

Article

Mobility Nodes as an Extension of the Idea of Transfer Nodes—Solutions for Smaller Rail Stations with an Example from Poland

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Abstract: This paper presents the idea of extending transfer nodes to mobility nodes as objects with more functions than just transport. Mobility hubs are often associated with large stations; however, they can be implemented at all or almost all stations. The main purpose of this study is (1) to show the potential of treating smaller railway stations as mobility hubs; (2) to formulate a methodology for classifying such nodes; and (3) to discuss the usefulness of the constructed methodology on a selected example. The method proposed here consists of five stages of identification and classification of mobility nodes and includes three categories and 10 criteria for assessing the level of service (LOS) at a selected station. The proposed method may be useful for evaluating mobility nodes and identifying those which require improvement. The presented concept can be used to formulate plans for the development of nodes. Broadly speaking, the proposed methodology could be useful for designing high LOS nodes from the first stages of planning.

Keywords: mobility; mobility node; train station; transportation plan; TOD



Citation: Kruszyna, M.; Makuch, J. Mobility Nodes as an Extension of the Idea of Transfer Nodes—Solutions for Smaller Rail Stations with an Example from Poland. *Sustainability* **2023**, *15*, 2106. <https://doi.org/10.3390/su15032106>

Academic Editors: Renata Żochowska, Marianna Jacyna and Armando Carteni

Received: 28 November 2022

Revised: 17 January 2023

Accepted: 19 January 2023

Published: 22 January 2023



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1. Introduction

Nodes are objects which connect different transport means, as well as elements of modeled networks in, for example, microsimulations [1], optimization tools to reduce the number of passenger transfers [2], or graphs and topologies in networks [3,4]. Nodes in railway networks serve as important hubs in agglomeration transport systems [5]. The cooperation of different means of transport and the right location and design of nodes are important to effectively utilize light rail systems such as trams, tram-trains, and various hybrid solutions [6].

A node could be a destination object for electric vehicles [7,8], demand-responsive transport [9], or autonomous driverless shuttle buses [10]. Railway stations, as nodes, represent “urban functional areas” [11] and increase real-estate prices [12]. Nodes improve pedestrian flow around train stations [12]. Probably, nodes could also make up part of “green infrastructure” [13]. They contain not only platforms and stops but also parking for commuters with cars or bikes in the Park and Ride (PR) or Bike and Ride systems. The quality of a node is an important factor influencing the quality of the PR system [14].

Some nodes become extremely important and are called Hubs. Hubs are often located near airports. Rome Fiumicino is an exemplary hub [8]; it has its own specificities, e.g., the number of travelers or the nature of outgoing/incoming vehicles. Some railway or metro stations can be classified as large-scale hubs [15,16]. In contrast, railyards are a kind of node [17].

Current research highlights the impact of the COVID-19 pandemic on travel in cities and agglomerations (for example [18,19]). The decreasing number of passengers has created a need for continuing development of public transport and wider coordination of means of transport. Therefore, the importance of nodes is increasing.

Bus networks are a good example of the hierarchy of a node system which can be categorized as either a hub or as peripheral nodes [20]. The typologies of both urban and rural transportation systems were presented by Bell [21]. Five kinds of node centralities in a metro network were considered in [4]. The classification of railway stops and stations is presented in [22]. An interesting typology of railway stations is proposed in [23]. The authors use a modified Node-Place model introduced by Bertolini in 1999 [24]. In [23], a node is analyzed not only as a part of the railway infrastructure but as an element of the development of the city. The process, called transit-oriented development (TOD), is partially connected with the idea of mobility nodes. Main railway or subway stations in large agglomerations are important elements of TOD [25,26]. They influence neighboring areas [27] and effect social changes [28,29]. The idea of TOD is also implemented in mid-sized cities [30].

Urban functional areas can be defined by considering interconnections in public transport [31]; however, nodes, as key elements of public transport systems, could be classified using descriptions of surrounding areas. Nodes can be evaluated using various factors. For example, the quality of a node can be rated with a comparison of waiting time [32] or the standard of the waiting areas [33]. The value and significance of the various factors are lower in medium-sized stations and much lower in smaller stations than in big transport hubs. However, the careful creation of smaller objects is important too. Given the lack of studies of smaller objects, this study investigates solutions for smaller stations. The notion of extension of the interchange node into a mobility hub is presented.

A mobility hub is defined, for example, in “mobility plans” or “mobility policies” (see [34,35]). These objects *are intended to create important transit network connections, integrate various modes of transportation and accommodate an intensive concentration of places to live, work, shop or play* [34].

Previous publications and research have concentrated on bigger hubs as parts of TOD. Although some publications have considered smaller stations [23,30], complex analyses of all stations as mobility nodes are lacking in current research. Smaller nodes (stations) can also serve as mobility nodes with the same kinds of elements, albeit on a smaller scale. The main purpose of this study is (1) to show the potential role of smaller rail stations as mobility nodes; (2) to formulate a methodology for the classification of such nodes; and (3) to discuss the utility of the constructed methodology on a selected example.

The paper is constructed as follows. First, the idea of the mobility node within the context of smaller stations is described in Section 2.1. The proposed method for the identification and classification of mobility nodes is described in Section 2.2. The next part of the paper discusses the case study, located in the Wrocław Agglomeration, Poland (Section 3). The advantages of the introduction of mobility nodes are discussed in Section 4. Conclusions are presented in Section 5, as well as the limitations of the present study and proposed future research.

2. Materials and Methods

2.1. The Idea of the Mobility Node

Until now, the main function of a junction was to change means of transport; as such, these places are called “transfer junctions” [5,12,21,22]. Mobility nodes are places consisting of functional and large transfer nodes and the accompanying service facilities. These facilities may be located close to the transfer junction. Actions are also taken to closely integrate the transport part of the mobility node with other facilities [23]. Sometimes these settings are enriched with “aesthetic” functions [34]—see Madrid Atocha station (Spain), Figure 1 [36]. This is particularly effective within railway stations. Examples include European stations such as the Leipzig Hauptbahnhof (Germany) or Warsaw Wileńska (Poland) or Far Eastern stations in Kyoto, Tokyo Shinjuku (Japan). Two of the aforementioned stations feature toothed platforms. Although such stations are quite popular, especially in European cities, they will not be considered in the present analysis, which will instead focus

on city rail systems where the diameter line system is preferred. In fact, although the main railway station in Leipzig has toothed platforms, the city railway line runs underground.

An interesting discussion of the “aesthetic” functions of stations (described as their “hedonic value”) was presented in [37]. That study proposed a quantitative analysis of the perceived value of station quality versus more conventional service variables such as waiting time, boarding and access time, frequency of service, and monetary cost. The authors took into account factors such as hedonic value related to architectural or aesthetic quality, emphasizing the importance of applying high architectural standards. A similar, broader view of suburban rail and commuting is proposed in [38]. The authors of [37] also made a significant contribution to the literature on the aesthetic or hedonic qualities of railway stations.

Mobility nodes are becoming important and integral parts of planning studies. For example, for the Toronto–Hamilton (Canada) area, a transport plan [34] has been developed, adopted and implemented, one of the nine milestones of which is the creation of a mobility hub system. The location of these nodes within the network of basic connections is shown in Figure 2.

The authors of [34] give two examples of how a mobility node works. Madrid’s Atocha Station (Spain) services regional rail and city metro lines. It contains shops, cafes, a night club and a garden with an area of 4000 m². The second example, from St. Paul (Minnesota, USA) is a combination of a new light urban railway (LRT) station with a regional bus and train station. It also includes public spaces for various activities.

Places where rail passengers can board or disembark from trains are classified as stops or stations. At stops, trains stop only for the exchange of passengers. At stations, trains can also pass each other, overtake, start or end a run and change direction. In this article, the term “station” will be used for both of the places mentioned above. In analyzing mobility nodes, a richer classification of stations is necessary. The first step is to define the boundaries of the following two areas:

- the area of facilities located within the station itself
- the service area as an area adjacent to the station.

The next step is to identify the equipment and development in each of these areas and to analyze the location of these areas in relation to each other and the connections between them.



Figure 1. Exemplary mobility node—the Atocha train station in Madrid, Spain [36].



Figure 2. Mobility Hubs in the Greater Toronto and Hamilton Area [34].

Platforms are a basic element of facilities areas. They can offer different levels of service depending on four criteria.

1. They can be low (making it necessary for passengers to step up/down when entering/exiting a train) or high (devoid of this inconvenience).
2. They can be accessed at ground level or only by a footbridge or tunnel—with or without a lift or ramp.
3. They may or may not have benches, sheds, roofing (on part or all of their length), waste bins, static or dynamic information boards, lighting, voice announcements, ticket machines, ATMs, vending machines, or kiosks with drinks and snacks, waiting rooms, access to wireless Internet, and monitoring.
4. They can be adapted to serve people with disabilities (e.g., with tactile warning stripes, guidance paths, elevators or ramps in addition to stairs) or not.

Station buildings are usually located within larger stations. These facilities, similar to platforms, can also offer different levels of service. They may or may not have a waiting room, toilet, cash desks, information point, luggage storage, ticket machines, ATMs, parcel lockers, vending machines with drinks and snacks, kiosks, shops, service points, fast food, bars, cafes, restaurants, libraries, small businesses or offices (post office, police), cinemas, gyms, solariums, and game rooms. The bigger the station, the more elements one is likely to find.

On the premises of the station or directly next to it, there may be:

- supermarket or a shopping mall,
- car parks: Park and Ride, Kiss and Ride, Bike and Ride,
- stops for other means of public transport,
- rentals of public bicycles and scooters,
- a taxi stand.

In the service area, in addition to the elements listed above, there may be schools, clinics, doctors' offices, seats of local government units or state administration, companies (small, medium, large), swimming pools, sports fields, stadiums, sports and entertainment halls, playgrounds, parks, theaters, orchestras, museums, etc. The farther they are from the station, the less attractive the mobility hub they create will be. The service area can be arranged in a mono- or multi-functional way. Possible functions are "residential", "commercial and service" or "industrial".

The service area may include a single settlement unit (i.e., a large, medium, or small city, or a village), a certain part of a unit (in the case of large cities), or more than one unit. In the latter case, one can distinguish:

- the primary unit close to the station and one or more satellite units not served by other stations
- two separate units located on either side of the railway line, of comparable size and development method.

Passengers can access a station from the service area on foot or by means of individual or public transport (other than rail). In the case of pedestrian access, a limitation in the form of a certain maximum acceptable distance (e.g., 500 m) should be taken into account. The street layout in the service area can be radial, rectangular, or irregular, with dead ends or with closed areas. The above conditions may provide more or less favorable access to the mobility node.

When analyzing the mutual distribution of both types of areas, several specific patterns can be distinguished (see Section 2.2). The historical aspect is important here; this is related to the moment of the establishment of a town or station. The first stations were typically built on the outskirts of existing towns. However, there were situations when a town was created around a new station. A characteristic example is Brwinów (Poland), a town that “built itself” around the station launched in 1848 on the line of the Warsaw–Vienna Railway, commissioned three years earlier (Figure 3). This is a model solution for a mobility node. The station is located in the middle of a service area and a radial road system leads directly to it.

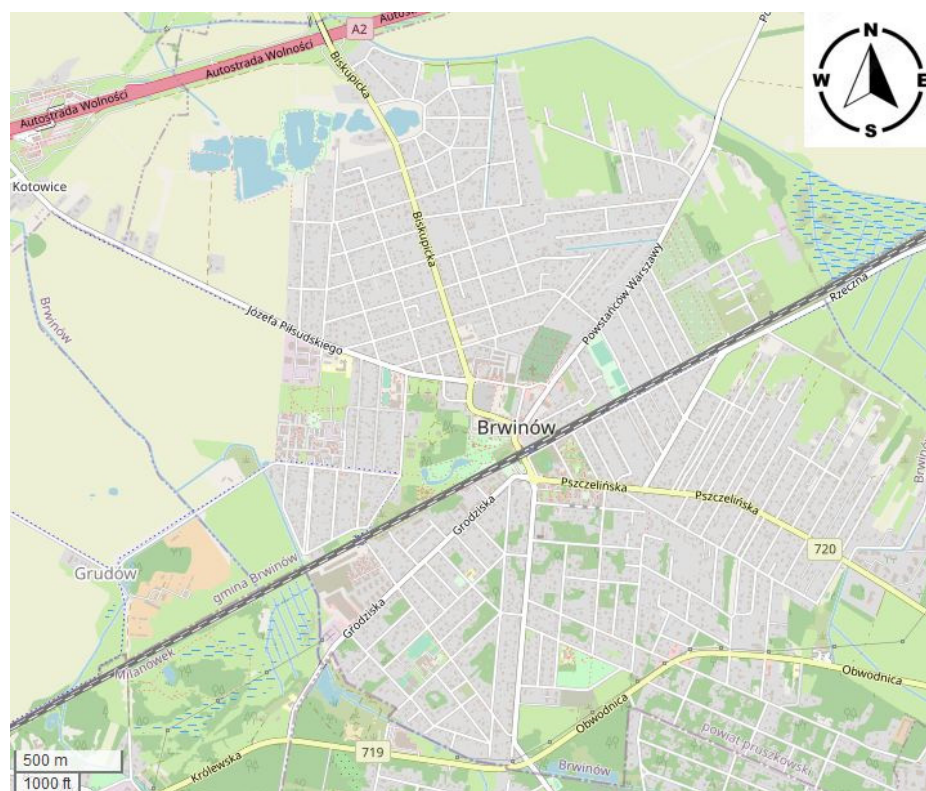


Figure 3. The town of Brwinów with a station (from 1848) on the Warsaw–Vienna Railway Line (founded in 1845) [39].

The conditions described above are the basis for developing a proprietary method for identifying and classifying mobility nodes.

2.2. Method of Identification and Classification of Mobility Nodes

Figure 4 shows some possible layouts of the devices and facilities area in relation to the service area. The most advantageous solution is a layout in which the station is located in the center of the town, at the point constituting the center of its activity. It can be at a major intersection, near an important shop, a school, a church, etc. The name “central” has been introduced for this arrangement. There are situations where a railway line runs through the center of the town, but the station is located on its outskirts. The name “central shifted” was introduced for this arrangement. Another case is the “central internal” arrangement, where built-up areas do not end at the border of the service area but are adjacent to the built-up areas of the service areas of other stations. This occurs in large cities where it is impossible to distinguish one dominant center of activity. Another group of arrangements concerns the situation when the whole town is located on one side of the railway line and the station remains at a certain distance from the center of the town. The name “side” was proposed for this type of arrangement. In this group, sub-variants of layouts have also been identified, i.e., “side shifted” and “side with behind”. It is also possible to combine both of the above layouts in the form of “side shifted with behind”. The least favorable situation is when the entire town is located a great distance from the station. The name “distant” has been proposed for this type of system.

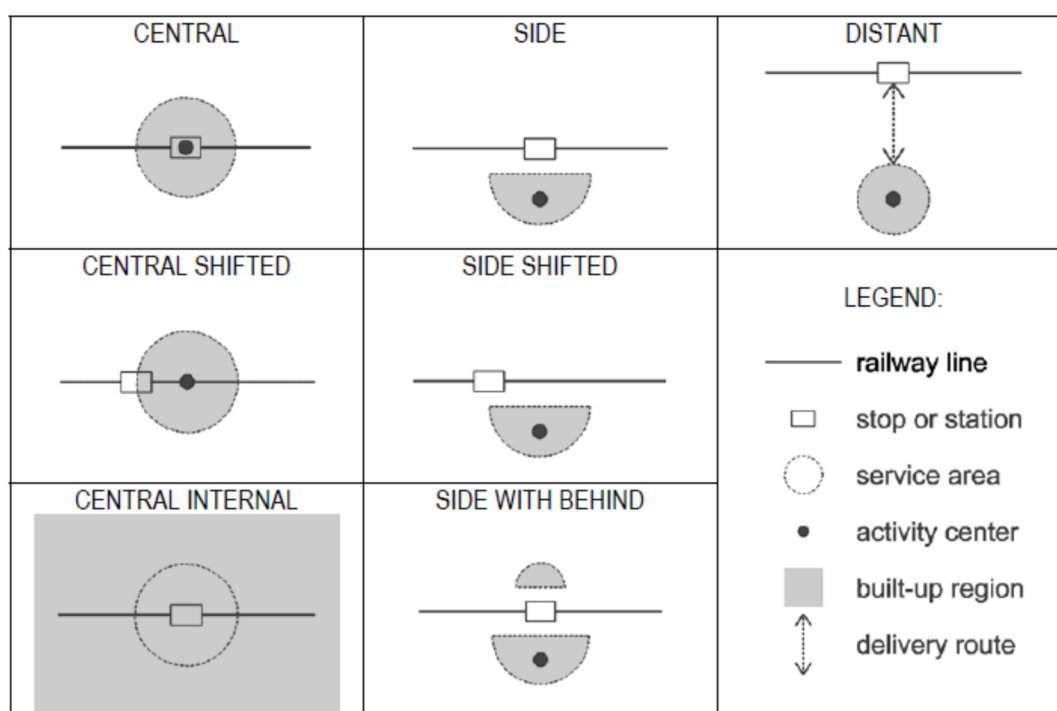


Figure 4. Possible layouts of the arrangement of the station location in relation to the service area.

The basic criterion for classifying mobility nodes is formulated here. It takes into account the conditions of transfers and distinguishes among four groups of stations:

- “non-interchange”, i.e., without the possibility of changing to trains going in other directions,
- “non-interchange + start/end”, as above, but with starting and ending trains,
- “interchange”, with the possibility of changing to trains going in other directions,
- “interchange + start/end”, as above, but with starting and ending trains.

It is also possible to classify mobility nodes as “small”, “medium”, and “large”. In this way, the daily number of passengers and other customers using the mobility center or “range of the offer” (supply) is taken into account. This value is determined by multiplying the planned number of departures from a given station per day by the transport capacity

of trains making individual journeys and including similarly determined measurements of the supply of facilities located in the area of the mobility node. This criterion is not used in the present stage of research but will be developed in the future.

The method proposed here consists of five stages of identification and classification of mobility nodes and contains three categories and 10 criteria to evaluate the level of service (LOS) at the selected station. The criteria correspond with the above description. To help to understand the role of the different sources implemented, Figure 5 shows a flow chart of the applied method. Each criterion considers two or more possible cases and is assigned a specific value. The list of criteria and the possible range of values are summarized in Table 1.

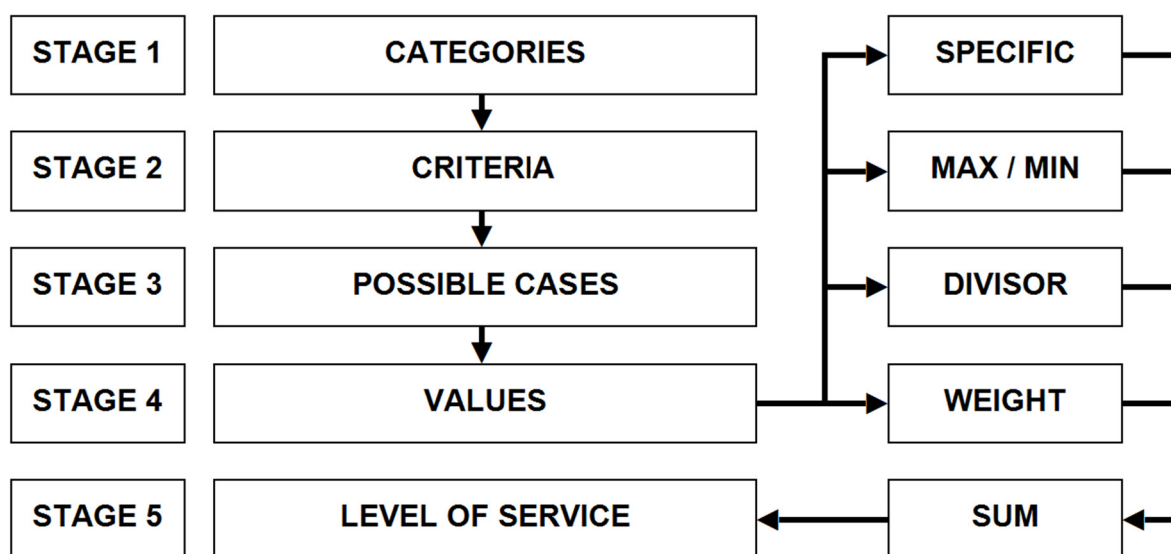


Figure 5. Flow chart of the applied method.

Table 1. Criteria to evaluate LOS at the stations.

Category		Criterion		v	
Name	Code	Name	Code	Minimum Value	Maximum Value
Rail classification	C1	Station building	C11	0	1
		Conditions of transfers	C12	1	4
Feeding transport	C2	Mode of feeding public transport	C21	1	3
		Distance to public transport stops	C22	0	6
		Parkings	C23	0	4
Land use	C3	Land use form	C31	1	3
		Function	C32	1	3
		Layout of streets	C33	1	3
		Rail vs Town arrangement	C34	1	10
		Satellites	C35	0	1

In the applied method, criterion C11 is assigned a value of 0 if there is no station building at the station or 1 if there is such a building there. For criterion C12, the following four possible cases exist: non-interchange, non-interchange with start and end, interchange, and interchange with start and end. Depending on the case, this criterion is assigned a value from 1 to 4, respectively. Similarly, the following three possible cases were defined for criterion C21: suburban bus, bus, tram, and bus, and the value assigned to this criterion is, respectively, 1, 2 or 3. Criterion C22 gets a value of 0 in the absence of service for the analyzed station by means of public transport, or, if such transport exists, then depending

on the distance of the stop of this means of transport from the analyzed station, a value from 1 to 6 for distances of 1000, 500, 400, 300, 200 and less than 200 m, respectively. Criterion C23 receives a value of 0 in the absence of service of the analyzed station with individual transport facilities such as park and ride, bike and ride, city bike, kiss and ride; if such facilities exist, then depending on their total number, a value from 1 to 4 is used.

For criterion C31, the following three possible cases are defined: rural, local, and urban. On this basis, this criterion is assigned a value from 1 to 3. Similarly, the following three possible cases are also defined for criterion C32: residential, commercial and service, and industrial. This time, however, the value of the analyzed criterion is the result of the total number of cases that can occur simultaneously, that is, a value between 1 and 3. As in the case of criterion C31, the following three possible cases were defined for criterion C33: irregular, rectangular, and radial. On this basis, this criterion is assigned a value from 1 to 3. For criterion C34, as many as ten possible cases have been specified: distant, side shifted, side shifted behind, side, side + distant, side with behind, side + side, central shifted, central, and central internal. On this basis, this criterion is assigned a value from 1 to 10. The last criterion, C35, is assigned a value of 0 if the analyzed station does not support nearby satellite settlements or 1 if such service exists.

For the criteria described above, for which the value assigned to them is not the result of summing the possible cases (all except C23 and C32), the lists of these cases, and, as a result, the values assigned to them, are ranked in order from the worst to the best in terms of the attractiveness of the service level mobility node. The maximum value of LOS is 10. This is calculated as the weighted sum of all criteria values with consideration of a “divisor”. The role of the “divisor” is to allow comparisons to be made of the values of all of the criteria. The values of each criterion divided by the divisor are in a range between 0 and 1. Therefore, the divisor value for the specific criterion equals the maximum possible value for the relevant criterion. Although our method can apply weighting to each criterion, this is not used in the present research; in other words, we do not differentiate between, for example, the impact of the location of a station and the existence of parking.

The proposed set of criteria is preliminary and was developed based on an analysis of the available data for the case study (see Section 3). All perceived differences in the analyzed stations became the basis for formulating the criteria, as well as the means of their quantification. The purpose of the conducted research was also to test the validity of the proposed research method. Further research involving a larger railway network is planned; this will allow us to redefine the set of criteria and thus improve the proposed research method.

The LOS information is intended for various management, planning, and design units, both in the field of railway infrastructure and urban and rural spatial development infrastructure. These entities could use LOS information to:

- undertake the proper development of urbanized areas and the transport systems serving them,
- improve quality of life,
- limit the harmful impact of human activity on the natural environment,
- promote sustainable development.
- The LOS measure can be used to:
 - assess the need or effect of balancing regions in terms of the attractiveness of their public transport system services (different regions at the same time),
 - assess the effect of improving the attractiveness of regions serving public transport systems over the years (the same region in different periods).

The higher the value of the LOS index, the more attractive a given station is to a traveler. Therefore, it is not about determining preferences, i.e., which railway stations is most likely to be chosen by the passenger, but rather, about determining the probability that a traveler will decide to use public transport. The method applied for the identification of LOS is explained in the example in Section 3.

3. Case Study

3.1. Description of the Case Study Area

The official division of Poland does not include regional units called “agglomerations”. However, there are administrative divisions between main cities and several surrounding areas. In selected studies, the term “functional area of a city” is used. Such an area has been defined, for example, for Wrocław [35]. The term “Wrocław agglomeration” (AW) refers here to groups of territorial units around Wrocław and Wrocław itself as the core city of the agglomeration. This is an area slightly different from that described in [35] but of a similar size. AW comprises 27 communes (plus Wrocław). This area has just over 1 million inhabitants, of which over 630,000 reside in Wrocław. The agglomeration is well recognized in terms of traffic conditions, transport networks, sustainable development, and the phenomenon of urban sprawl [40–43]. Suburban rail and its effects are also studied [38].

Figure 6 shows the AW railway network (green lines). One line, distinguished by the dotted line, is planned for reactivation. All existing stations outside Wrocław and selected stations in the city are marked on this network. The bigger stations with interregional train stops have been highlighted as squares. The attempt presented here to define the boundaries of AW is based on the range of a potential agglomeration railway with a distance of 25–30 km from the center. This distance translates into a journey time by train not exceeding 30 min. It is possible to get to the railway stations by other means of transport (including buses) within a combined travel range (including connection time) not exceeding 1 h.

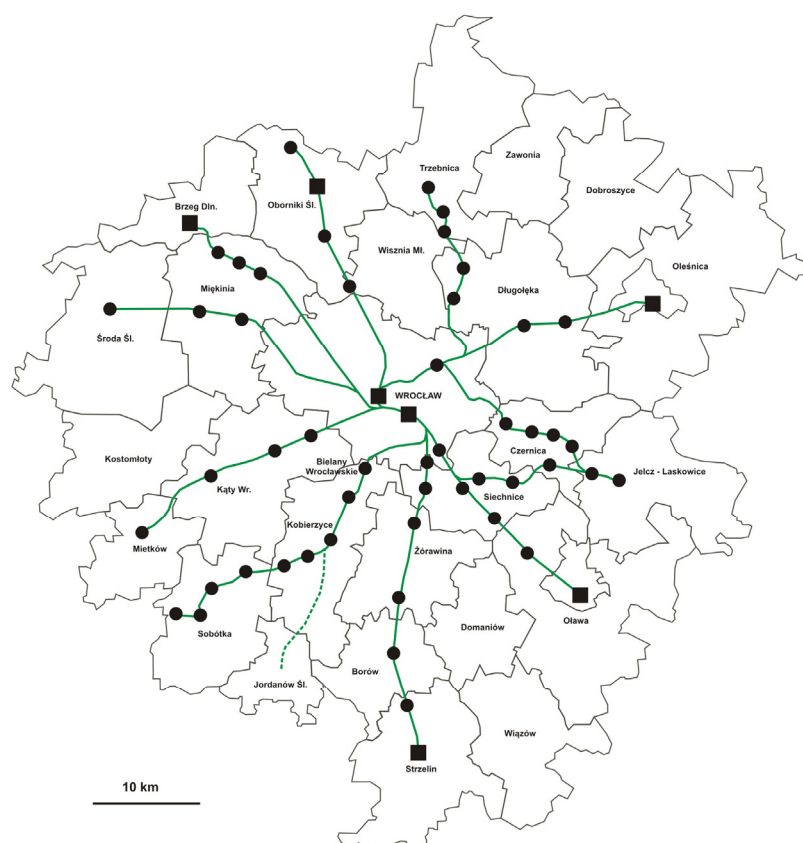


Figure 6. Agglomeration of Wrocław.

Apart from Wrocław, commune centers or powiat administrations have been marked (giving their names). Additionally, the station in Bielany Wrocławskie was distinguished, as it is a place that services a very extensive suburban area (residential, commercial, and service/industrial), as well as the southern housing estates of Wrocław. The proximity of

the economic zone with a huge traffic generator in the form of LG plants and their partners also speaks in favor of such a location for a mobility node.

The above list should also include a mobility node at the (currently non-existent) Wrocław Lotnisko station. Since the identification of new sections of railway lines (which will undoubtedly necessary in the future) has been abandoned, potential mobility nodes within such sections have not been indicated here.

The selected connections in the AW area were chosen for further analysis, using the data presented in [38]. There is a group of two lines connecting the city of Jelcz–Laskowice with Wrocław (Figure 7). The detailed classification of nodes as a case study concerns precisely these alternative combinations.



Figure 7. Study area subject to detailed analyses. The symbols are explained in the text.

3.2. Classification of Mobility Nodes

As an example of the use of the proposed methodology, two lines in the Wrocław agglomeration connecting Wrocław Główny and Jelcz–Laskowice with different routes were selected: via Wrocław Sołtysowice, i.e., line D70, or via Wrocław Brochów, i.e., line D7 (Figure 7). This figure presents railway lines (thick black and blue), numbers of stations (corresponding with the list in Table 2), and the names of the most important stations.

The next analysis involves the sections of these lines with smaller stations, i.e., for the D70 line from Wrocław Sołtysowice to the end of the route and for the D7 line from Wrocław Brochów to the end of the route (distinguished by a thick blue line). A synthesis of the analysis results is presented in Table 2. Detailed data and calculation results are included in the Supplementary Material, Table S1.

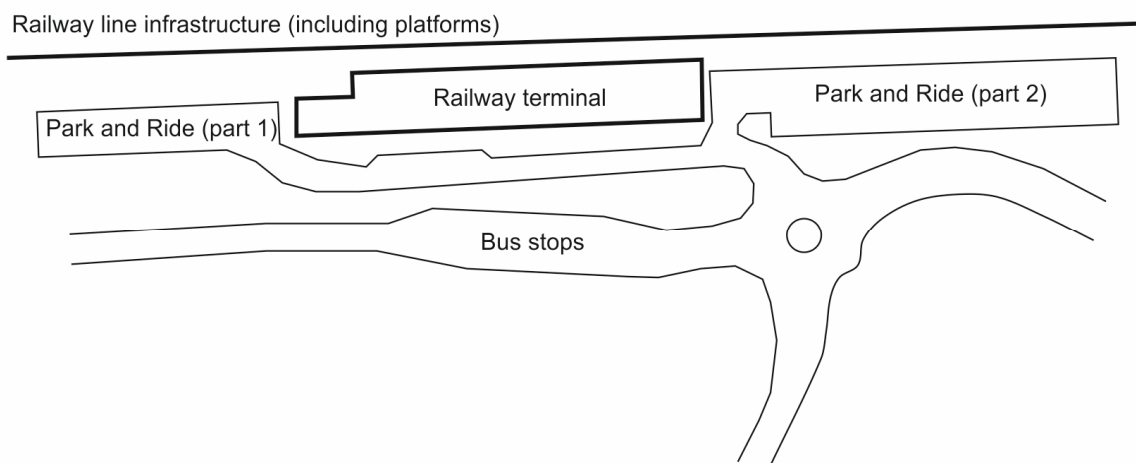
Although the present research focuses on small stations, the calculations also include larger stations in Wrocław. This allowed us to compare and show the differences in LOS between the bigger and smaller stations. The identified LOS is higher in the towns than in the villages. However, the locations of smaller stations can yield different LOS values. This is the effect of placing more or less emphasis upon specific objects and activities. A plan to add selected elements is needed to enlarge the LOS value for a selected location.

Table 2. Identified LOS in the case study area—synthesis of the results.

Number of Station	Name of Station	LOS
1	Wrocław Główny	8
2	Wrocław Mikołajów	7
3	Wrocław Szczepin	5
4	Wrocław Nadodrze	6
5	Wrocław Sołtysowice	5
6	Wrocław Kowale	4
7	Wrocław Popiele	4
8	Wrocław Swojczyce	5
9	Wrocław Strachocin	4
10	Wrocław Wojnów	5
11	Wrocław Wojnów Wsch.	5
12	Dobrzykowice Wr.	5
13	Nadolice Małe	4
14	Nadolice Wielkie	4
15	Chrzastawa Mała	4
16	Wrocław Brochów	7
17	Siechnice	6
18	Zakrzów Kotowice	3
19	Czernica Wrocławska	5
20	Jelcz Miłoszyce	6
21	Jelcz-Laskowice	7

3.3. Exemplary Solution for Small Rail Station

Figure 8 shows the possibilities of shaping the infrastructure of mobility nodes as transfer stops (17—Siechnice). This example shows the “minimum program”, i.e., a specific condition necessary to shape a mobility node, namely, a functional transfer node integrating rail and road transport with the use of facilities such as “Park and Ride” or “Bike and Ride” car parks and a number of bus stops. The railway terminal in the station building is not yet open but creates opportunities to establish various services there.

**Figure 8.** Plan of a node in station 17 (Siechnice).

It is possible to add elements complementing a transfer node in order that it resembles a mobility node. As part of the “terminal” replacing a former railway station building, a wide range of services can be introduced, including the location of selected departments of the municipal office or expansions, e.g., a shopping mall. The quality and scope of impact of the mobility node will be determined not only by the “transfer” program but also by the created services, culture, and administration facilities. Today, the LOS of station 17 in Siechnice is 6, but the addition of new elements could increase this value.

4. Discussion

Ten criteria to evaluate LOS for mobility nodes are assumed in the presented method. These are initially set considering selected aspects but not all possible points of view. For example, the criteria connecting “the range of the offer” were not considered. The reason for such simplification is the changeability of the offer. The suburban rail system in AW is being developed, and the number of lines is increasing. Today’s offer is still too small but could be higher in the near future. Therefore, the present stage of the method concentrates more on “spatial” factors. Despite this simplification, the proposed method could be useful to evaluate the mobility nodes and identify better ones or others which would benefit from development. The potential impact of different factors will be studied in the future.

The proposed method ranks nodes on a scale from 1 to 10, with the best ones being assigned a value of 10 and the worst ones a value of 2 or less (theoretical arithmetical value). In the presented case, the smaller stations in the “blue” sections are evaluated in the range between 3 (18. Zakrzów Kotowice) and 7 (21. Jelcz—Laskowice). The differences are the result of the effect of the used components of the method and the local circumstances that influence the values in the criteria. This shows the usefulness of the method in identifying and evaluating nodes. The presented concept can be used to formulate plans for the development of nodes, as presented in the example, i.e., station 17—Siechnice. More broadly, the proposed methodology could be useful to plan new nodes with a high LOS from the outset.

The mobility needs of the physically disabled were not highlighted in this study. It is assumed that all railway stations have an obligation to meet the needs of this group. In Poland, stations are obligated to provide:

- access to the station (including platforms) and the ability to move around it without having to climb stairs (i.e., with elevators and ramps)
- the possibility of getting on and off trains without having to climb steps (i.e., high platforms, leveling the platform level with the entrance to the interior of the train)
- sufficiently wide pedestrian traffic infrastructure (including doors on trains), i.e., not smaller than the gauge of a person in a wheelchair.

5. Conclusions

The authors of [34] argued that the concentration of services and buildings in the vicinity of interchange nodes (main stations) encourages people to live close to public transport and “opens up” many destinations via this mode of transport. In addition, a transfer station is an important point of contact between passengers and the transport system. By appropriately shaping information, one can influence travelers, i.e., by showing them the advantages of a particular means of traveling, it is possible to encourage them to use such a service more frequently and influence their family and friends to do likewise. Conversely, a poorly developed junction causes frustration and may contribute to the general public abandoning public transport.

Mobility nodes have great potential to help transform agglomerations and strengthen local transport policies, bringing about a balance in transport systems. The nodes will become centers of activity; they will attract people from a large area through reliable and efficient transport. This is only possible if there are committed private sector partners, successful integration of land use and transport planning, decisive action, and a shared vision for the future. However, not only large stations have the potential to be mobility nodes; smaller ones located outside the core city in an agglomeration can and should be a form of “mobility mode” with a smaller size but with similar additional services for travelers.

The authors of [34] mention a number of advantages of mobility nodes, including the potential to improve the efficiency of the entire transport system, to generate a return on investment, and to attract business, investments, and developers. Mobility nodes should be present at all stations in an agglomeration’s rail system.

The creation of transfer junctions concerns the supply side of transport. It is important to create a functional place to change between routes which are sometimes served by different means of transport. Transfer junctions are mainly accompanied by transport-related facilities, such as waiting rooms, ticket sales points, and information points. The mobility node, on the other hand, offers a wider range of activities not related only to transport functions. Services (in a broad sense) enhance the attractiveness of the place where transfers are made. The concentration of activity in such a place means that there is no need to use a car when traveling to shops, offices, cinemas, recreation places, etc. Thus, creating mobility nodes influences communication behavior and moderates the demand side of a transport system. Therefore, it seems that the issue of locating and shaping mobility nodes goes beyond traditional spatial planning. Moreover, there is a visible need to integrate the planning of transport systems with the overall urban or agglomeration activities.

Railway stations located either in large cities or in poviat and communes are presented with a genuine opportunity for revitalization. Renovations consisting not only of upgrades to buildings, platforms and the squares in front of stations, but also of restoring stations to their former function as the main center of activity, services and administration can be undertaken. The concentration of activities in a place with good public transport services will be beneficial for railways, local governments, and the general public by promoting environmentally friendly and economically rational forms of transport.

Although the utility of the proposed method has been shown, the selected elements of the evaluation of mobility nodes in smaller stations should be enhanced. The proposed methodology will be tested in other locations (other lines in AW and in other cities). This could lead to the modification of the applied factors. Notably, factors considering the range of the offer should be added. The components of the calculation procedure with consideration of the role of the weight applied to each factor will also be tested.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/su15032106/s1>, Table S1: details of calculations of LOS in the case study area.

Author Contributions: All of the listed elements (conceptualization; methodology; software; validation; formal analysis; investigation; resources; data curation; writing—original draft preparation; writing—review and editing; visualization; supervision) were jointly developed by both authors, M.K. and J.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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