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SUMMA

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SUMMA – Sustainable Multimodal Mobility In Adriatic Coastal and Hinterland Areas

Executive summary

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Executive summary

Feasibility Study and Legal Framework Analysis of the Single Ticket System

Programme	Interreg VI-A Italy–Croatia 2021–2027
Priority	Sustainable maritime and multimodal transport
Specific objective	**3.1 — Developing and enhancing sustainable, climate resilient, intelligent and intermodal national, regional and local mobility, including improved access to TEN-T and cross-border mobility**
Project	**SUMMA — Sustainable Multimodal Mobility in Adriatic Coastal and Hinterland Areas · ITHR0200485**
Work package · Activity	**WP2 — Pilot Actions For Better Multimodal Connectivity · Activity 2.2 — Single Ticket System**
Responsible partner	**Municipality of Pescara**
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1. Strategy, objectives and methodological approach

The SUMMA project – Sustainable Multimodal Mobility in Adriatic Coastal and Hinterland Areas – is situated within the framework of the European Green Deal and the Interreg Italy–Croatia Programme 2021–2027. It addresses challenges shared by Adriatic areas: high dependence on private cars, congestion during peak tourist periods, discontinuities in connections between coastal and inland areas, and fragmentation between land and maritime services and access hubs. Its objective is to promote more sustainable and accessible mobility by strengthening multimodal connectivity and cooperation between authorities and operators on both sides of the Adriatic.

The deliverable examines the feasibility of a single, intermodal ticketing system, designed to be introduced initially in the partner territories and subsequently extended across borders. The report is intended as a decision-support tool, providing the information and assessments required for possible future implementation. To this end, the study combines a technical and economic feasibility analysis, developed in Chapters 1–8, with an examination of the relevant legal and regulatory framework in Chapter 9.

The approach combines a review of transport supply and demand, market analysis and user preferences, benchmarking of fare and technological solutions, definition of demand scenarios, emissions assessment, economic and financial analysis and risk assessment, and a review of legal conditions. Comparability of the

results requires the different scopes to be kept distinct: seven pilot territories for the territorial and environmental assessment, the Municipality of Pescara alone for the economic and financial analysis of integrated ticketing, and specific revenue and cost assumptions for the comparison of platforms.

2. Current state of local public transport and main challenges

The analysis covers seven pilot territories: Greater Pescara (Pescara, Montesilvano and Spoltore), Caorle, Comunità Riviera Friulana, Split, Zadar, Poreč and Labin. Their combined population of 512,292 residents, based on the 2021 census, defines the reference territorial scale and does not represent the number of potential service users.

Local transport systems differ in scale, management arrangements and levels of demand. In the urban centres of Pescara and Split, regular commuter and student flows predominate, concentrated during peak hours and along access routes to city centres; in tourism-oriented coastal destinations such as Caorle and Poreč, services are subject to marked seasonal fluctuations. Less densely populated areas and links to the hinterland face greater difficulties in terms of service frequency, coverage and accessibility, with greater reliance on private vehicles.

These differences are also reflected in the available data. Split records high volumes of urban mobility, with more than 31 million passengers in 2019, while passenger volumes in the Pescara area were approximately 5.8 million in 2023. In seaside destinations, demand concentrated in the summer season creates capacity, information and fare-access requirements that differ considerably from those of centres with regular commuter flows.

The assessment identifies recurring challenges: insufficient coordination of timetables and connections, incomplete integration between buses, railways, maritime services and active mobility, non-harmonised fare systems, and information spread across different channels. At the same time, the existence of digital tools already in operation in some territories demonstrates that the intervention does not involve digitalisation from scratch. The Pescara area already has the UNICO fare, contactless payments and best-fare mechanisms on urban buses: the added value to be assessed therefore lies in extending integration across modes, operators and territories.

The demand assessment confirms the need for differentiated solutions: the same system must serve both residents' recurring journeys and visitors' occasional trips, for which unfamiliarity with the network, tickets and conditions of use constitutes an additional barrier. Maritime crossings between Italy and Croatia are not included in the quantitative scope of the assessment, which focuses on urban and extra-urban travel and access to port and airport hubs.

Table 1 – Comparative overview of the seven pilot territories (qualitative assessment)

Territory	Predominant profile	Services and distinctive features
Pescara (IT)	Commuter and metropolitan	Urban network and regional services; UNICO fare and MaaS4Abruzzo
Caorle (IT)	Seasonal tourism	Urban services strengthened in summer; ATVO operator
Riviera Friulana (IT)	Tourism and dispersed demand	Seasonal Lignano routes and extra-urban connections
Split (HR)	Urban and commuter	Extensive urban/suburban network; Promet Split
Zadar (HR)	Urban, suburban and island	Connections with surrounding areas and islands; Liburnija
Poreč (HR)	Seasonal tourism	Small-scale urban services
Labin (HR)	Low demand	Reliance on county-level connections

3. Market analysis and adoption potential

The market analysis places integrated ticketing within the context of local, regional and transnational demand and distinguishes the main user segments: residents and commuters, students, tourists and occasional travellers. The attractiveness of the service depends not only on fare levels but also on the ability to plan an entire journey, use different transport modes without purchasing multiple tickets, and access reliable information and accessible payment methods.

Surveys conducted as part of SUMMA activities point to a consistent finding: 78.6% of residents surveyed in the Pescara area and 79.0% of tourists in the central Adriatic consider integrated ticketing important or very important. These shares exceed those assigned to reducing transport costs, at 74.1% and 72.3%, respectively. In Pescara, journey speed received an average reported score of 4.30 out of 5, compared with 3.93 for cost.

The assessment of technological readiness reveals heterogeneous starting conditions across operators and territories. The SWOT analysis and benchmarking against integrated ticketing systems highlight the opportunity to develop an interoperable and scalable service without requiring the immediate replacement of existing technologies. The service proposition should therefore emphasise a simpler travel experience, continuity of information and operator neutrality, while complementing digital channels with inclusive means of access.

The benchmarking covers Italian and European experiences – including STIBM Milan, UnicoCampania, BIP Piemonte, Südtirol Pass, Oyster, Navigo, SwissPass and HVV – which demonstrate that the value of

integrated ticketing depends at least as much on shared fare rules and governance as on technology. Daily or periodic fare capping, compatibility with widely used payment instruments and the availability of non-digital channels can facilitate adoption. Existing cross-border cases are predominantly land-based and cannot be directly replicated in the Adriatic context, which is characterised by non-contiguous transport and regulatory systems.

From a commercial perspective, the study identifies potential measures such as tourist passes and agreements with tourism operators, solutions for students and major employers, introductory promotional fares and distribution through third-party platforms. These are positioning proposals to be validated with operators and through demand testing, rather than fare products that have already been agreed. A multi-channel approach – apps and QR codes, smart cards and contactless bank cards – aims to combine ease of use, accessibility and continuity with existing systems.

4. Technological solution and system architecture

The study outlines an Account-Based Ticketing (ABT) architecture in which tickets, fare rules and travel entitlements are managed at account and back-office level rather than relying exclusively on a physical support. The architecture provides for differentiated access and validation channels, centralised transaction processing, application of fare rules and a clearing system to allocate revenues among operators. Open-loop EMV and best-fare/capping functionalities can improve the user experience but require shared rules for transaction processing and settlement.

For users, the ABT architecture should provide a seamless travel experience: journey planning, a choice between an app with QR code, smart card and contactless payment, validation and subsequent calculation of the applicable fare. Best-fare and capping mechanisms nevertheless require common rules on transaction identification and the reference period. The availability of physical channels remains essential to ensure that access to transport does not depend on owning a smartphone or bank card.

Interoperability is the structural requirement of the intervention. The study proposes standards and reference frameworks for data exchange and system integration, including Transmodel, NeTEx, ITxPT and National Access Points (NAPs). The model must allow new operators and territories to join progressively, accommodate different fare policies and integrate with existing systems. The operational sequence, from ticket selection and validation to fare calculation and clearing, must be understandable to users and verifiable by operators.

5. Definition of demand scenarios

Scenario modelling combines the scope of the pilot territories, available mobility data, demand-elasticity assumptions and a Bass diffusion curve to represent the progressive adoption of the MaaS service. The model distinguishes underlying growth from the potential effect of integration and accounts for the

composition of the user base. The simulations are not observed forecasts: they depend on the assumptions adopted, the availability of local data and the transferability of parameters drawn from the literature.

Four scenarios are defined: a Baseline Scenario, representing the underlying trend; an Intermediate Scenario, associated with integration at national level; an Optimistic Scenario, considering full cross-border integration; and an S0 Scenario, in which the physical public transport offer remains unchanged and only the MaaS layer is introduced. This distinction is essential: the effects of the digital and fare instrument alone must not be confused with those of potential service enhancements or other mobility measures.

Modelled adoption remains particularly sensitive to demand density and seasonality. The diffusion parameters are drawn from general references rather than estimates specific to the SUMMA territories; they may therefore be more representative of urban centres with established demand than of smaller destinations with highly concentrated tourism flows. For this reason, the report supplements the central scenario with sensitivity analyses.

The potential adoption pool is assumed to equal 25% of residents across the seven territories, or approximately 128,100 users, and is the most sensitive parameter in the forecast. Applying the Bass curve with p = 0.03 and q = 0.38, the study estimates 4,581 active users in 2026 and 42,427 in 2030, corresponding to 8.3% of the reference population and 33.1% of the potential pool; the largest annual increase in new adopters is projected for 2032. These are simulation results rather than observed forecasts and depend particularly on assumptions about the reachable user pool and the capacity to activate the service.

6. Technical and financial sustainability and cost–benefit analysis

The report examines the economic sustainability of the single ticketing system through two distinct but complementary analyses. The first assesses the financial sustainability of three technological alternatives, comparing investment and operating costs with expected revenues over a ten-year period, using a real discount rate of 4%. The second assesses the socio-economic value of introducing integrated ticketing in the Municipality of Pescara through an incremental cost–benefit analysis over twenty years, at constant 2025 prices and using a real social discount rate of 3%.

Comparison of technological alternatives

The study examines three potential solutions for implementing the single ticketing system, differing in development approach, functionality and cost structure. Specifically, Option 1 involves in-house development of a dedicated platform designed for the system's specific requirements; Option 2 considers the adoption of a standard commercial platform already available on the market; and Option 3 proposes

an advanced commercial MaaS platform with broader capabilities for integrating mobility services and managing transactions between operators.

The comparison considers the incremental costs associated with each alternative, distinguishing them from the expenditure required to develop and operate the MaaS ecosystem as a whole. Specifically, the report estimates an investment of EUR 414,800, including VAT, for the Pescara pilot project, while the operating cost of the entire ecosystem once fully operational is estimated at approximately EUR 500,000 per year. These amounts relate to a broader scope than the incremental costs of individual platforms shown in the following table and should therefore neither be treated as alternatives nor added together.

Table 2 – Financial comparison of technological alternatives, based on the study assumptions

Technological solution	Incremental CAPEX	Annual OPEX	10-year financial NPV	Investment payback
Option 1 – In-house development	~500.000 €	~80.000 €	−749.958 €	More than 10 years
Option 2 – Standard commercial platform	~300.000 €	~60.000 €	−19.513 €	Year 10
Option 3 – Advanced MaaS platform	~250.000 €	~50.000 €	+2.377.387 €	Year 5

Option 3 emerges as the preferred solution in terms of functionality, scalability and financial performance: it has a positive financial NPV of approximately EUR 2.38 million and achieves payback in year five. Option 2 approaches break-even in year ten, while Option 1 does not recover its investment within the period analysed.

The advantage of Option 3 also depends on revenue assumptions: Options 1 and 2 are assumed to generate, respectively, 13% and 25% of the revenues of the third solution. The ranking therefore depends on the assumed functionalities and market trajectories, rather than on costs alone.

Revenue model and conditions for financial sustainability

The financial assessment considers several potential revenue sources, including commissions on pay-per-use transactions, subscriptions and MaaS Pass products for individual and corporate users, as well as potential indirect revenues. Their actual introduction nevertheless depends on defining a shared fare policy and specific agreements between the authorities and operators involved, as a unified cross-border fare has not yet been established.

A central element of the system's sustainability is the clearing mechanism, through which journeys are recorded and revenues allocated among the various operators. Its role is not solely technological but also

economic and organisational: adopting transparent and verifiable revenue-allocation criteria is essential to ensuring the system's balance and encouraging operator participation.

Against this background, the financial comparison results must be interpreted as estimates conditional on the assumptions adopted, not as proof of the profitability of the entire cross-border system. In particular, the platform's incremental financial assessment does not automatically include all shared, coordination and governance costs required to operate the MaaS ecosystem. Any adoption of Option 3 will therefore require further technical, contractual and market assessments, alongside the definition of an organisational and financial model capable of ensuring service continuity over the medium to long term.

Socio-economic cost–benefit analysis

Alongside the financial assessment, the study develops a cost–benefit analysis to estimate the socio-economic value of introducing integrated ticketing. The exercise is limited to the Municipality of Pescara, for which a sufficiently robust information base is available, and compares the with-project and without-project scenarios while keeping the physical transport offer unchanged.

This assessment uses a cost scope distinct from that of the platform comparison, comprising an initial investment of EUR 524,900 excluding VAT and a fixed annual operating cost of EUR 129,400 once fully operational, also allowing for a start-up phase. These amounts reflect the specific assumptions of the socio-economic analysis and do not represent additional expenditure to be added to the investments described above.

The analysis assumes baseline demand of 5.7 million journeys per year (ISTAT, 2025 data) and estimates a unit time benefit of 0.4965 minutes, equivalent to approximately 29.8 seconds per journey. The benefit mainly arises from simpler journey planning and fewer ticket-purchasing operations when transferring between different operators or transport modes.

Over a twenty-year period, the present value of socio-economic benefits is estimated at approximately EUR 5.51 million, against discounted costs of approximately EUR 3.39 million. This yields a positive economic net present value of approximately EUR 2.12 million and a benefit–cost ratio of 1.62. Under the assumptions adopted, benefits to society therefore exceed the intervention costs, indicating positive socio-economic value for the Pescara transport hub.
In time terms, the estimated benefit corresponds to approximately 47,168 hours saved each year in the Pescara area. A parametric extension to Pescara, Split and Zadar, the only territories with an established demand data base, brings the estimated total saving to approximately 189,500 hours per year. This projection indicates the potential transferability of the benefits but does not constitute a monetary assessment of the entire cross-border system, for which no equivalent economic value is calculated.

Time savings account for the predominant share of benefits, with a present value of approximately EUR 5.33 million out of EUR 5.51 million in total benefits. In particular, 79% of the value of time benefits is concentrated in non-routine journeys, for which simpler planning, purchasing and transfers are more important. The result therefore highlights the system's potential benefits particularly for occasional users and tourists, who are generally less familiar with local networks and fare rules.

The assessment adopts a prudent approach, monetising only benefits directly attributable to ticketing integration. It therefore excludes time savings already achievable through existing contactless systems and does not attribute to the single ticket any benefits arising from potential service enhancements or infrastructure investment. Further positive effects, such as reduced fare evasion and improvements in perceived reliability, information quality and accessibility, are acknowledged but are not automatically assigned monetary values.

8. Sensitivity and risk analysis

The sensitivity analysis confirms that economic results remain positive within a reasonable range of variation in the key parameters and identifies the potential user pool as the most significant driver: when revenues and operating costs vary, the impact remains manageable but requires particular attention to marketing and adoption during the roll-out phase.

The risk analysis maps the main challenges and corresponding mitigation measures: institutional and operator resistance, to be managed through extensive stakeholder engagement and revenue-sharing mechanisms perceived as fair; financial sustainability, to be ensured through a multiannual business plan; external factors, which require flexibility and continuous monitoring; and technical interoperability and security risks, which require thorough testing along pilot corridors before any full-scale launch.

9. Legal framework and institutional conditions for implementation

The legal study reviews the European, national and regional framework for intermodal mobility, with particular attention to Abruzzo, and examines Italian experiences of fare integration in Campania, Lazio, Lombardy, Emilia-Romagna, Tuscany, Marche and Basilicata. The regulatory framework examined does not reveal any general prohibition on introducing an integrated cross-border ticket; however, the institutional and contractual framework required to make it operational among entities subject to different legal systems and competences still needs to be established. Italian experience demonstrates the feasibility of integrated solutions at national level but does not provide direct precedents for cross-border operation.

The review considers three governance models without identifying any as already selected: a consortium of transport companies with legal personality and binding allocation rules; a public agency responsible for coordinating services, timetables and fares; and a public–private partnership assigning management to an operating entity. For Abruzzo, a zonal fare model is identified as a possible reference, while distance-based or mixed alternatives remain open, with adjustments for tangential journeys, low-demand areas and transfers.

The cross-border perspective first requires an interinstitutional agreement between the competent Italian and Croatian authorities, to be translated into the administrative instruments and service contracts needed to regulate fares and conditions of use. This should be accompanied by an interoperability agreement defining roles, responsibilities, service levels, platform management and the clearing centre. Revenue allocation could follow a gradual transition: initially referring to operators' historical revenues and subsequently applying algorithmic criteria based on the traffic and service data actually available.

Particular attention is required regarding VAT and the tax classification of tickets valid under two legal systems: before commercialisation, the issuing entity, territorial scope of the services, sales documentation and revenue-allocation rules will need to be clarified. Similarly, mutual recognition of digital tickets and the management of cross-border transactions require a coherent contractual and administrative framework. These are not insurmountable legal barriers, but conditions that cannot be deferred until launch.

Further examination is needed of suppliers' obligations and liabilities; passenger protection in the event of missed connections; refunds and complaints; accessibility and assistance for persons with disabilities; personal data processing; non-discrimination; and incorporation of fare rules into public transport contracts. The technical ability to establish a clearing system does not confer the power to impose obligations unilaterally on operators and authorities in the other country: institutional cooperation is therefore an enabling condition of the intervention, not an ancillary phase.

The study's recommendations focus on establishing shared governance, an interoperability agreement and a clearing centre; incorporating requirements concerning security, accessibility, data protection and user rights; and preparing contractual clauses that preserve data and software portability and reduce vendor lock-in. The legal form of the joint entity, allocation of competences, fare regime and definitive revenue-sharing model remain matters for subsequent examination and agreements, rather than decisions already taken by the deliverable.