different categories of goods and the modes of transport used. Furthermore, the project aims to identify the stakeholders involved in transit traffic through the Gorizia freight village, taking into account the main road and rail operators, and narrowing the scope of the analysis to operational, managerial and infrastructural aspects (e.g. sites, warehouses, railway tracks, manoeuvring yards, goods handling equipment, etc.), highlighting the strengths and weaknesses of the regional infrastructure.

Keywords: Gorizia Dry Port · Railway Terminal · Logistics

1 Introduction

The project formed part of a scenario analysis concerning the development of the Gorizia Dry port's intermodal terminal, in light of the key challenges posed by the achievement of the SDGs relating to the social, economic and environmental sustainability of the transport sector, including through innovative integrated approaches, in line with the pillars of Spoke 8 of the iNEST project (focused on maritime technologies, sustainability and innovation) [1].

iNEST—Interconnected Nord-Est Innovation Ecosystem—is one of the 11 Innovation Ecosystems funded by the PNRR–NextGenerationEU. The activities of Spoke 8 are organised into five strategic areas, including sustainable maritime and inland waterway transport and integrated sea-land maritime planning, which are naturally extended to the challenges of multimodal logistics and the interconnection between port and hinterland hubs such as the one in Gorizia.

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The European regulatory framework further reinforces the project's relevance. The European Commission's Strategy for Sustainable and Smart Mobility sets the target of increasing rail freight volumes by 50% by 2030 and doubling them by 2050. The shift from long-distance road transport to rail for distances exceeding 700 km could save 40 million tonnes of CO_2 per year, bringing the modal share of rail freight transport to 36% in the EU. In this context, the development of intermodal hubs such as the Gorizia Interport becomes a direct means of implementing the sustainability objectives of the 2030 Agenda, in particular SDG 9 (resilient infrastructure and sustainable industrialisation), SDG 11 (sustainable cities and communities) and SDG 13 (climate action) [1].

The freight village is a crucial hub for freight transport and international logistics, given its strategic proximity to the Slovenian border, within the broader context of increasing freight traffic to and from Central and Eastern Europe, combined with the need for a modal shift from road to rail and the relocation of logistics and transport functions to dry ports, with a corresponding expansion of the terminal's infrastructure and operational components [2].

The benefits of this analysis related to the following aspects:

- economic: growth in the market segment, new jobs and competitive advantages;
- social, in terms of regional development and improved quality of life;
- environmental: an efficient logistics system contributes to the reduction of pollutant emissions.

Another aspect concerned the potential development pathways for the Isonzo area, situated within the network of port and hinterland infrastructure hubs in the relevant geographical area. This development should be understood both in terms of its evolution as a logistics hub within the wider freight transport system and with regard to the potential for infrastructural expansion, taking into account both existing constraints arising from planning and programming instruments, as well as expansion constraints linked to the presence of the international border and the urban context of the Isonzo area.

Alongside these levels of understanding lies the fundamental objective of pursuing the transition towards sustainable transport and logistics systems, aimed at minimising environmental impacts, which can also be achieved by encouraging a modal shift from road to rail transport. In this regard, therefore, particular attention was paid to the developmental aspects linked to the infrastructure enhancement of the hub, both in terms of specific infrastructure and its linear components.

2 Context

The Gorizia Interport is an intermodal logistics hub covering an area of 600,000 square metres, offering a wide range of services for international trade and road and rail transport to and from countries in Central and Eastern Europe. The area under consideration covers a total surface area of approximately 4,000 square metres and includes a railway terminal, currently in a state of disuse, located within the Gorizia freight village. It contains a 3,000-square-metre industrial warehouse, as well as a large area connected by railway tracks, which gives the site significant strategic potential from a logistical and infrastructural perspective.

This study stems from a desire to assess the feasibility of reactivating logistical activities in the area, which is considered a key asset for the development of the region and the local community. The rail terminal could, in fact, play a crucial role in supporting production chains and integrating transport modes, helping to reduce logistics costs and environmental impact.

The aim of the study is twofold: on the one hand, to understand the type and volumes of goods currently transiting through the Gorizia area and, on the other, to map the production activities present in the area and their associated logistics requirements.

To achieve these objectives, it is essential to identify the main transport operators working in the Gorizia freight village area, analysing their flows, the origin and destination of goods, as well as the predominant modes of transport (road, rail, intermodal).

3 Metodology

The innovative aspect of the project's implementation involves structuring the analysis and design proposal through the implementation of a Spatial Decision Support System (SDSS), integrated into the development of 'As is' and 'To be' scenarios.

An SDSS is an IT tool designed to support decision-making in contexts with a significant geographical component, integrating geographical data, models and analytical tools to support the evaluation and selection of options. This is combined with the conceptualisation of 'As is' (existing scenario) – 'To be' (desired scenario) scenarios, mapping out the processes and operations of the logistics hub in line with future developments in transport flows at the Gorizia dry port [3] (Figs. 1 and 2).

Multiscale analysis is an approach that allows the system to be analysed across different levels and scenarios. One level of analysis involves the classification and observation of phenomena at the 'macro' and 'regional' scales (Friuli-Venezia Giulia, extending to the neighbouring areas of Slovenia, Veneto and Austria): e.g. the current state of linear and point infrastructure; flows within the reference territory; the territory's capacity to generate/attract flows. A second level involves consideration of the 'micro' level, namely the Gorizia dry port and its territorial area. This concerns the characteristics and infrastructure facilities of the hub, as well as the planning instruments within the related context and of interest to the reference context.

The levels of observation refer to two points in time: 'As is' (initial) and 'To Be' (project).

The 'overlay' analysis allows for a multi-criteria weighted overlay to classify the area based on a series of attributes and different layers of geographic data, with the aim of producing various scenario maps that combine the different pieces of information.

Central to this analysis is the acquisition, collection and organisation of the various types of geographically referenced data relevant to the project under study.

The analysis focuses on a geographical buffer zone of approximately 50 km, with the aim of identifying economic operators who may be interested in utilising the services that could be offered by the logistics area, including in collaboration with ARS [4–6].

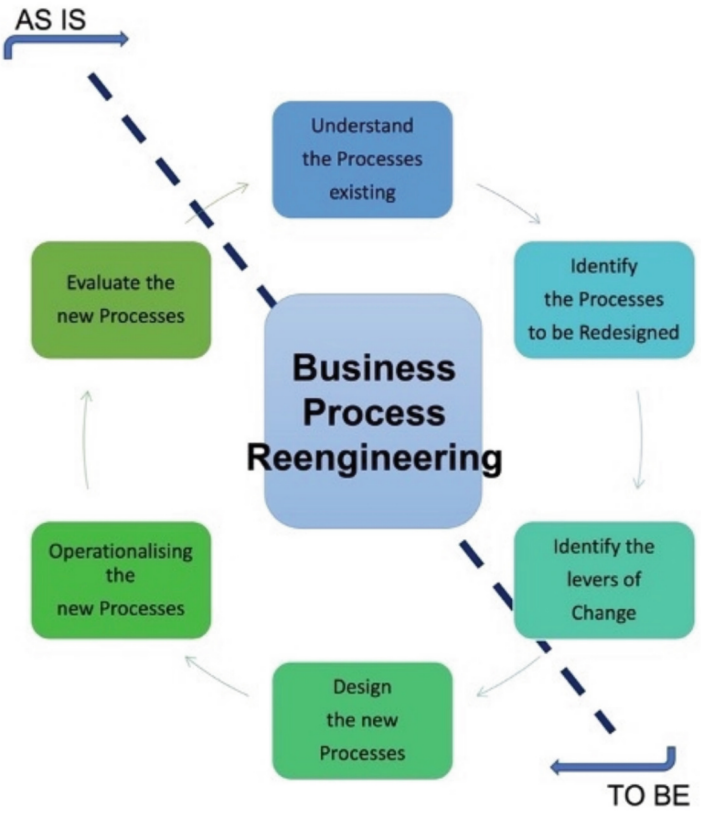

Fig. 1. The framework of standard analytical tools.

The research is divided into several phases, combining qualitative and quantitative approaches:

- Desk research: collection of secondary data and preliminary analysis of the target area, including an economic and infrastructural overview.
- Targeted questionnaires: to analyse operators' logistics and customs requirements; to gather information on routes, modes of transport and perceived critical issues.
- Flow analysis: study of goods movements with particular attention to origin-destination routes, both by road and rail.
- Multi-level survey: distribution of questionnaires to local and regional economic operators to understand the strategic orientation of their activities and their propensity towards intermodality.
- Mapping of local stakeholders: identification and classification of operators potentially interested in using the logistics hub.
- Organisation of thematic days: events and workshops dedicated to promoting the freight village and discussing opportunities related to intermodality, with the involvement of stakeholders [3, 7, 8].

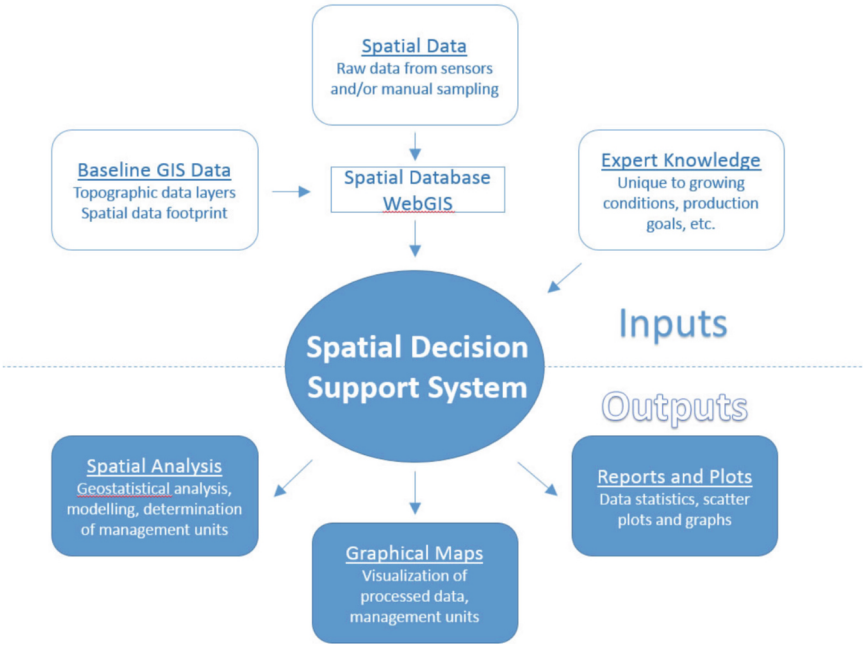

Fig. 2. Sdss: 'As is' - 'To be'

4 Data

4.1 A Gorizia Dry Port Overview

The Gorizia Intermodal Terminal, managed by SDAG (Gorizia dry port), is a major logistics hub located on the border between Italy and Slovenia. It covers an area of over 600,000 square metres and offers a wide range of services, including customs operations, cold storage facilities and infrastructure for intermodal transport. The key components of the infrastructure are as follows:

- Total area: 600,000 m^2
- Intermodal warehouse: a 3,000 m^2 facility with integrated road and rail access.
- Rail infrastructure: five railway tracks equipped to handle intermodal operations.
- Refrigerated storage facilities: 11 cold stores totalling 4,400 m^2, capable of maintaining temperatures down to –30 °C.
- Security measures: the terminal is equipped with CCTV, access control systems and is fully paved, fenced and lit.

Key operational features include:

- Specialisation: it focuses on the logistics of fresh and frozen food products, utilising advanced cold storage capabilities.
- Intermodal services: it offers seamless integration between road and rail transport, improving the efficiency of goods movement.

- Customs services: provides comprehensive customs clearance services, facilitating international trade operations.
- Strategic positioning in cross-border logistics
- Geographical advantage: Located at the crossroads of Italy, Slovenia and Austria, the Gorizia Intermodal Terminal is a key hub in the Trans-European Transport Network (TEN-T). Its proximity to the port of Koper in Slovenia and the port of Trieste in Italy enhances its strategic importance in facilitating trade between Southern and Central Europe.

With regard to cross-border connectivity:

- Rail links: connected to the main rail corridors, it enables efficient freight transport to and from Austria and other Central European countries.
- Road access: direct access to the A34 motorway and other regional roads ensures smooth cross-border road transport operations.
- Collaborative initiatives: involved in various EU-funded projects aimed at improving cross-border transport infrastructure and services, promoting regional economic integration.
- Data on freight flows and destinations: although specific data on freight volumes at the Gorizia intermodal terminal are limited in publicly available sources, regional studies and reports provide detailed information on freight movements and strategic importance:
- Freight consolidation: the terminal helps to consolidate freight flows, improving the profitability of intermodal transport systems through rail services from the terminal to external destinations.
- Integration into supply chains: the terminal's role within the wider logistics network is highlighted in studies focusing on the integration of intermodal terminals into supply chains, emphasising their strategic position in cross-border logistics.

4.2 Geographical and Economic Overview

The area around the SDAG freight village in Gorizia is characterised by a high concentration of logistics, transport and light industrial activities. The concentration of economic activities follows two main axes:

- the west-east axis: along Via dell'Industria and Via Enrico Fermi, which are home to freight forwarding services, logistics companies and manufacturing firms;
- the cross-border axis: leading towards the Slovenian border and Šempeter, with logistics and customs firms serving international traffic.

A well-established logistics-industrial cluster can be observed, thanks to the presence of over 20 companies within a 1 km radius of the freight village, facilitated by its strategic location and proximity to customs crossings. Each of the two areas on the map contains companies classified by sector (e.g. manufacturing, logistics, customs services) (Figs. 3 and 4).

The attached figure provides an overview of the names, sectors and addresses of the companies, including the impact of the consolidation and cross-border integration of the logistics and industrial system.

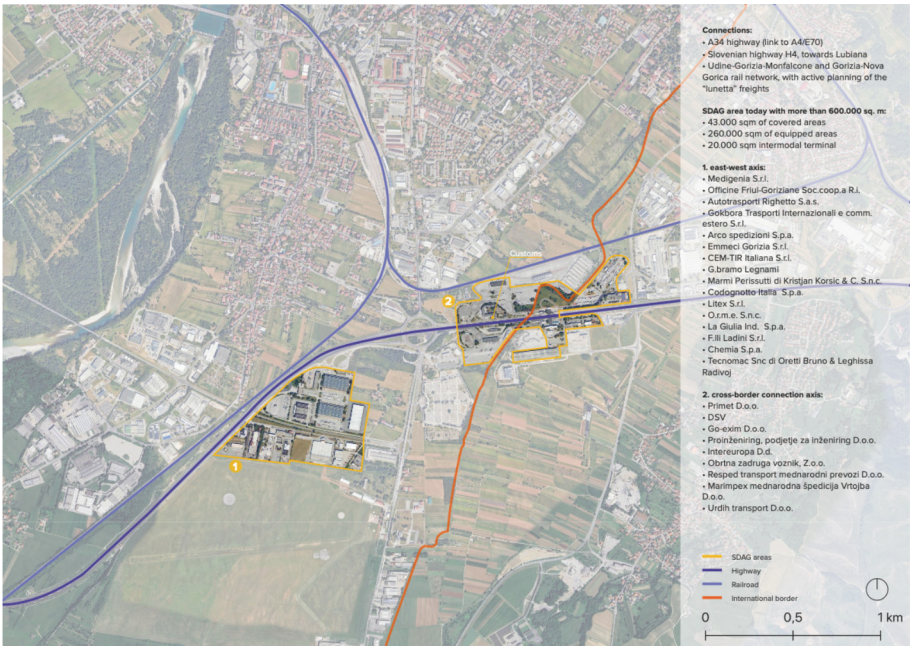

Fig. 3. Geographical and economic overview of the Gorizia dry port.

The €12 million 'rail junction' is currently under construction; it will directly link Udine-Gorizia-Monfalcone to the line for Nova Gorica, eliminating the need to change direction at Gorizia. This will improve connections with the ports of Trieste and Monfalcone.

SDAG has strengthened its partnerships with RFI, the Port System Authority of the Eastern Adriatic Sea and Adriafer to develop intermodal synergies and adopt more sustainable rail operations.

On 25 May 2022, SDAG officially changed its status and obtained the designation of freight village, opening the door to national and European funding.

It has joined the national association UIR (Unione Interporti Riuniti).

Together with the freight villages of Trieste and Cervignano, it presents itself as a single logistics platform with a view to regional synergies: collectively, they offer over 1.5 million m^2 and a rail network with approximately 22 tracks [4–7].

4.3 Database and Questionnaire Construction

To provide an overview of the businesses operating in the Isonzo area, a database has been created, structured and organised using both quantitative and qualitative variables. Its construction was based primarily on unique records such as the company name, supplemented by a geographical variable corresponding to the location of the business, in order to subsequently obtain the georeferencing of the surveyed enterprises and allow for aggregation by territorial area. In addition, variables useful for obtaining a categorical classification were considered, including sectoral affiliation and company size -

Business	Sector	Adress
Medigenia S.r.l.	Pharmaceuticals and pharmacovigilance	Interporto, Gorizia
Officine Friul-Goriziane Soc.coop.a R.i.	Car repair shops and service centers	Interporto, Gorizia
Autotrasporti Righetto S.a.s.	Trucking	Interporto, Gorizia
Gokbora Trasporti Internazionali e comm. estero S.r.l.	International transports	Interporto, Gorizia
Arco spedizioni S.p.a.	Domestic, international transport and integrated logistics	Interporto, Gorizia
Emmeci Gorizia S.r.l.	International shipping and transportation	Interporto, Gorizia
CEM-TIR Italiana S.r.l.	Freight forwarding service	Interporto, Gorizia
G.bramo Legnami	Working lumber	Via dell'Industria 23/25a, Gorizia
Marmi Perissutti di Kristjan Korsic & C. S.n.c.	Funeral monuments	Via dell'Industria 7, Gorizia
Codognotto Italia S.p.a.	Customs forwarders	Via dell'Industria 25, Gorizia
Litex S.r.l.	Rubber hose production	Via dell'Industria 5, Gorizia
O.r.m.e. S.n.c.	Electrical installations, civil and industrial	Via Enrico Fermi 39, Gorizia
La Giulia Ind. S.p.a.	Confectionery production	Via Enrico Fermi 17, Gorizia
F.lli Ladini S.r.l.	Mechanical constructions	Via Enrico Fermi 13, Gorizia
Chemia S.p.a.	Fertilizers	Via Enrico Fermi 33, Gorizia
Tecnomac Snc di Oretti Bruno & Leghissa Radivoj	Wood, machine processing and trade	Via Enrico Fermi 7, Gorizia
Primet D.o.o.	Distribution of meals and raw materials	Mednarodni prehod 2A, Šempeter Pri Gorici
DSV	International logistics service	Mednarodni prehod 2B, Šempeter Pri Gorici
Go-exim D.o.o.	Shipping services	Mednarodni prehod 2B, Šempeter Pri Gorici
Proinženiring, podjetje za inženiring D.o.o.	Engineering consultant	Mednarodni prehod 2B, Šempeter Pri Gorici
Intereuropa D.d.	International logistics service	Mednarodni prehod 8, Šempeter Pri Gorici
Obrtna zadruga voznik, Z.o.o.	Transportation services	Mednarodni prehod 2, Šempeter Pri Gorici
Resped transport mednarodni prevozi D.o.o.	Transportation services	Mednarodni prehod 2, Šempeter Pri Gorici
Marimpex mednarodna špedicija Vrtojba D.o.o.	Customs advisor	Mednarodni prehod 2, Šempeter Pri Gorici
Urdih transport D.o.o.	Transportation services	Mednarodni prehod 2A, Šempeter Pri Gorici

Fig. 4. Significant activities in the proximity of the SDAG area and within their sector

derived from the number of employees - to stratify the sample according to standardised dimensional criteria [8].

To obtain an overview of international trade, two variables were considered: Imports Size and Exports Size. These variables were considered in order to identify potential businesses to which an ad hoc questionnaire could be sent.

The questionnaire was distributed anonymously during the project period to a sample of 142 logistics operators in the sector via the Google Forms platform, which facilitates the processing, analysis and aggregation of results. The aim is to understand how companies currently manage logistics and how the expansion of the terminal could affect economic performance and sustainability. The questionnaire has been divided into several thematic sections. The first part of the questionnaire was designed to gather general information about the companies, whilst the second part was designed to gather information regarding the expected economic and environmental impact associated with the potential development of the terminal. Completing the survey takes approximately 15–20 min. All responses will be treated with the utmost confidentiality and used exclusively for research purposes. As of today, the data collection phase is still ongoing.

5 Conclusion and Future Research

This study is set within a context of strategic importance, focusing on intermodal logistics infrastructure in the context of regional economic development and the transition towards more sustainable freight transport models.

Specifically, the rail terminal located within the Gorizia freight village represents a potential hub for integrating the Friuli Venezia Giulia region into European transport networks. This potential is enhanced by its strategic border location and proximity to the TEN-T corridors. The methodological approach used for the analysis allows for the triangulation of both qualitative and quantitative data, through a combination of territorial analysis, the creation of a company database and the administration of a bespoke questionnaire. The aim of this methodological integration was to obtain a systematic overview of the interdependencies between infrastructure provision and the behavior and perceptions of logistics operators in the region.

Nevertheless, the research is not without limitations, which must be considered to ensure a correct interpretation of the results. Firstly, as data collection is still ongoing, this constitutes a critical variable; meanwhile, the estimation of company value and the scale of trade flows – where not derived from verified official sources – may be subject to inaccuracies due to the self-reported or indirect nature of such information.

In the near future, it would be desirable to expand the sample to include cross-border operators, in order to involve logistics operators from neighboring countries.

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