Exploring MaaS–DRT Integration Through a Systematic Literature Review: Methodological Insights for Rural Mobility Planning

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Abstract. Today's mobility is evolving toward the smarter paradigm, rapidly introducing new technologies (such as IoT, AI, and 5G) and designing increasingly connected, sustainable, and autonomous transport systems to improve urban efficiency. This evolution is lagging in rural areas, where transportation demand is low, mobility trends are inconsistent, modal choice is limited, and a significant percentage of users are affected by the digital divide. In these areas, it is necessary to evaluate the implementation of flexible transport services complementary to public transport, such as dial-up services (DRT). These services are also evolving as integrated components of the Mobility as a Service (MaaS) system, representing a significant opportunity to encourage users to adopt more sustainable mobility behaviors. This study presents a comprehensive literature review aimed at identifying key trends, research directions and scientific developments in the field of MaaS, with particular attention to the enabling technologies, platform architectures and operational models adopted in practice. The systematic literature review allows for the analysis of sector research from the last twenty years using keywords and Boolean variables that can link them. The study, specifically focused on rural areas and the combination of MaaS and DRT, reveals an uneven spatial and temporal distribution. The research examines not only the correlation between the themes but also focuses on social inclusion and gender equity to assess the impact of these integrated transport solutions. The results of this research demonstrate how the integration of MaaS and DRT represents a fundamental pillar of modern sustainable mobility policies in Italy and Europe. This integration also represents a fundamental strategy in rural and inland areas to combat depopulation, improve accessibility to essential services, and reduce private car use. In this context, current and future policies must aim to transform and integrate local public transport with flexible services based on dedicated digital platforms and MaaS systems to ensure territorial coverage (last mile) and social inclusion.

Keywords: Mobility as a Service (MaaS) · Demand Responsive Transit (DRT) · Rural Mobility · Low-Demand Transport Systems · Accessibility and Social Inclusion

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1 Introduction

The evolution of transport systems currently shows a different distribution across urban, semi-urban and rural areas. Numerous studies have highlighted this disparity on the basis of territorial factors [1], economic [2] and social [3, 4].

Data from 2020 [5, 6] shows that 29% of European citizens and 17.33% of US citizens live in rural areas. Demographic factors, the presence of underdeveloped infrastructure, limited public transport and longer travel distances are significant obstacles for areas with low demand, making it difficult for both public transport and innovative mobility systems to achieve viability and user acceptance [7].

While causality is difficult to establish, numerous studies report an association between rural depopulation and reduced public transport provision. Limited access to services and opportunities, often linked to a lack of transport infrastructure and services, is one of the factors contributing to the marginalisation of rural areas and their depopulation [8].

The last decade has been marked by numerous disasters and pandemics, which have led to an increase in low demand areas because of a lack of transport services and the depopulation of cities [9, 10]. Rural and sparsely populated areas represent one of the main challenges facing modern transport systems [11, 12].

The scattered nature of settlements, reduced demand for transport and an ageing population making it difficult to organise traditional public transport services that are both efficient and economically viable. There is a need to reverse this trend and improve connections between urban areas and outlying regions [13].

In non-urban areas, there is also a high level of private car use, leading to an increase in the negative externalities of the transport system in terms of pollution, accident rates and CO_2 emissions. It is necessary to make public transport services more attractive, so that they can better meet the needs and expectations of users, thereby encouraging a modal shift towards more sustainable modes of transport [14, 15].

Among the most promising solutions, Demand-Responsive Transit (DRT) is is highly adaptable in low-demand areas [16]. By responding exclusively to actual user demand, it offers a flexible and customisable service, often serving users without access to private transport [17].

In this context, the analysis of integrated transport systems plays a central role in safeguarding the right to mobility and combating social and territorial isolation.

The demand for mobility in rural areas is characterised by certain structural features: low travel volumes, high temporal variability, heavy reliance on private cars, and a prevalence of journeys linked to work, healthcare, education and access to essential services.

Beyond these factors, there are often more vulnerable groups, such as the elderly, young people and individuals with limited financial resources [18–20].

These factors make public transport models based on fixed routes and rigid timetables ineffective, highlighting the need for flexible solutions that can be adapted to actual demand.

It is therefore beneficial to roll out integrated PT-DRT transport services, promoting the concept of integration not only in organisational terms but also in operational and fare-related aspects, so as to optimise all available resources and extend service

coverage across the region. DRT enables operators to tailor service provision to user demand, thereby reducing operating costs and expanding regional coverage. However, these services are most effective when integrated into a coordinated system rather than operating as stand-alone solutions.

In the current urban mobility landscape, Mobility as a Service (MaaS), based on the integration of multiple transport services, represents an emerging development. Through a unified digital platform supported by Information and Communication Technology (ICT) tools, it allows users to plan, book and pay for various transport options. By placing the user and the fulfilment of their needs at the heart of their primary objectives, these platforms promote multimodal mobility, increasingly establishing themselves as a strategy for urban mobility that is ever more efficient, inclusive and sustainable from an environmental, social and economic perspective [21–24].

This study presents a systematic review of the literature on the diffusion of PT-DRT integrated transport systems, and at the same time examining the integration of these services into MaaS digital platforms with a view to improving user experience.

Section 2 analyses the state of the art on-demand transport systems over the past decade and their integration with public and shared transport services but also analyses the evolution of MaaS digital platforms.

Section 3 defines a methodology for the systematic literature review using the main scientific databases.

Section 4 discusses the results from the previous section and outlines strategies for improving the integration of transport services with the technologies for mode choice.

2 Literature Review

2.1 The Development of DRT Services

The spread of DRT services has made it possible in recent years to implement sustainable transport services [25, 26].

The development of these services within an integrated transport system has led to improvements in social inclusion (for example, through the introduction of services tailored to the most vulnerable groups) and better accessibility in underserved areas, thus becoming a valuable service for covering the first and last mile [27–29].

Several studies have shown that DRT services using fleets of minibuses (both electric and non-electric) have been introduced, and an increased number of studies also focus on autonomous vehicles [30–33].

It is important to emphasise that whilst scheduled public transport, particularly sub-urban and regional rail services, acts as the backbone of the system, flexible transport services with a feeder and distribution role.

Therefore, through integrated planning, on-demand services could be used as links to transport hubs, stations or main stops, ensuring journey continuity and reducing travel times to essential services.

This approach helps to overcome the divide between urban areas with good transport links and marginalised rural areas, promoting greater territorial equity [34, 35].

Other studies, however, have highlighted the uneven distribution of these services due to regulatory restrictions [27], a lack of technical consultation between service providers and issues related to the digital divide [36, 37].

In recent years, there has been a lack of clarity and consistency in the policy framework within which the public sector plays a strategic and coordinating role. It is therefore necessary to develop an integrated mobility plan that explicitly includes rural areas within catchment area plans, SUMPs and territorial development strategies [38]. It must be borne in mind that, unlike in urban areas where transport demand allows for a greater number of market operators, in areas with low demand these dynamics are often absent, and public intervention is essential to ensure the continuity, fairness and quality of services.

Another critical issue relates to the question of public funding for the sustainability of such services in areas with low demand. Funding models must recognise the social value of transport, going beyond an assessment based solely on economic efficiency.

Targeted subsidies, flexible service contracts and compensation mechanisms can enable the integration of on-demand services into the public transport system, preventing them from remaining experimental or temporary solutions.

In this regard, the development of MaaS platforms can ensure the implementation and improvement of multiple services, or rather the improvement of the entire mobility ecosystem, by supporting interoperable digital platforms, integrated fare systems and subscription models that also include rural services. This approach makes it possible to ensure the economic sustainability of services which, taken individually, would not be viable, but which are essential for guaranteeing the right to mobility [39, 40].

According to the literature, the adoption of modern technologies could significantly enhance the integration and flexibility of public transport, but above all its coverage in areas with low demand; it could also balance and contain operating costs and support principles of social, economic and environmental sustainability [41, 42].

Digital integration makes it possible to coordinate these services with public transport networks, reducing overlaps and improving the overall efficiency of the system.

In this sense, the integration of DRT and MaaS emerges as a promising strategy for improving the efficiency and coverage of transport systems, indeed data from 2024 relating to the eighth National Report on Sharing Mobility confirms this growth, with a 40% increase already in the first few months of 2024, with 41 active services: 24 operating in urban areas and 12 in rural areas [43, 44, 45].

Among the advances in integrated transport solutions, Mobility as a Service (MaaS) is playing an increasingly central role because it ensures integration between different modes of transport, promoting greater flexibility, access to real-time travel information and efficiency [46, 47].

Ensuring a greater availability of transport services in areas with low demand means facilitating access to work, education and healthcare, thereby combating depopulation and strengthening territorial cohesion.

Furthermore, by improving the synergistic integration between public transport and on-demand services, a significant contribution can be made to reducing private vehicle use.

Finally, governance represents a further critical element. Integrated transport systems in rural areas require multi-level governance models, in which regions, local authorities and transport authorities collaborate with public and private operators. In this context, public authorities must retain control over service objectives, quality standards and territorial equity, whilst operators are responsible for operational and technological implementation. MaaS platforms can become tools for governance as well as service delivery, facilitating data sharing and performance monitoring [40, 48] as discussed.

2.2 The Development of MaaS

The concept of MaaS is relatively recent in academic circles; the first publications date back to 2018 and focus on the main characteristics of the service.

There is not yet a single definition of the MaaS concept, but it is generally understood as a model for the provision of transport services that includes both public and on-demand transport, which, by converging on a single platform, optimises multimodality.

The research of [47, 49] summarises the key features of the MaaS model in three main elements relating to the integration of:

- mobility, enabling access for different transport operators within the same area
- ticketing and bookings consolidated into a single platform
- information technologies capable of providing real-time information on transport services.

An analysis of the spatial and temporal distribution of scientific contributions reveals that the number of publications has risen rapidly in recent years and that they originate predominantly from Europe, with the Netherlands leading the way, followed by Sweden, Finland, and then the United Kingdom and the USA. The latter region represents the area with the most significant growth, particularly for MaaS users [50].

However, research highlights significant gaps in the assessment of the impact of MaaS on existing transport systems, as well as in the design and pricing of services to make them more attractive to users. Ultimately, however, it appears that the widespread adoption of these models, by improving last-mile coverage, will significantly reduce the use of private vehicles [51]. In Italy, thanks to the National Recovery and Resilience Plan (PNRR), a portion of the funding has been allocated to MaaS projects, thereby contributing to the large-scale development of these models. The aim of streamlining the relationship between public and private transport, making it more sustainable, efficient and accessible, includes Mobility as a Service among its key initiatives. Indeed, among the pilot schemes launched in Italy are three metropolitan cities: Milan, Naples and Rome [52].

From literature review [50] it appears that multi-level approaches to cooperation and organisation among the stakeholders involved have been defined, highlighting how public and private entities can integrate and work in synergy. However, several issues have been identified that pose substantive challenges to the roll-out of these MaaS systems. Specifically, these concern to the management of sensitive data, including its secure processing, and storage, while ensuring privacy is respected.

It also refers to the qualitative and quantitative impact of MaaS on the use of different modes of transport, and on service design, planning and pricing strategies, so as to

make the service attractive to users. The adoption of such services is, in fact, closely linked to users' socio-economic and behavioural factors, as user satisfaction significantly influences the adoption of the service.

MaaS represents the new trend in smart mobility, as these platforms are able to provide integrated urban transport solutions, including buses, underground, car sharing and micro mobility services, thereby ensuring that users can plan their journey using a single platform and choose the most appropriate mode of transport for each leg of the journey [53].

MaaS also represents an innovation in the planning and use of transport systems.

Stemming from the fundamental need to overcome the fragmentation of mobility and the idea of unifying both public and private transport services within a single digital platform, the concept of MaaS was born, a way of offering users a travel experience centred on a personalised and seamless service.

By promoting the combined use of public transport and shared mobility services, MaaS offers an interesting approach to sustainable mobility, tailoring transport solutions to users' needs and ensuring accessibility in rural areas where demand for transport is low [51].

Consequently, the integration of MaaS platforms into rural areas represents a significant development in the literature, as these platforms were initially strongly geared towards predominantly urban contexts. Numerous studies [54] highlight that although MaaS models originated predominantly in urban settings, they can be adapted to rural contexts, as these approaches represent a promising solution to the structural challenges faced by areas with low transport demand. Indeed, MaaS models can make areas with low transport demand accessible, enabling the integration of public transport, on-demand services and other forms of mobility into journey planning. This integration and multimodality helps reduce barriers to the use of public transport and increases user confidence in the system. In the MaaS context, on-demand transport serves a complementary and connecting role, covering the so-called 'last mile' or serving areas and times when a scheduled service would be inefficient.

The integration of PT and DRT can therefore be considered at several levels [25, 55]:

- Information level: through MaaS platforms that display travel solutions that combine, for example, a regular bus service with an on-demand service for the final leg
- Operational level: the on-demand transport system can be designed to act as a feeder service for local public transport

The evolution of MaaS systems and the integration of public transport with on-demand services have a significant impact on environmental and social sustainability [46, 56].

A well-designed system can reduce private car use, emissions and congestion, whilst improving accessibility for older people, people with disabilities and residents in outlying areas [54]. In particular, on-demand services integrated into MaaS can ensure a minimum level of access to transport even where traditional public transport is not economically viable, helping to reduce regional inequalities.

Furthermore, when discussing integration, it is possible to propose a further perspective in this regard because, in some models, the on-demand system can be integrated, even

if only partially, into the public transport fare system, making journey costs transparent for the user and fostering collaboration between public and private bodies [39].

Despite its potential, the implementation of MaaS and the integration of transport services still present several challenges, including the development of sustainable business models, the definition of public authorities' roles in coordination, and the management and archiving of data held.

Looking ahead, strengthening policies, governance and public funding models could facilitate the full integration of rural areas into MaaS systems. This requires a paradigm shift, in which mobility is not viewed merely as a cost, but as a strategic investment in territorial cohesion, local development and the overall sustainability of the transport system.

The integration of public transport, flexible services and MaaS, supported by a strong role for the public sector, therefore represents one of the main levers for ensuring a greater presence of mobility services even in areas with low demand, reducing territorial inequalities and improving the quality of life in rural areas.

2.3 Research Gaps, Objectives, and Contribution

The purpose of this document is to understand the benefits and challenges associated with these digital solutions, which are of considerable importance not only for service providers but, above all, for users, who are guaranteed a flexible and sustainable transport service. The literature highlights the role of MaaS systems integrated with DRT systems; it is noted that on-demand transport systems improve accessibility, reduce territorial marginalisation in rural areas, and demonstrate economic and operational benefits compared to public transport.

Despite this, there are gaps in the literature, identified primarily in the scarcity of concrete case studies, the limited actual integration between public and private service operators, the risk of digital exclusion in rural areas, and the lack of effective policies to integrate MaaS and DRT.

The primary objective, therefore, would be to attempt to integrate future policies aimed at transforming and integrating local public transport with flexible services based on dedicated digital platforms and MaaS systems, in order to ensure territorial coverage (last mile) and social inclusion. In this way, it would be possible to ensure the development of operational models adapted to the diverse needs of users, guaranteeing well-being, accessibility and efficiency.

3 Methodology

The literature review, conducted using a Systematic Literature Review (SLR) approach, began with the definition of specific keywords and a search of the main scientific search engines such as Scopus, ScienceDirect and WOS. The document examines the topic based on scientific literature from the past decade, from 2016 to 2026.

The search was conducted using Boolean combinations applied to titles, abstracts, and keywords, as follows:

- [(“Mobility as a Service”) AND (“demand responsive transit”) OR (“DRT”) OR (“demand responsive transport”)]
- [(“Mobility as a Service”) AND (“demand responsive transit”) OR (“DRT”) OR (“demand responsive transport”) AND (“rural areas”)]
- [(“Mobility as a Service”) AND (“demand responsive transit”) OR (“DRT”) OR (“demand responsive transport”) AND (“policy”) AND (“public transport”)]
- [(“Mobility as a Service”) AND (“demand responsive transit”) OR (“DRT”) OR (“demand responsive transport”) AND (“policy”) AND (“social inclusion”) AND (“social exclusion”)]

A rigorous selection process was conducted based on clearly defined inclusion and exclusion criteria. Specifically, the review considered journals and conference proceedings written in English, covering subject areas relevant to the research, and available via open access. Contributions that did not meet these criteria were excluded.

4 Results and Discussion

The results consist of a total of 91 papers: 52 relating to the first combination, 11 to the second, 20 to the third and 8 to the fourth. Following a process of selection and removal of duplicate papers, only 21 were included in the final analysis.

The selection criteria included papers published over the last twenty years, encompassing both journal articles and conference proceedings.

Excluded, however, were all duplicates, papers belonging to different subject areas, non-open-access papers and book chapters, non-English papers and non-peer-reviewed papers.

The literature highlights how the promotion of MaaS systems in synergy with integrated transport systems proves to be a significant strategy in the structural transformation of transport systems and, above all, in improving accessibility conditions in contexts with low transport demand.

Table 1 summarises how each contribution relates to the proposed MaaS model.

The 21 contributions are classified by their primary theme: impacts on accessibility and territorial cohesion; policy, governance, and public funding; impacts on sustainability and inclusion; and technological evolution and related impacts.

As shown in Table 1, the 21 selected papers generally address specific issues that converge on the relevance of the MaaS model and the prospect of integration with on-demand transport services. However, a significant gap emergence in the literature. Most of the studies analyse integrated transport systems and advocate the adoption of MaaS as a tool capable of ensuring more efficient, personalised and technologically advanced services. A smaller subset examines applications in rural areas; however, it is observed that structural problems linked to socio-demographic factors complicate the implementation and roll-out of new smart mobility strategies. These findings, which focus on rural areas, highlight obstacles to implementation and underscore the difficulty of transferring results obtained from broader contexts to areas with low demand. Overall, most of the contributions take a predominantly theoretical and descriptive approach, presenting MaaS models as a viable and desirable strategy. This highlights a methodological gap in the literature, as the limited number of case studies identified in this systematic review

Table 1. MaaS Literature Review Table

Reference	Theoretical (T)/Application (A)	Impacts on accessibility and territorial cohesion	Policy, governance and public funding	Impacts on sustainability and inclusion	Technological evolution and related impacts
[57]	T	x	x		x
[58]	T	x	x	x	x
[59]	T	x		x	
[60]	T	x	x	x	
[61]	A	x		x	x
[62]	A	x		x	x
[63]	T	x		x	
[63]	T/A		x	x	x
[64]	A	x		x	
[65]	A	x	x	x	
[66]	T	x	x	x	
[67]	T	x		x	
[68]	T	x		x	x
[69]	T	x	x	x	
[70]	A	x	x	x	
[71]	T	x		x	
[72]	T	x	x	x	
[60]	T	x	x	x	
[17]	T	x		x	
[73]	A	x		x	x
[74]	A	x		x	x

restricts the ability to verify the information and theoretical approaches that prevail in the literature. While theopretical contributions emphasise all the potential benefits of MaaS, the pilot case studies remain too context-dependent and although they demonstrate a more practical approach, they cannot be applied too generally. Although the literature presents well-established findings, there are still few practical case studies from which to derive reliable and well-founded data.

The two most frequently addressed topics relate to the impact that MaaS integrated with DRT may have on territorial cohesion, and the impacts on sustainability and social inclusion.

Therefore, whilst on the one hand, with regard to purely theoretical contributions, it is not possible to provide clear evidence of the long-term objective benefits that may be derived from the adoption of MaaS-DRT in terms of economic, social and environmental

sustainability and the improvement of transport systems in areas with low demand; on the other hand, the awareness and consistency regarding issues of territorial accessibility, social inclusion and environmental impact are significant and highlight the confidence placed in these innovative mobility systems for marginalised areas.

From another perspective, the results of pilot projects in small towns demonstrate not only the effectiveness of DRT services but, also how these systems, when integrated into MaaS models, are evolving significantly, providing services increasingly tailored to users' needs and improving connections to public transport networks that can enhance accessibility and territorial connectivity.

The integration of DRT services within MaaS platforms, as the research suggests, would offer a range of benefits to both users and service operators, thanks to a dynamic balance between transport supply and demand. These benefits are also evident in terms of optimising and reducing journey times, operating costs and kilometres travelled. All of this is considered, according to the literature, to be among the most significant factors in users' perceived quality of service [57].

It is also becoming clear that these on-demand systems, when properly integrated into MaaS, represent an effective tool capable of complementing local public transport in areas with low demand, thus proving not to be a niche service but rather one that complements and integrates the wider transport network. When properly integrated into MaaS, on-demand systems effectively complement local public transport in low-demand areas. Mobility hubs are extremely useful in this regard because they manage to simultaneously integrate coherent strategic planning objectives, synchronising timetables, waiting times, journey times and routes to ensure increasingly comprehensive door-to-door services [60, 62].

Some contributions, however, focus on different aspects, highlighting other potential applications of MaaS. Indeed, when tailored to specific user groups, these services can better support the first/last mile function and provide connections to the main public transport network. However, this same concept, in trials already established in contexts with low demand, shows that when technological, operational and fare integration exists not only between MaaS and DRT platforms, but also includes integration with local public transport, it is possible to guarantee flexibility for users and sustainability over time [58].

Consequently, the multidimensional analysis proposed by Butler et al. clearly shows that integrated MaaS-DRT solutions can have a positive impact on tackling transport disadvantage and inequalities in access. Improvements are therefore evident in terms of territorial accessibility and social inclusion, particularly in contexts such as areas with low demand where public transport is often insufficient. From this perspective, another potential of MaaS is highlighted: it can serve as a policy tool capable of supporting and enhancing social and territorial cohesion objectives, particularly for rural projects with a dual public-private nature [70, 66].

Evidence from Japan highlights persistent challenges alongside the general potential: long-standing structural constraints, such as population ageing and shortages of operational staff, have limited the impact of smart-mobility innovations and MaaS pilot projects, leaving transport-demand issues unresolved. Compared with European case

studies, Japanese case studies demonstrate clear long-term results. It is also worth noting that different demographic factors, across various global contexts, have a significant influence on the success of services and outcomes.Therefore, based on this rural evidence, it would appear that the success of these platforms integrated with DRT systems does not depend so much on an increase in passenger numbers but rather on much more precise and specific assessments for each context with low demand. The success and positive benefits of these models can only emerge if there is a bespoke design of MaaS-DRT services for areas with low, rather than generalised, demand [65, 66].

In fact, solutions such as MaaS Lite, simpler solutions focused on local areas and a limited number of transport modes, can often bring immediate benefits and success [64].

This final point, in line with the European and Japanese case studies, lays the groundwork for a concept we believe to be significant, the importance of adapting these technologies, on-demand services and governance models to local circumstances, their specific characteristics and, above all, the mobility needs of these areas with low demand, thereby avoiding a standardised approach [68, 69].

5 Conclusions

This paper assesses, on the basis of scientific literature from the last decade, the direction of scientific development in the MaaS sector, paying particular attention to the integration of these platforms with DRT systems in areas with low transport demand, such as rural and suburban areas. Unlike traditional fixed-route systems, Demand-Responsive Transport (DRT) systems offer dynamic and customisable routes, thereby improving access to essential services and reducing territorial marginalisation. This analysis has shown that the integration of new MaaS technologies with DRT systems represents, particularly in theory, a fundamental pillar of modern sustainable mobility policies, presenting itself as a virtuous strategy in inland and rural areas. The systematic literature review revealed that many existing studies are purely theoretical in nature, highlighting the benefits of using on-demand systems and demonstrating a solid foundation in the literature, emphasising their crucial role particularly in areas with low demand and low population density, where a reduction in operating costs compared to traditional transport is necessary. They analyse how the roll-out and subsequent integration of MaaS systems would ensure real-time management of bookings, facilitating digital integration in these rural areas between public transport, both road and rail, DRT systems and shared mobility schemes. It is therefore noted that some papers, which also present pilot projects, emphasise the need to raise awareness of the issue. The results of the pilot projects highlight how MaaS platforms are expanding rapidly and developing their system architecture to provide high-performance, personalised services tailored to users' diverse needs. This undoubtedly improves connections to public transport networks and, consequently, territorial connectivity and continuity; however, we must also take into account improvements to the platforms' fare systems. The aim should be to create a single system, not only for ticketing but also for payment, as this is the only way to make bookings via a single interface in an even simpler and more accessible manner.

There are also a number of challenges that require attention, such as the importance of developing policies and improvement strategies to ensure that DRT-MaaS integration

has a meaningful impact; or the need for connectivity between mountainous and rural areas whilst avoiding digital exclusion; the need to integrate data from public and private sources, where dialogue and data sharing would facilitate the management of integrated services; the need to assess the impact of these services on citizens' well-being in these areas with low transport demand.

However, few studies analyse this aspect of policy and feasible strategies for integrating DRT systems in rural areas; rather, recommendations regarding differentiated policies for flexible services based on user clusters are becoming more common. Specifically, following a review of the existing literature, this paper proposes policy strategies to facilitate the integration of DRTs in these areas with low transport demand. In this context, flexible, reservation-based services that adapt to actual demand should be developed, alongside service models that experiment with 'Last Mile' approaches such as Route and Point Deviation.

It is also suggested that the regional regulatory framework be amended so that these on-demand transport systems can operate together with local public transport, ensuring a single fare system. It would indeed be effective to consider integrated ticketing and single-fare systems for journeys combining on-demand transport (DRT) with traditional transport services; this would ensure better accessibility at interchange hubs whilst minimising waiting times. This can be achieved through the development of apps, websites and call centres via which users can view and book both on-demand and fixed-route transport services.

In terms of funding and governance, this is a crucial point: in areas with low demand, transport services often face serious financial difficulties; consequently, long-term public support strategies and regional and local partnerships are essential in order to jointly define routes, timetables and fares, as is the case in inland areas. From this perspective, transport services are optimised, and educational, health and social services are also involved in a co-design approach. It follows that the economic sustainability of these services, particularly in areas with low demand, must be pursued through integrated governance models, so as to ensure balanced operating costs, operational sustainability and improved effectiveness over time.

To conclude from a technological perspective, the adoption of smart systems enables the implementation of dynamic and intelligent solutions that can optimise routes, journey times and waiting times. Indeed, the introduction of MaaS solutions integrated with Demand-Responsive Transit systems, particularly in low-demand areas, clearly emerges as a key recommendation. This would undoubtedly represent a radical change and a new perspective, but would simultaneously ensure the widespread adoption and establishment of equitable mobility, accessible to all, thereby reducing regional inequalities.

In light of the discussion so far, the findings highlight how the integration of MaaS and DRT represents a promising solution for ensuring better accessibility and efficiency of services in areas with low demand. It is possible to outline future lines of research to be directed towards medium and long-term analyses aimed at evaluating the MaaS-DRT integration in qualitative and quantitative terms, exploring how these can play a significant role in sustainable mobility solutions for areas with low demand. This research, conducted using a systematic literature review (SLR) approach, has yielded limited empirical results when compared with the wide range of theoretical studies. Therefore,

the main limitation of this research lies in the nature of the studies analysed, the majority of which are theoretical, with a relatively small number of pilot projects capable of validating the benefits of DRT-MaaS integration. Among future research objectives, the primary goal is undoubtedly to bridge this gap, focusing on more empirical contributions and on the effectiveness of integrated DRT-MaaS services in real-world contexts, and more specifically in rural settings. To refine and expand the theoretical hypotheses widely discussed in the literature, future research must prioritise experimentation and empirical evidence, which are the only means of supporting this transition from conceptual models to integrated DRT-MaaS solutions. This contribution could be useful to the scientific community as it summarises the main elements found in the literature, providing a knowledge base on the application of these platforms in rural areas, and also to service operators in terms of the guidance provided for the development of increasingly sustainable models.

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