

POSSIBILITIES FOR DEVELOPING PUBLIC PASSENGER TRANSPORT STRATEGY AND MARKETING

Abstract. Currently, high demands are placed on the quality and efficient functioning of public passenger transport, which must be the main element of people's mobility. However, several shortcomings are still evident in various areas of public passenger transport. The contribution points to current strategic bottlenecks and proposes brief but systematic academic solutions on how progress can be achieved in the area of setting a strategy for the functioning of public passenger transport and its marketing. The above proposals are followed by specific solutions to selected practical problems.

Keywords: Public passenger transport, Strategy, Marketing, Transport area

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Introduction

The main advantages of rail passenger transport are primarily its safety, environmental friendliness and high transport capacity. The development of this type of transport contributes to the fulfilment of several objectives, including the creation of a safe and fully interoperable single European railway system and improving sustainability. Other aspects of development are the creation of jobs and the strengthening of territorial connectivity, with particular emphasis on remote regions. Therefore, it is necessary to ensure that rail passenger transport is efficient and attractive for all groups of passengers. For this reason, it is necessary to point out its current shortcomings and subsequently present not only strategic but also marketing measures for its improvement.

1. Current Comprehensive Shortcomings in Public Passenger Transport

Despite efforts to support and develop public passenger transport as an environmentally friendly and sustainable mode of transport, this sector currently does not demonstrate a significant increase in transport performance. At the same time, several shortcomings and issues persist across various areas, reducing its attractiveness as well as its potential for individual modes of public transport to become more dominant, with a substantial increase in the number of passengers carried at the expense of individual motorized transport (Dedík, 2020).

1.1 Shortcomings in the Organization of Public Passenger Transport

The main shortcomings in the organization of public passenger transport stem from fragmentation and

insufficient competencies – rail transport is commissioned by the Ministry of Transport, bus transport by regional self-governing authorities, and urban public transport by municipalities. Synergy between contracting authorities and operators often does not function optimally, resulting in insufficient coordination of individual services. There is a lack of a unified definition of transport service provision, a national transport service plan for the Slovak Republic, and basic standards. The railway timetable is based on a regular-interval system and is primarily designed for long-distance services, which may lead to inadequate transfer connections in regional transport, including poorly coordinated links with bus services, often resulting in parallel running of train and bus services. Another issue is the absence of fare integration and interconnected dispatching systems, which complicates coordination and the transfer of delay-related information (Dedík, 2020; Ministry of transport, 2014).

1.2 Shortcomings in the Operation of Public Passenger Transport

Under current Slovak conditions, only approximately 30% of trips are made by public passenger transport, with rail transport accounting for just 18%. Attractiveness is reduced by remote station locations, low train frequencies on certain railway lines, and limited accessibility in rural areas. The decline in passenger numbers is most pronounced in regional transport, where insufficient service supply and further service reductions lead to decreased passenger frequency in public transport and a subsequent preference for individual transport (private car use). Non-motorized transport is disadvantaged by insufficient safety and existing barriers, despite the growing number of projects supporting the development of cycling and pedestrian transport (Dedík, 2020).

1.3 Shortcomings in Public Transport Infrastructure

Railway infrastructure, particularly on regional lines, is largely outdated, which is reflected in low line speeds, obsolete signalling equipment, and level crossings. Many stops and stations are often neither modern nor safe. Furthermore, there is currently no comprehensive strategic plan for the modernization of individual railway lines. Bus and urban transport lack high-quality interchange hubs and terminals, and Park-and-Ride (P+R) and Bike-and-Ride (B+R) facilities are absent in most areas. Public spaces are inadequately designed for pedestrians and cyclists (Ministry of transport, 2014).

1.4 Shortcomings in Rolling Stock and Maintenance

The rolling stock in rail transport has not yet undergone comprehensive modernization, as modern vehicles cover only part of operations and low-floor units are not available everywhere. A similar issue exists in some cities, where the urban public transport fleet is outdated and the vehicle renewal cycle has not been adequately addressed. The workforce situation is not managed systematically with a long-term perspective, as there is currently a shortage of operational and maintenance staff, which increases failure rates and reduces the attractiveness of public transport (Ministry of transport, 2014).

1.5 Shortcomings in the Promotion of Public Passenger Transport

A significant shortcoming is also the loss of modern status and image of public passenger transport, which is often perceived as outdated, time-consuming, and less comfortable. In the eyes of the travelling public, it currently has a negative image and is frequently regarded as an obsolete and unpleasant mode of transport, often associated with being imposed since the 1990s, as it failed to adequately respond to the rise in individual motorization. Incoherent solutions and the growth of individual transport further reduce its usage. Transport policy is often more oriented towards road transport than towards the systematic development of public passenger transport (Dedík, 2020).

2. Potentially Applicable Methods for Improving the Current Situation

In addressing the current situation, it is essential to propose systematic and conceptual long-term solutions that can be directly implemented in practice. This paper approaches the issue primarily from an academic and scientific perspective and therefore offers expert solutions whose outcomes are derived from specific universal methods. The following subsections briefly explain individual scientific and management methods that can be applied in this context. Each method is also accompanied by a brief practical application (Dedík, 2020).

2.1 Method of Analysis and Synthesis

Both methods are used as fundamental cognitive approaches in analysis and synthesis. Analysis is a method based on examination and decomposition, in which a whole is broken down into individual components, parts, and elements. It represents a process of division. In contrast, synthesis is an intellectual process that, based on experience or logic, proceeds from the simplest principles to more complex ones by combining and integrating individual parts into a whole. In synthesis, the relationships between individual components of a phenomenon are examined.

In the context of public passenger transport, these methods can be applied, for example, in analysing issues such as train delays or poorly designed and unattractive timetables in selected regions (Dedík, 2020).

2.2 Method of Induction and Deduction

The method of induction is a scientific approach representing one of the main cognitive procedures and the most important form of so-called reductive reasoning. It is a fundamental way of linking ideas, where general conclusions are derived from multiple specific and individual observations.

The method of deduction is based on the opposite principle. It is a cognitive process in which specific, particular, and less general conclusions are derived from general premises and results. Deduction can be classified as progressive, regressive, or logical. Both methods enable the formulation of theories and hypotheses.

In the case of public passenger transport, these methods can be applied when evaluating specific problems across different transport modes, integrated transport systems (ITS), or regions, identifying common patterns in the results and ultimately proposing universal, generally applicable solutions to advance the public transport system as a whole. Subsequently, through deduction, these general conclusions can be applied to individual modes of transport or specific regions/ITS, considering their particular characteristics to achieve improvements over the current state (Bamber et al., 2011).

2.3 Expert Panel Method

The expert panel is a scientific and managerial method primarily used in decision-making, planning, and forecasting in situations where empirical data are insufficient or decisions are complex and uncertain. The method involves assembling a group of experts who systematically discuss, analyse the problem, and provide estimates, evaluations, or solution proposals. The outcome is a consensus or a set of recommendations based on expert knowledge.

In the context of public passenger transport, this method can be applied, for example, by establishing a working group composed of experts from various fields e.g., representatives of the Ministry of Transport, infrastructure managers, state railway operators, private

railway operators, bus operators, integrated transport system managers, as well as members of the academic community (Bamber et al., 2011).

2.4 Six Sigma Method

Six Sigma is a quality management methodology originally developed at Motorola and later popularized by General Electric. Its goal is to minimize process variability and reduce the number of defects—ideally to 3.4 defects per million opportunities (the “six sigma” level). The method employs several typical tools, such as:

- Ishikawa (fishbone diagram) – identification of root causes of problems,
- Pareto analysis (80/20) – focusing on the most significant factors,
- SPC (Statistical Process Control) – control charts for monitoring variation,
- FMEA – risk and failure mode analysis,
- 5 Whys – simple identification of root causes.

In practical application within public passenger transport, the following process can be implemented:

- Define: Passengers frequently complain about delays in urban public transport.
- Measure: Collect data on departure punctuality across all lines.
- Analyse: Identify that the main issues are traffic congestion on specific routes and long boarding times due to on-board ticket purchases.
- Improve: Introduce public transport priority at intersections, increase the number of ticket vending machines, implement mobile applications, etc.
- Control: Continuously monitor departure punctuality and the number of complaints.

2.5 Kaizen Method

Kaizen is a Japanese philosophy and management system meaning “continuous improvement” (kai = change, zen = for the better). It is based on the following principles:

- Small steps → big results – not revolutionary changes, but gradual daily improvements,
- Involvement of all employees – from management to operational staff,
- Elimination of waste – reducing unnecessary time, errors, and costs,
- Standardization – improvements become new standards,
- Culture of openness – employees are encouraged to propose improvements, benefiting both themselves and the organization.

In the practical application of Kaizen in public passenger transport (specifically rail transport), the following outputs can be identified:

- Defining a clear vision: “Railways as the first choice of mobility – comfortable, ecological, and customer-oriented.”

- Implementing small steps: introducing micro-improvements in organization, marketing, and customer communication instead of large campaigns.
- Applying the PDCA cycle: each step is tested on a selected line or station → evaluated → if successful → implemented system wide.
- Employee involvement: staff at all levels are encouraged to propose changes.
- KPIs: monthly monitoring of passenger volumes and satisfaction trends compared to targets (e.g., +5% per quarter).
- Implementation of Kaizen standards: at least one small marketing improvement per month (e.g., website updates, new app features, simplified visuals).
- Transparency: publishing improvements in quarterly public reports – “How we improved your train journey.”
- Visible small successes: passengers notice improvements and build trust in the operator and the overall system.

The core principle of Kaizen lies in focusing primarily on operational, organizational, and marketing measures that do not require high investments (e.g., new railway lines, rolling stock, or information systems). It emphasizes continuous, systematic, and conceptual implementation of small changes aimed at improving travel quality and making rail transport a more reliable and attractive alternative to private car use (Dedik et al., 2024), (Bamber et al., 2011).

2.6 Pareto Principle

The Pareto principle, often referred to as the 80/20 rule, states that 80% of effects result from 20% of causes. In other words, a small portion of inputs or efforts typically generates the majority of outcomes. Importantly, the 80/20 ratio is not exact or universal but rather reflects an unequal distribution of impact.

In practice within public passenger transport, it may manifest as follows:

- Most passengers (80%) travel along a relatively small number of routes or lines (20%).
- For example, 20% of urban public transport lines may serve up to 80% of passengers in a city.
- Most delays or overcrowding (80%) occur during specific periods, such as morning and afternoon peak hours (20% of time).
- 20% of vehicles or lines may cover 80% of demand, while the rest are used less efficiently.

For this reason, it is essential to evaluate processes in public passenger transport using this principle and to design targeted measures accordingly. Ideally, improving 20% of processes within the system can lead to an 80% overall improvement (like the “small steps → big results” principle of the Kaizen method) (Bamber et al., 2011).

3. Scientific and Academic Principles for Improving the Current State of Public Passenger Transport with an Emphasis on Rail Passenger Transport

The mentioned chapter deals with a detailed analysis of railway passenger. Given the persistent shortcomings across multiple areas of public passenger transport, it is essential to approach their resolution in a systematic, professional, and conceptual manner. It is also advisable to draw inspiration from the mentioned methods and their potential practical applications.

Although certain visions currently exist, they are typically limited to the level of infrastructure managers, transport operators, or ministries. As a result, they are insufficient and cannot be considered truly strategic or conceptually robust for the future. Therefore, it is necessary to develop and implement a new strategic development plan for public passenger transport, which must be highly professional and grounded in scientific principles within the field of transport processes.

The development of such a strategic plan requires the involvement of experts from various transport sectors. For example, in the railway sector, this could include:

- the contracting authority for rail transport (Ministry of Transport),
- the infrastructure manager (Railways of the Slovak Republic),
- the national operator (Railway Company Slovakia),
- private operators,
- managers of integrated transport systems,
- transport experts and representatives of other institutions dealing with railway transport.

However, it is crucial to involve as many experts as possible from the academic sphere, who can provide comprehensive professional and scientific solutions to this issue. First, it is necessary to summarize all identified shortcomings and bottlenecks and correctly identify their causes and consequences. Subsequently, based on scientific principles and methods, a system of measures should be proposed and implemented across different areas of the railway sector.

Based on current scientific knowledge, a preliminary framework of specific measures within selected areas of the railway sector is presented below. These areas and measures are described in the following subsections (Škorupa et al., 2024).

3.1 Visionary and Strategic Area

This area focuses on creating a high-quality expert strategic vision for the development of railway transport in Slovakia in the short-, medium-, and especially long-term horizon. The objective is not only to address or “extinguish” current major problems but also to provide a conceptual vision of where railway passenger transport should progress within the broader context of public passenger transport in the coming years, including the definition of a key global strategic objective.

At the same time, it must be clear how this objective will be achieved and what steps need to be taken in individual years (annual cycles). Currently, such a vision is lacking, as both public passenger transport and rail passenger transport have lost a clear direction, and it is not evident where development should lead in the coming years.

One of the key pillars for improving this vision appears to be long-term financing of transport infrastructure projects. A comparison of approaches adopted by different infrastructure managers reveals that both Slovak and Czech railway infrastructure managers rely primarily on short-term financing, with funding certainty typically guaranteed only for the following year. A clear long-term infrastructure development vision would provide a foundation for stable financing. However, such a nationwide vision is currently lacking in both Slovakia and the Czech Republic.

In contrast, Western countries demonstrate a different approach. For example, the Austrian infrastructure manager ÖBB has developed a renewal plan known as the “ÖBB Framework Plan,” with €21.1 billion allocated for the period 2024–2029 (Poimer, 2024).

Key elements of such systems are regular-interval nodes (transfer stations) and travel times between them, known as “edge times.” These are characterized by the following principles:

- edge times must be integer multiples of half the interval,
- complete circulation cycles are always integer multiples of the interval,
- edge times in opposite directions are identical or differ only slightly.

This principle is also applied in Germany through the so-called Deutschlandtakt. This regular-interval timetable is based on a simple yet clear concept: “First the timetable, then the infrastructure” (Drdla, 2021), (Deutschlandtakt, 2025).

3.2 Infrastructure Area

This area focuses on establishing clear prioritization and hierarchy in the modernization of public passenger transport infrastructure, including railway lines—an aspect that is currently either missing or insufficiently defined and systematic.

It is therefore necessary to develop a modernization plan for individual track sections based on the principle of prioritizing “the most important and most heavily used sections first,” while taking into account urgency and importance. Each section should include a planned implementation timeline under optimistic, realistic, and pessimistic scenarios, depending on available financial resources. These plans should also incorporate the potential construction of integrated transport terminals (TIOPs) and other key infrastructure elements.

Another important measure is the assessment of the current state and identification of bottlenecks on railway lines using selected operational indicators that determine

the quality of transport services and reveal the transport potential of a line. This includes evaluating:

- line speeds on individual sections (maximum, minimum, average),
- capacity and practical throughput performance,
- classification and hierarchy of track sections based on capacity and speed.

To compare results (and potentially apply them in road transport), train (or bus) delays can be characterized using the lambda parameter. To determine this parameter, it is necessary to know the input delay at the entry point—i.e., the location where a train (or bus) enters the monitored section.

Delays in railway transport are influenced by numerous factors, including infrastructure maintenance works, technical failures, extraordinary events, and operational disruptions. Delays may also originate on the operator's side, for example due to non-compliance with planned train composition—differences in maximum speed, type of traction vehicle affecting acceleration and braking, weight limits, train length, etc. Significant delays can also arise from inefficient capacity usage, where operators request train paths that are known in advance to be infeasible.

Additional influencing factors include weather conditions and delay propagation caused by crossings, overtaking, or waiting for connections.

The following table presents the frequency and proportion of delayed trains. The proportion is calculated using the following formula (Křižan, 2022):

$$P_{OV} = \frac{\check{c}_i}{\sum_{i=0}^n \check{c}_i} \quad (1)$$

where:

- P_{OV} — proportion of delayed trains [-]
- $\check{c}$ — frequency of a given delay [-]

After obtaining valid data (as shown in the table above), tools of exponential probability distribution are applied. Since input delays are typically described using an exponential distribution, the lambda parameter is calculated using the following formulas (SM 124, 2019), (Křižan et Vojtek, 2023).

$$E(X) = \sum_{i=1}^n x_i \cdot P_{OV} \quad (2)$$

$$\lambda = \frac{1}{E(X)} \quad (3)$$

3.3 Transport Service Organization Area

Measures in transport service organization primarily involve the design and implementation of a strategic plan for sustainable mobility and transport services across the entire Slovak Republic, including all its regions, with an emphasis on rail transport. In this context, it is particularly

important to support the rapid and efficient establishment of national transport authorities (within four territorial units of Slovakia), as well as the development and expansion of integrated transport systems.

Within rail transport, it is necessary to reassess the current so-called “revolutionary” timetable (GVD) and all its planned phases and alternatives. In long-distance transport, multiple service alternatives should be developed for the Bratislava – Žilina – Košice corridor, including an evaluation of reintroducing InterCity (IC) trains. In connection with this corridor, alternative solutions should also be prepared for other railway lines.

In terms of regional connectivity, it would be beneficial to support the development of so-called interregional transport by introducing a greater number of Regional Express (REX) services across multiple areas, thereby improving and accelerating transport connections between regions (e.g., on routes such as Žilina – Trstená, Žilina – Prievidza, Prievidza – Zvolen, etc.).

In regional transport, it is important to reassess transfer and connection links, as well as to evaluate the potential of regional railway lines based on factors such as population size, accessibility of railway infrastructure, passenger mobility, modal split share, and similar indicators.

From the perspective of population size, it would be appropriate to assess individual settlements served by rail transport using a five-level classification system. Each level is represented by a specific coefficient and a set of parameters (Table 1).

Table 1. Expression of the factor "population"

Number of inhabitants	Adjacent coefficient	Verbal expression
0 - 499	1	Sparsely populated village, low transport potential
500 - 999	2	Below-average populated municipality, transport potential is not high.
1,000 – 1,499	3	Averagely populated village, average transportation potential.
1,500 – 1,999	4	Above-average populated municipality, transportation potential is higher.
2,000 and more	5	Densely populated village (downstream), high transport potential.

From the perspective of railway infrastructure accessibility, it is also appropriate to assess the accessibility of individual settlements, expressed as the distance of railway stations and stops from the centre of a given settlement. Accessibility is likewise categorized into five levels, each defined by a specific coefficient and corresponding parameters (table 2). Subsequently, based on these coefficients, it will be possible to assess and reassess in greater detail the potential of individual railway lines and to establish correlations, for example, with current passenger volumes in rail transport, and subsequently across public passenger transport, as well as with individual motorized transport, etc. For this reason, it is essential to effectively determine the indicator known as

“population mobility,” which represents an important quantitative indicator in rail passenger transport.

Table 2. Expression of the factor "accessibility"

Station (stop) availability – distance in km from the centre of the settlement	Adjacent coefficient	Verbal expression
0 – 0,39	1	The distance is very short, accessibility is excellent.
0,40 – 0,79	2	The distance is relatively short; accessibility is very good.
0,80 – 1,19	3	The distance is medium, accessibility is average.
1,20 – 1,59	4	The distance is quite long; accessibility is below average.
1,60 and more	5	The distance is very long; the accessibility is inconvenient.

It is influenced primarily by population growth and rising living standards. Total population mobility can be derived from the number of passengers transported by all modes of transport, both public and private. However, determining total population mobility precisely is very complex, as it is significantly affected by private car use.

Population mobility expresses the number of trips per inhabitant within a given territory per year and is calculated as follows:

$$H = \frac{C_i}{O_u} [\text{trips per inhabitant}] \quad (4)$$

where:

H – population mobility,

C_i – number of passengers transported by a given mode of transport within the observed area per year,

O_u – population of the given territorial unit in the observed year.

To ensure transport service provision for a given area and to forecast its development, it is also appropriate to determine so-called projected (future) mobility, which is based on historical trends and an analysis of all relevant influencing factors. Ideally, this trend should be monitored across all transport modes to determine passenger transport trends as accurately as possible.

The most effective and accurate approach is to determine the current value of population mobility within a specific transport relation or area for a given year as the ratio of total transport performance across all modes to the population of the area. However, obtaining such a value is relatively complex, as it requires comprehensive data on transport performance across all modes (rail transport, public road transport, urban public transport, inland waterway transport, air transport, and private car transport).

Another subfactor influencing transport service provision is the currently available passenger frequency data. These data are often used to determine the level of service on individual railway lines; however, they may not

always be fully relevant, as current frequency statistics do not necessarily capture the full picture.

Therefore, from the perspective of the strategic development of rail passenger transport and public transport as a whole, it is essential to intensify the monitoring of transport flows. This should comprehensively include:

- assessment of passenger volumes on individual railway lines,
- evaluation of passenger flows by type (regional vs. long-distance),
- analysis of passenger composition (students, workers, retirees),
- identification of short-term and long-term trends in passenger volumes on individual lines,
- comparison with competing transport modes (modal split analysis),
- monitoring, processing, and evaluation of complex transport flows using innovative methods (e.g., mobile SIM data), combined with calculations related to population mobility.

3.4 Fare Policy Area

In the area of fare policy, a relatively large number of shortcomings can also be identified, which need to be addressed through the implementation of several measures. A significant issue is the absence of a unified ticketing system across public passenger transport (except for integrated transport systems, where this operates only to a limited extent). It is therefore essential to support the simplest possible form of a unified ticket that is easily accessible, user-friendly, and straightforward for passengers to purchase. This system should be unified across all modes of transport, as well as across all cities and regions.

Another important measure in fare policy is to expand the portfolio of discounts to increase the attractiveness of rail passenger transport and public transport as a whole for various passenger groups. New types of discounts could include:

- introducing new discount schemes (e.g., for recent graduates of secondary schools and universities),
- improved support and availability of season tickets and group discounts (creating strong competition with private car use),
- streamlining the ticket purchasing process (e.g., implementing a “check-in/check-out” system),
- improving the functionality of transport operators’ mobile applications or introducing a unified application for the entire public transport system,
- implementing loyalty programs,
- offering additional benefits such as discounts on cultural and sporting events, accommodation, attractions, or other services when using public transport.

3.5 Preferences (Marketing and Advertising Area)

Marketing and advertising represent key areas in many organizations, often determining their success or failure. Public passenger transport, including rail passenger transport, must significantly improve its performance in this domain by strengthening its strategic direction and increasing marketing efforts.

Currently, negative publicity tends to dominate across various communication channels, including social media. Therefore, it is necessary for transport operators to strengthen their marketing departments, increase marketing activities, and invest more effectively in advertising to address the issue identified in Section 1.5—namely, the negative public perception of public transport.

Specific measures should include:

- implementing positive advertising campaigns on billboards and in the media, using authentic and original messaging to position public transport as the first choice compared to private car use,
- promoting positive content on social media (e.g., creative and engaging videos, photos, and visuals), particularly to appeal to younger generations,
- defining strategic slogans, such as:
 - ❖ “Passengers first!” – passengers should be treated as customers (our customer = our priority), not as a burden,
 - ❖ “Meeting the needs of ALL passengers!” – ensuring inclusive transport services for all population groups (students, workers, retirees, managers, entrepreneurs),
 - ❖ “Public transport as your first choice!”
 - ❖ “From a necessary evil → to a preferred brand.”

If these activities are clear, consistent, and regularly implemented, there is a strong likelihood that they could contribute to a significant “transformation” in public passenger transport.

Conclusion

This paper initially focuses on a brief analysis of the current shortcomings of public passenger transport in Slovak conditions. In this context, it subsequently proposes scientific and academic framework solutions, particularly in the areas of strategy and marketing. These solutions aim to apply and implement various scientific and management methods to improve selected aspects of public transport.

The third chapter presents specific measures in selected areas which, in the long term, could help increase the attractiveness of public transport, boost transport performance, and improve operational efficiency. The scope of these measures is relatively broad, and each area could be further elaborated in a dedicated scientific paper.

Five key strategic areas were identified, which are considered the most important from both academic and marketing perspectives. However, the principles for improving public passenger transport can also be applied to other areas, such as financing, rolling stock, services,

and human resources. More detailed outputs in these areas remain the subject of further research by the authors.

The proposed measures aim to provide a systematic solution to bottlenecks in public transport and to outline its future direction across different domains. These steps and measures could contribute to the development and implementation of a new strategy for public passenger transport in the short, medium, and long term. Such a strategy is crucial not only for the development of the transport sector but also for improving overall mobility and supporting broader societal development.

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